10 - Menopause And Osteoporosis

Gyan - Vahini

From

FOGSI, Food Drugs & Medicosurgical Equipment Committee October - 2025

Dr. Asha Jain

Editor & Chairperson, FOGSI FDMSE Committee

Message From Dr. Sunita Tandulwadkar

Dr. Sunita Tandulwadkar

President FOGSI-2025

As President of FOGSI, I take great pride in witnessing the steady academic growth within our organisation. Initiatives such as this monthly e-magazine reflect FOGSI's commitment to continuous learning, dissemination of evidence-based knowledge, and a strong focus on preventive health.

This October edition, themed **Menopause and Osteoporosis**, brings attention to two vital aspects of women's health that deserve our sustained focus. As life expectancy increases, the quality of life in the post-reproductive years becomes a key measure of overall healthcare success. It is our duty as gynaecologists to ensure that every woman transitions through midlife with comfort, dignity, and scientific guidance.

I congratulate **Dr. Asha Jain**, Chairperson, Food, Drugs and Medicosurgical Equipment Committee, and her dedicated team for their sustained effort in creating content that is relevant, practical, and rooted in Indian realities. Each chapter in this issue blends clinical depth with preventive perspective—a true reflection of the FOGSI spirit.

Let us continue to take forward our mission of **"Health for Every Woman, at Every Age."** Through education, innovation, and empathy, we can make preventive obstetrics and gynaecology the new standard of care across India.

Dr. Sunita Tandulwadkar
President, FOGSI

Message from Dr Abha Singh

Dr. Abha Singh
Vice President FOGSI-2025

Dear Fogsians, Greetings !

Menopause is a pivotal phase in a women's life. It is marked by significant physiological transition in her life- one that brings not only symptomatic changes but also long term implications for bone health. Decline in estrogen hormone during the menopausal period

accelarates bone resorption thus making postmenopausal women vulnerable to osteoporosis , fragility fractures and other morbidities including hot flashes , urogenital symptoms ,mood swings and loss of sleep.
Early recognition of osteoporosis by screening in perimenopausal period by bone mineral density assessment and prophylactic management can prevent these complications.

Emphasis should be on screening and life style interventionssuch as adequate calcium with Vit D intake , prevention strategies to reduce fracture risk by weight – bearing exercises and fall.

As clinicians our responsibility extends beyond diagnosis to advocacy- promoting awareness, empowering women with knowledge , and ensuring access to effective therapeutic options. This edition of e- magazine on menopause and osteoporosis under the guidance of Dr Asha Jain and FDMSEC team highlights the current perspectives and advances in understanding of menopause and osteoporosis. It also reinforces our collective commitment to improve Women's health across her lifespan and building a generation of healthier and stronger women.
Wishing all the members a Merry Christmas and a Happy New Year!

Dr Abha Singh
VP FOGSI (North)

Message from Dr Suvarna Khadilkar

Dr. Suvarna Khadilkar
Secretary General FOGSI-2025

FOGSI continues to strengthen its academic foundations through structured, evidence-based, and practice-oriented publications. This issue on **Menopause and Osteoporosis** highlights our collective commitment to preventive women's healthcare.

With longer life spans and changing lifestyles, the need for awareness on post-reproductive health is greater than ever. The topics in this edition—from hormonal and non-hormonal therapies to bone density interpretation and fracture prevention—address the real challenges faced by clinicians in day-to-day practice. I, as the Chair of the Menopause Committee of FIGO, conducted a seminar on "Musculoskeletal Diseases in Women beyond Menopause" in October, 2025 at Cape Town in the FIGO Conference.

I commend **Dr. Asha Jain**, Chairperson of FDMSEC, and her enthusiastic team of contributors for curating another high-quality issue that blends academic clarity with clinical relevance. Such focused initiatives not only educate but also unify FOGSI members under a shared vision of scientific excellence.

Let us continue to spread awareness, encourage early screening, and foster proactive care so that menopause and osteoporosis management become integral to women's health programmes at every level.

With best and warm wishes,

Dr. Suvarna Khadilkar
Secretary General, FOGSI

Dr. Asha Jain
Chairperson
FOGSI FDMSE Committee

FOREWORD

Every October, we focus on **Menopause and Osteoporosis**—two milestones that define a woman's midlife health and longevity. This issue reflects our commitment to bringing practical, evidence-based information to every clinician, especially in the Indian setting where awareness still lags behind prevalence.

Menopause is a physiological transition that demands understanding beyond hormones. Emotional balance, cardiovascular fitness, bone health, and mental wellbeing all intertwine during this phase. Osteoporosis, the silent epidemic, often reveals itself only after a fracture —but it can be anticipated, prevented, and managed with timely intervention.

This issue brings together experts who combine clarity with clinical wisdom. My heartfelt thanks to our authors:
Menopause section: Dr. Ruche Bhargava, Dr. Chitra Pandey, Dr. Neetha George, Dr. Monika Gupta, Dr. Jyothi G.S., Dr. Priyanka Rai, Dr. Ginny Gupta, Dr. Urvashi Barman, Dr. Sandhya Rani, and Dr. Padmaja Veeramachaneni.
Osteoporosis section: Dr. Vishnupriya, Dr. Sreedevi Vellanki, Dr. Sugandha Goel, Dr. Sonal Gupta, Dr. M. Chandra, Dr. Deepti Gupta, Dr. Monica Umbardand, Dr. Archana Singh, and Dr. Prabhdeep Kaur.

I sincerely thank our FOGSI leadership—Dr. Sunita Tandulwadkar, President; Dr. Abha Singh, Vice-President; and Dr. Suvarna Khadilkar, Secretary General—for their unwavering support and encouragement.

Let this issue remind us that every midlife consultation is a window for prevention. By merging science with compassion, we can make preventive obstetrics and gynaecology not just an idea, but a routine reality.

Dr. Asha Jain
Chairperson
FOGSI FDMSE Committee

"Know Your Numbers" is an ambitious health initiative.

- This project seeks to gather vital health data- Weight, Blood pressure, Blood Sugar Level with HbA1C, and Hemoglobin level -from women across India.
- By focusing on these key health indicators, the project aims to foster a proactive health management culture among women.
- The data collected will be instrumental in identifying prevalent health issues early and promoting interventions that can significantly reduce the incidence of che diseases.
- This initiative not only emphasizes the importance of regular health monitoring but also strives to empower women with the knowledge and tools needed to take charge of their health, ensuring they lead longer, healthier lives.
- Collect key health data: weight, blood pressure, blood sugar, HbA1C, and hemoglobin from women across India.
- Encourage proactive health management for early identification of prevalent health issues.
- Promote timely interventions to reduce chronic disease incidence.
- Empower women with knowledge and tools for better health and longevity.
- Gather vital health data: weight, blood pressure, blood sugar (HbA1C), and haemoglobin levels from women across India.
- Foster proactive health management among women.
- Identify prevalent health issues early and promote timely interventions.
- Reduce the incidence of chronic diseases through regular monitoring.
- Empower women with knowledge and tools for healthier, longer lives.

SURVEY FOR KNOW YOUR NUMBER (KYN) PROJECT

KNOW YOUR NUMBER

FOGSI FOOD DRUGS & MEDICOSURGICAL EQUIPMENT COMMITTEE

ADVISORS

Dr. Narendra Malhotra
Past President Fogsi

Dr P C Mahapatra
Past President Fogsi

Dr Rishma Pai
Past President Fogsi

Dr Jaydeep Tank
Imm. Past President

Dr Ashok Khurana
Patron Society of SFM

Dr Ragini Agrawal
Past VP Fogsi

Dr, Rajendra Singh Pardeshi
Past VP Fogsi

Dr. Ameya Purandare
Joint Treasurer

Dr Vidya Thobbi
VP Elect Fogsi

Dr Ritu Khanna
Past CP FDMSEC

COMMITTEE - MEMBERS

Dr Arati Kulkarni
Aurangabad MH

Dr Archana Singh
Hyderabad Telangana

Dr Chitra Pandey
Prayagraj UP

Dr Dolly Mehra
Ratlam MP

Dr Durgadas Asranna
Tumkur Karnataka

Dr E S Usha
Erode TN

Dr Ginny Gupta
Ludhiana Punjab

Dr Himleena Gautam
Assam

Dr Jyothi GS
Bangalore Karnataka

Dr Kiran Chhabra
Delhi

Dr M Chandra Ponnusami
Namakkal Tamil Nadu

Dr Neetha George
Thrissur Kerala

Dr Nidhi Bajaj
Katni MP

Dr Okram Sarda Devi
Imphal Manipur

Dr.Padmaja Veeramachaneni
Vijayawada

Dr Prabhdeep Kaur
Bhilai CG

Dr Prerna Saigal
Pathankot Punjab

Dr Priyanka Rai
Deoghar Jharkhand

Dr Ragweshwar Jyoti Mahajan
Shimla Himanchal Pradesh

Dr Renu Jain
Gwalior

Dr Rimpi Singla
Chandigarh

Dr Ruche Bhargava
Jalandhar Punjab

Dr Sandhyarani Panigrahi
Berhampur Odisha

Dr Sarita Kumari
Jamshedpur Jharkhand

Dr Shikha Sachan
Varanasi UP

Dr Sonal Gupta
Faridabad Hariyana

Dr Sreedevi Vellanki
Vijaywada AP

Dr Sugandha Goel
Jodhpur Rajasthan

Dr Sujaysri Sangita
Bhimavaram AP

Dr Urvashi Barman Singh
Prayagraj UP

Dr Vandana Gupta
Delhi

Dr Vishnu Priya
Bangalore Karnataka

(PART - A) INDEX- MENOPAUSE

01

What Really Happens In Perimenopause And Menopause

Author - Dr. Ruche Bhargava
MD, D.N.B Jalandhar

Climacteric is the phase of the aging process during which a woman passes from the reproductive to the non reproductive stage. The signals that this period of life have been reached are referred to as " climacteric symptoms" Perimenopause,or menopausal transition refers to that part of the climacteric before the menopause occurs when the menstrual cycle is likely to be irregular and when other climacteric symptoms or complaints may be experienced.The menopause is the final menstruation(FMP) ,which occurs during the climacteric.

Post menopause refers to the phase of life that comes after menopause.
Menopause usually ocurrs between the ages of 47-51 years.In India the average age is around 46 years, with average age lower in rural population compared to urban population.

To develop a more functional staging system of reproductive aging, the Stages of Reproductive Aging Workshop (STRAW)was held in 2001.

STRAW (2001) MENOPAUSAL STAGING

Stages of reproductive aging workshop members considered a number of potential components of a staging system : menstrual cycle, hormonal factors, fertility, sign and symptoms in other organ systems and uterine and ovarian anatomy.

The anchor for the staging system is the final menstrual period (FMP).Prior to the FMP, there are 5 stages. The age range and duration for each of these stages are variable.

On September 20 and 21,2011, a workshop was held in Washington to address the unfinished agenda of menopausal staging started 10 years back in 2001

i.e. STRAW +10 . It added more supportive criteria using endocrinologic parameters (FSH) and antimullerian hormone(AMH),Inhibin B,and antral follicle count(AFC).

PATHOGENESIS

The hormonal characteristics of this transitional phase are of special interest and importance.The irregular episodes of vaginal bleeding in premenopausal women represent the irregular maturation of ovarian foliicles with or without evidence of ovulation.The potential for hormone secretion by the remaining follicles is diminished.

Transitional phase of menstrual irregularity is not one of marked oestrogen deficiency. High level of FSH appears to stimulate residual follicles to secrete bursts of estradiol. Occasionally estradiol level will rise to concentrations 2 to 3 times higher than is normally seen,probably reflecting the recruitment of more than 1 follicle for ovulation. This may be followed by corpus luteum formation, often with limited secretion of progesterone. Because the episodes of follicular maturation and vaginal bleeding are widely spread, premenstrual women may be exposed to persistentoestrogen stimulation of the endometrium in the absence of regular cyclic progesterone.

At birth ,there are approximately 1-2 million oocytes, and by puberty this number is reduced to 300,000 -500,000.Continued reduction in the number occurs during the reproductive yearsthrough ovulation and atresia. Nearly all oocytes vanish by atresia with only 400-500 actually being ovulated.

Menopause apparently occurs in human female because of two processes. First,oocytes responsive to gonadotropins disappear from the ovary,and the second, the few remaining oocytes do not respond to gonadotropins.

Changes in hormone metabolism associated with menopause

After menopause there are major changes in androgen,oestrogen,progesterone, and gonadotropin secretion,much of which occurs because of cessation of ovarian follicular activity.

1.ANDROGENS

In post menopausal women, the mean plasma androstenedione concentration is reduced by half.
Plasma testosterone levels are only slightly reduced.
Plasma DHEA and DHEAS levels are decreased .

2.Estrogen

In post menopausal women ,estradiol level falls.
Estrone levels falls though not as much as estradiol.

3.PROGESTERONE

In post menopausal women progesterone level falls due to loss of follicular activity.

4.GONADOTROPINS

In postmenopausal women both the levels of FSH and LH rise substantially due to absence of negative feedback of ovarian steroids and inhibin on gonadotropins.

Menopausal status classification is important to clinicians treating midlife women who need to be able to identify perimenopausal women in order to counsel them accordingly.

REFERENCES

1. Harlow SD,Gass M,Hall JE,et al :ferti steril .2012:97(4):843-51

02 Vasomotor Symptoms: Nonhormonal & Hormonal Options - How To Choose

Author: Dr. Chitra Pandey
M.D. FICOG, Consultant- Obs. & Gynae.
And Director Harsh Hospital, Prayagraj

INTRODUCTION

With increasing life expectancy, significant proportion of womenspend nearly one third of their life in postmenopausal period. This physiological transition is often accompanied by several symptoms among which vasomotor symptoms (VMS) are most common and distressing, significantly affecting sleep, mood, productivity and quality of life. While menopausal hormone therapy (MHT) remains the gold standard for symptom relief, nonhormonal therapies play a vital role for women who are unable or unwilling to use hormones.

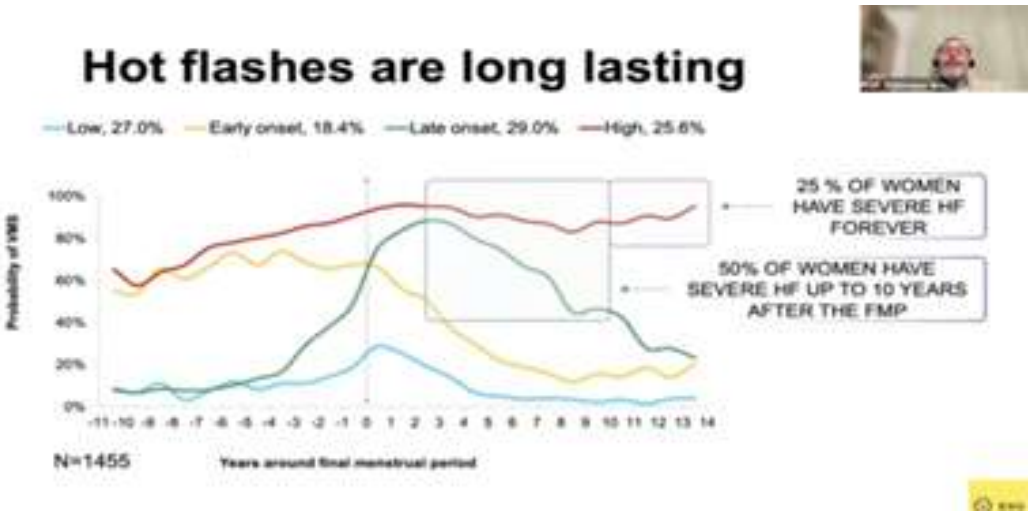
VASOMOTOR SYMPTOMS OF MENOPAUSE

Vasomotor Symptoms- hot flashes, night sweats and general sweating are hallmark of Peri and postmenopausal period.

Hot Flashes are characterised by sudden sensation of heat centred on the upper chest and face that rapidly becomes generalised often associated with profuse perspiration, palpitations, chills and a feeling of anxiety.

INCIDENCE AND DURATION

Vasomotor symptoms are experienced by 70 to 80% of women during the menopausal transition and may persist for several years. VMS Can start 2-3 years before menopause and may last for 7 years on an average(ref-1). In 25% of cases symptoms can persist for 10 - 14 years. Frequency varies from less than one each day to as many as one per hour during the day and night.



VMS CLASSIFICCATION

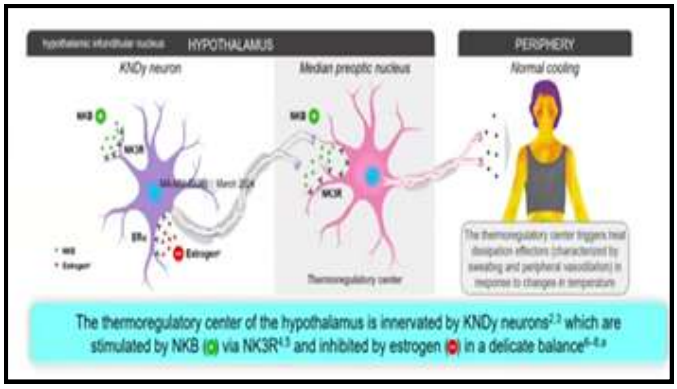
MILD: A sensation of heat without sweating that does not interfere with activity or sleep.

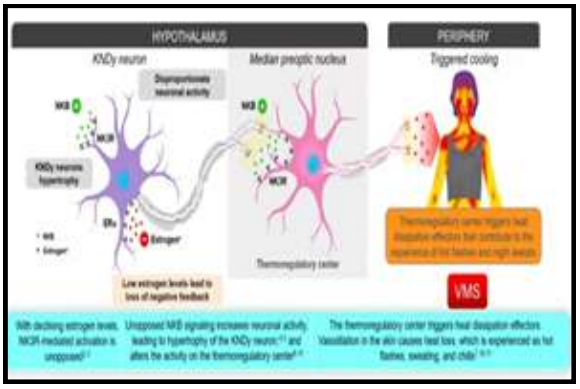
MODERATE: A sensation of heat accompanied by sweating which may cause some discomfort and interfere with daily activities or sleep.

SEVERE: Intense heat with profuse sweating which causes interruption of activities and sleep often with palpitations, irritability or anxiety.

PATHOPHYSIOLOGY OF VMS

Estrogen Withdrawal alone does not explain the cause of VMS. The thermoregulatory Centre of the hypothalamus is innervated by KNDy (Kisseptin ,Neurokinin B and Dynorphin) neurons which play a central role in both regulation of GnRH pulsatility and thermoregulation. These neurons are stimulated by NKB and inhibited by oestrogen.





Due to declining oestrogen levels NK3R mediated activation is unopposed and NKB signalling increases neuronal activity leading to hypertrophy of KNDy9 neurons and alters the activity of the thermoregulatory centrewhich triggers heat dissipation by vasodilatation in the skin which is experienced as hot flashes, sweating and chills.

IMPLICATIONS OF VMS

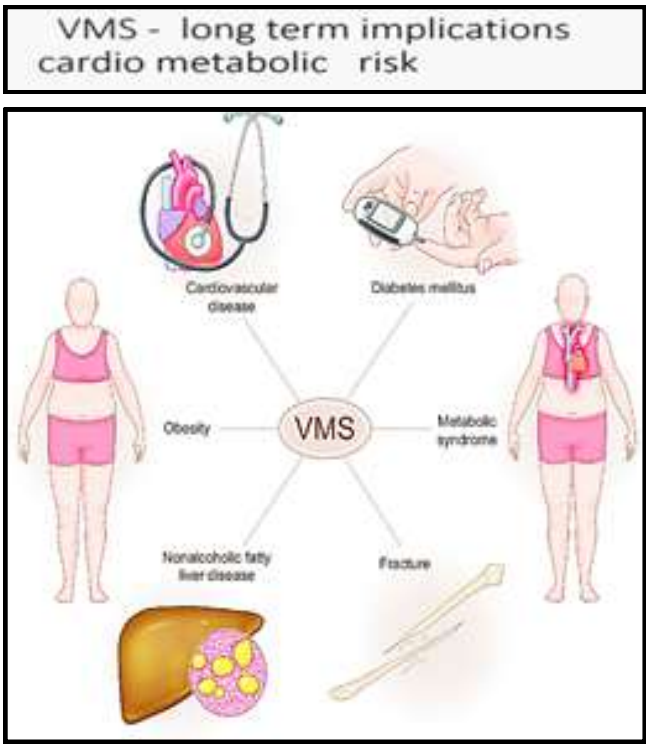
Short term implications

- Anxiety, Irritability and depressive symptoms
- Sleep disturbances: Insomnia, fragmented sleep ,Sleep apnea syndrome
- Mood swings: Emotional lability can lead to depression in severe cases
- Cognitive deficits
- Quality of life impairment
- Sexual dysfunction

Long term implications

VMS are biomarkers of impaired cardiometabolic conditions. Presence And severity of VMS is associated with increased risk of

- Metabolic syndrome
- Insulin resistance
- Nonalcoholic fatty liver disease (NAFLD)
- Hypertension
- Coronary heart disease : Subclinical cardiovascular disease can be predicted by carotid artery intima media thickening and aortic calcification.Various studies have emphasized Menopausal transition as critical window for implementing early intervention strategies to reduce CVD risk (ref-2)



MANAGEMENT OF VASOMOTOR SYMPTOMS

NONPHARMACOLOGICAL OPTIONS

LIFESTYLE MODIFICATION

- Avoiding triggers
- Sleep Hygiene
- Diet and nutrition
- Exercise
- Stress management

ALTERNATIVE THERAPIES

- Mind body therapies
- Cognitive-Behavioral therapy and Clinical Hypnosis are recommended as alternative therapy by North American Menopause Society(ref-3)
- Herbal supplements
- Acupuncture

PHARMACOLOGICAL OPTION

MENOPAUSAL HORMONE THERAPY (MHT)

MHT is the most effective and evidence based treatment for relief of VMS reducing hot flashes frequency by 75 - 90% and severity by 90%.

MHT helps by restoring oestrogen lavels and maintains thermoregulatory stability by modulating serotonin and norepinephrine activity in the hypothalamus.

TYPES OF MHT

- **ESTROGEN THERAPY**: 17 betra Estradiol 1mg or 2mg, CEE.625mg, Estradiol Valerate,Ethinyl estradiol
- **COMBINED ESTROGEN-PROGESTOGEN THERAPY**: In Patients with intact uterus Natural micronized progesterone 100mg, 200mg or Dydrogesterone 10 mg combined with estrogen to prevent endometrial hyperplasia and carcinoma
- In patients without uterus continuous estradiol Can be given, starting with 1 mg and increased to 2mg if not relieved.
- Routes- oral, transdermals patches , topical gels/lotions are available in different strength and delivery system, subcutaneous implants and vaginal rings
- Transdermal estrogen is less likely to produce VTE, stroke and CAD.

TYPE OF ESTROGENS

Estrogens	Standards Doses
Conjugated Equine Estrogens (CEE)-oral	0.625 mg
17β-Estradiol (Oral)	2 mg
17β-Estradiol (Transdermal Patch)	0.05 mg
17β-Estradiol (Transdermal Gel)	1.5 mg
Estradiol Valerate (Oral)	1 mg

TYPE OF PROGESTOGENS

Progestogens	Standards Doses
Natural Micronized Progesterone	Oral-200/Vaginal 100 mg
Dydrogesterone	5 mg
Levonorgestrel	0.02 mg

TIBOLONE

- A synthetic steroid with week estrogenic, progestogenic and androgenic action
- Alternative to estrogen for hot flashes when estrogen is contraindicated
- Dose – 2.5 mg /day

TISSUE-SELECTIVE ESTROGEN COMPLEX (TSEC)

- Innovative treatment combining CEE (.45mg) and a selective estrogen receptor modulator, bazedoxifene-BZA (20mg)
- CEE+BZA is effective in treating VMS and bone loss.

DURATION OF THERAPY

- Principal is to use the lowest effective dose for the shortest duration.
- Duration Is individualized according to symptoms persistence and risk profile.
- Discontinuation can be tried every 12months in prolonged uses.

NONHORMONAL TREATMENT

Nonhormonal therapies are suitable for :

- Women who would prefer not to take hormones
- Women with contraindications or at increased risk to MHT

- Age 60yrs or more
- Menopause onset > 10 years prior
- History of breast cancer
- Hormone dependent cancers
- Cardiovascular disease
- Active liver disease
- Undiagnosed vaginal bleeding
- DVT or VT

NONHORMONAL MEDICATIONS

- Selective Serotonin Reuptake Inhibitors
- Serotonin Norepinephrine Reuptake Inhibitors
- Gabapentinoids
- Clonidine
- Neurokinin 3 Receptor Antagonist
- Stellate Ganglion Block

SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRI)
SEROTONIN NOR EPINEPHRINE REUPTAKE INHIBITORS (SNRI)

These drugs are most effective alternative of hormonal therapy and alleviate the VMS by 50 to 60%.

MECHANISM OF ACTION: These drugs modulate neurotransmitters Serotonin and noradrenaline thereby stabilising hypothalamic signalling and Widening to thermoneutral zone thus reducing hot flashes and night sweats.

SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRI)

SSRIs Increase serotonin availability in the synaptic cleft by inhibiting its reuptake thus improving thermoregulatory stability.

SSRI Escitalopram and Paroxetine and SNRI Venlafaxine are proven to be most effective.

A low dose paroxetine salt 7.5 mg /day is FDA approved for the treatment of moderate to severe VMS along with improvement in sleep without weight gain or negative effect on libido.

CONTRAINDICATIONS: Prior Neuroleptic syndrome, serotonin syndrome and concurrent use of monoamine oxidase inhibitors

CAUTION: Patients with uncontrolled seizures, bipolar disorders, kidney or liver insufficiency, hyponatremia.

ADVERSE EFFECTS:

- Nausea, dizziness, fatigue, insomnia
- Sexual dysfunction, weight changes
- Drug interactions: Paroxetine Inhibit CYP2D6, decreasing conversion of tamoxifen to its active metabolite and should be avoided in breast cancer patients.

SEROTONIN-NOREPINEPHRINE REUPTAKE INHIBITORS (SNRI)

SNRIs Inhibit the re uptake of neurotransmitters serotonin and nor epinephrine in Presynaptic neurons providing dual modulation of thermoregulation.

Venlafaxine is preferred in breast cancer patients while Duloxetine is useful for women with concurrent mood disorders or musculoskeletal pain.

CONTRAINDICATIONS: Heart disease, uncontrolled hypertension and electrolyte imbalance, used with caution in liver diseases.

DURATION OF THERAPY

Therapy should be continued for at least 6-12 weeks to excess full efficacy. Long term uses are safe.

GABAPENTINOIDS

MECHANISM OF ACTION

Gabapentinoids (Gabapentine and Pregabaline) are structural analogues of gamma aminobutyric acid (GABA) and modulate neurotransmitters (Glutamate, norepinephrine and substance P) and stabilize neuronal excitability in the hypothalamus and broaden the thermoneutral zone.

ADVANTAGE

- Preferred when sleep disturbance or neuropathic pain coexist with VMS
- Useful in breast cancer survivors receiving tamoxifen or aromatase inhibitors.

SIDE EFFECTS:

Dizziness, fatigue, unsteadiness and peripheral edema

CLONIDINE

Clonidine is a centrally active alpha-2 adrenergic agonist. It Is less effective than SSRIs, SNRIs and gabapentin in reducing VMS.

Clonidine is not recommended by NAMS, IMS and other societies but licenced in UK for hot flashes.

OXYBUTYNIN

It Is an antimuscarinic, anticholinergic therapy used for the treatment of overactive bladder and urinary urge incontinence.

Oxybutynin Significantly improved moderate to severe VMS in postmenopausal women. Long term use may be associated with cognitive decline.

FEZOLINETANT NEUROKININ B ANTAGONIST (NK3RA)

Fezolinetant is first-in-class neurokinin B antagonist that is FDA approved For management of moderate to severe VMS.

It regulates body temperature by blocking NKB signaling and decreasing the activity of KNDy neurons .

ADVERSE EFFECTS: It can cause severe liver damage and LFT should be monitored before starting and every 3 months thereafter.

DOSES OF NON-HORMONAL MEDICATIONS

SSRIs (Selective Serotonin Reuptake Inhibitors)

- Escitalopram 10 to 20mgs/day
- Paroxetine salt 7.5 mg/day
- Paroxetine 10 to 25 mg/day
- Citalopram 10 to 20 mg/day

SSRIs (Serotonin-Norepinephrine Reuptake Inhibitors)

- Desvenlafaxine 100 to 150 mg/day (start at 25 to 50 mg/day)
- Venlafaxine 37.5 to 150 mg/day (start at 37.5 mg/day)
- Duloxetine 30 to 60 mg/day

Gabapentin (Gabapentenoid)

- 900 to 2400 mg/day in divided doses (start with 100 to 300 mg at night, add 300 mg at night, then add morning dose of 300 mg)

Clonidine

- 25 mcg twice daily for 2 weeks, increased up to a maximum of 50 mcg three time a day

Fezolinetant-Neurokinin B antagonist

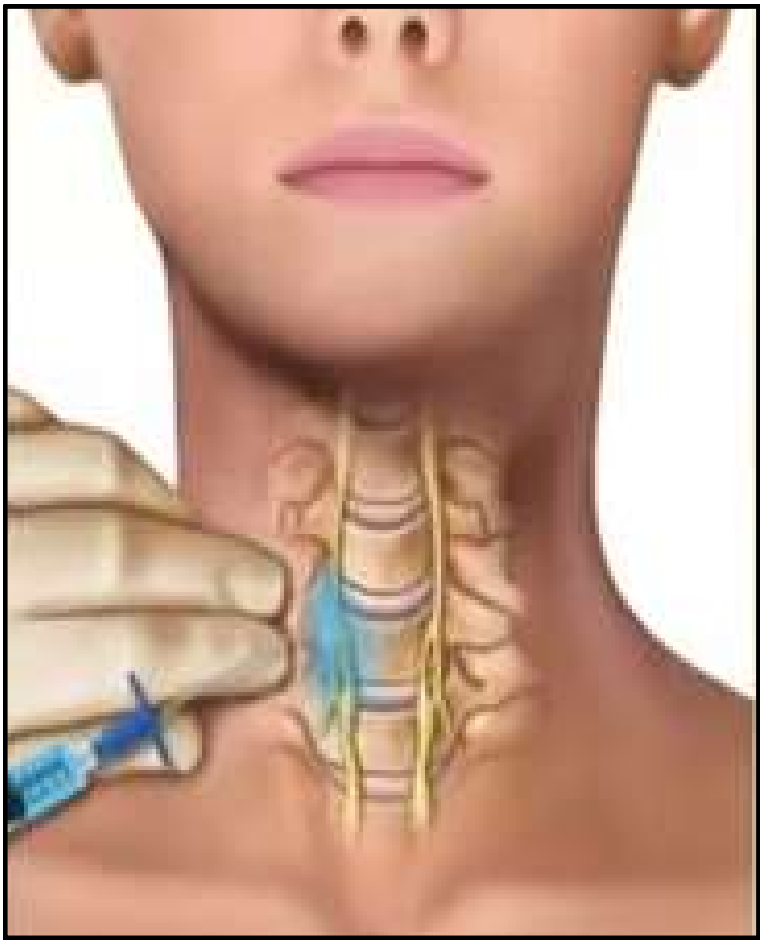
- 45 mg/day

Oxybutynin (Antimuscarinic Anticholinergic)

- 2.5 to 5.0 mg twice daily or 15 mg extended release daily

STELLATE GANGLION BLOCK

It is a new technique in the management of hot flashes and includes local anaesthetic injection in the stellate ganglion. It acts through sympathetic inhibition and central modulation of thermoregulation. Advantages are rapid relief of symptoms, prolonged duration, improved sleep and repeatability. It can be tried in patients



- refractory to other treatments
- women with breast cancer

HOW TO CHOOSE THE TREATMENT IN VMS

Holistic management-Lifestyle modification, mind body therapy, alternative therapies

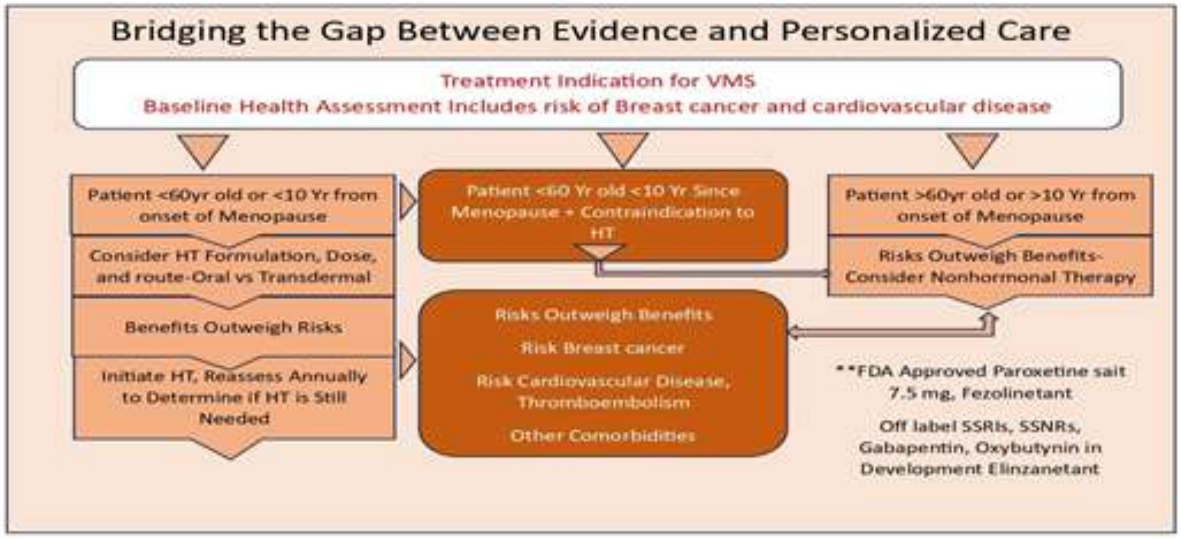
MILD VMS – Lifestyle changes only

MODERATE TO SEVERE VMS –

- Age < 60 yrs or <10 yrs of menopause
- No risk factors
- patient willing to take hormonal treatment: Low dose Estrogen with or without progesterone

If estrogen is contraindicated -Nonhormonal treatment such as SSRIs and SNRIs (Paroxetine,Citalopram,Escitalopram) are first line drugs

Women with predominantly night-time symptoms - Gabapentin



CONCLUSION

Vasomotor symptoms and precocity and severity of hot flashes are markers of future health risk like CVD.

Menopausal hormone therapy is most effective therapy for VMS, if contraindicated many nonhormonal options are available.

Fezolinetant-NK3 receptor antagonist is novel nonhormonal option for moderate to severe VMS and other emerging interventions like stellate ganglion block offer valuable alternatives.

An individualized, evidence-based treatment on the basis of informed choices and regular monitoring ensures safe management of VMS.

REFRENCES

Ref 1. JAMA Intern Med.2015;175(4):531-539

Ref 2. Samar R.El Khoudary et al statement from the Anerican Heart Association

Ref-3.Menopause 30(6):p 573-590,June 2023 NAMS nonhormone therapy position statement

Ref-4. NAMS 2022 Position statement on hormonal therapy

----------xxxxx----------

03 Genitourinary Syndrome Of Menopause

Author - DR.NEETHA GEORGE MS
DGO FMAS FICO Diploma in lap,hysteroscopy,urogynaec(Kiel),Assoc. Prof in OBG ,JMMC ,Thrissur ,Kerala

Genitourinary syndrome of menopause (GSM),(vaginal atrophy, vulvovaginal atrophy, urogenital atrophy, or atrophic vaginitis) is defined as a collection of symptoms and signs caused by hypoestrogenic changes to the labia majora/minora, clitoris, vestibule/introitus, vagina, urethra, and bladder that occur in menopausal patients. Group of symptoms include vaginal pain, vaginal dryness, itching, pain during sexual intercourse and fragile vaginal tissues as well as urinary symptoms including urinary frequency, urgency, incontinence, haematuria and recurrent urinary tract infections that occur due to a lack of the hormone estrogen.

ETIOLOGY

1.GSM occurs primarily in patients who are peri- or postmenopausal. Conditions or medications that induce a transient or chronic hypoestrogenic state can also cause atrophic vaginal changes - Natural menopause,Bilateral oophorectomy,Primary ovarian insufficiency.

2.Ovarian failure due to radiation therapy, chemotherapy, or an adverse consequence of uterine artery embolization; these may be temporary or permanent.

3. Premenopausal use of medications with antiestrogenic effects, such as tamoxifen, aromatase inhibitors, danazol, medroxyprogesterone acetate, gonadotropin-releasing hormone agonists (eg, leuprolide, nafarelin, goserelin) or antagonists (eg, ganirelix).

4.Postpartum reduction in estrogen production, particularly during lactation. Prolactin elevation due to hypothalamic-pituitary disorders with secondary reduction of estrogen secretion by the ovary.

5.Hypothalamic amenorrhea or amenorrhea in severe systemic lupus erythematosus or rheumatoid arthritis (due to hypothalamic hypogonadism or primary ovarian insufficiency) combined with glucocorticoid therapy – The combined suppression of ovarian and adrenal activity (loss of adrenal androstenedione reduces estradiol synthesized through extraovarian aromatization) results in extremely low estradiol levels.

6. Transgender women with a neovagina. Individuals who have undergone penile inversion vaginoplasty do not have any mucus-producing glands in the neovagina.

By contrast, those who have undergone colovaginoplasty will experience mucus production, but not in response to sexual stimulation.

7.Factors other than low estrogen and possibly diminished androgen levels can modulate the degree of vulvovaginal atrophy or the severity of symptoms-vaginal nulliparity or vaginal surgery may intensify vaginal atrophy symptoms .Abstinence from sexual activity appears to exacerbate atrophic changes whereas sexual activity helps preserve the vaginal epithelium, presumably by increasing blood flow and tissue elasticity.

8.Cigarette smoking causes relative estrogen deficiency and may reduce vaginal perfusion

9. Patients with depression and urinary incontinence may be more likely to report distressing vulvovaginal atrophy symptoms that more negatively impact their quality of life, including their sexual functioning. With urinary incontinence, this may be due to chronic perineal pad use .

CLINICAL PRESENTATION

Vulvovaginal dryness -Decreased vaginal lubrication during sexual activity, Dyspareunia, including vulvar or vaginal pain (at the introitus or within the vagina)
Vulvar or vaginal bleeding (eg, postcoital bleeding, labial fissures)
Decreased arousal, orgasm, or sexual desire
Vulvovaginal burning, irritation, or itching
Vaginal discharge (leukorrhea); thick, yellow, or malodorous vaginal discharge may be a sign of infection and requires evaluation

Levator spasm

Urinary tract symptoms (eg, urinary frequency, urinary urgency, dysuria, urethral discomfort, hematuria, recurrent urinary tract infections)

Urethral prolapse/caruncle

Symptoms accompanying vaginal atrophy are usually progressive and worsen as with duration of hypoestrogenism. Early in the menopause transition, patients may notice a slight decrease in vaginal lubrication upon sexual arousal, which is often one of the first signs of estrogen insufficiency. As the hypoestrogenic state becomes chronic, additional symptoms may be reported by the patient, including a sensation of vaginal dryness during daily activities, not necessarily during sexual activity (the most common symptom), and other symptoms may develop.

EVALUATION

The evaluation for GSM typically includes both a medical history and a pelvic examination. Laboratory testing is not typically required.

A medical history should include the obstetric and gynecologic history, including menstrual history, assess menopausal status and evaluate for etiologies of low estrogen other than menopause. The clinician should ask about response to any previous interventions. A complete review of systems should be performed, as urogenital symptoms may be due to etiologies other than loss of estrogen. A pertinent sexual history, including a history of sexual trauma, should be taken to evaluate whether the symptoms adversely impact sexual activity and cause distress.

The clinician should ask about painful vulvar symptoms, symptoms that may be associated with infection or inflammatory conditions (as part of a differential diagnosis), as well as use of products that may be irritants or result in allergic reactions (eg, perfumes, powders, panty liners, soaps, deodorants, spermicides, lubricants, tight clothing). This should also include a history of pelvic radiation. Quality of life issues should also be assessed; these include degree of discomfort, behavioral responses to symptoms, as well as the impact of symptoms on daily activities, sexual activity, and partner relationships.

The clinician should ask about the patient's therapeutic goals. Patients who are not having vaginal intercourse due to pain or discomfort should be asked if this is something they would like to be able to have in the future, recognizing that there are often multiple factors (eg, relationship status, aging, partner sexual dysfunction, lack of interest) that affect this decision.

Pelvic examination

Labia minora resorption or fusion
Tissue fragility/fissures/petechiae Introital retraction Loss of hymenal remnants
Prominence of urethral meatus, Urethral eversion or prolapse, Vulvovaginal pallor/erythema.
Loss of vaginal rugae
Decreased vulvovaginal secretions/lubrication, Decreased elasticity
Vaginal discharge that is thin, white, and nonodorous
Spasm of levator muscles on palpation of the posterior fourchette
The external genitalia are examined and may show scarce pubic hair, diminished elasticity, and turgor of the vulvar skin; introital narrowing or decreased moisture; and fusion or resorption of the labia minora,

Exclude lichen sclerosus when there are structural changes like fused labia minora and loss of the clitoral hood. Loss of the labial fat pad gives the labia majora a pendulous appearance and makes the labia minora less distinct and/or makes the clitoris appear more protuberant. A urethral caruncle may be present and appear as proliferative red tissue at the opening of the urethra. Urethral prolapse or polyps may also occur.

In patients with severe atrophic changes, exercise caution when performing the speculum and bimanual examinations as even gentle contact can cause pain and bleeding. Levator spasm may make insertion of a gloved finger too uncomfortable; instead of a two-finger pelvic exam, a one-finger gloved examination is often better tolerated by the patient.

A lubricated narrow speculum is also usually most comfortable. Thus, among metal speculums, a Pederson is usually chosen rather than a Graves speculum . Rectal examination or transabdominal pelvic ultrasound may allow evaluation of uterus and organs when the vagina is too stenotic.

EUA

When an office examination cannot be comfortably completed and is deemed essential before management can begin, and an adequate ultrasound that excludes pathology is not possible, an examination under anesthesia may be necessary. Classic vaginal findings of atrophy include a pale, dry vaginal epithelium that is smooth and shiny with loss of most rugation. If inflammation is present, there may be patchy erythema, petechiae, blood vessels visible through the thinned epithelium, friability, bleeding, and discharge. The vagina may be shortened, narrowed, and poorly distensible. The cervix may become flush with the vault, and it may be difficult to identify the cervix or the cervical os. The vaginal fornices may become obliterated. The urethra is often prominent due to loss of collagen support and eversion of urethral mucosa may occur.

Laboratory tests

are usually not necessary for the diagnosis and evaluation of GSM, other than for exclusion of other etiologies under consideration

Vaginal pH – The pH of an estrogenized vagina is acidic, typically in the range of 4 to 4.5. Vaginal pH may reach levels of 5.5 to 6.8 or higher in postmenopausal patients, especially those who are not on estrogen therapy . Thus, a pH of ≥5 in the absence of other causes (eg, infection, semen in setting of recent intercourse) can be an indicator of vaginal atrophy due to estrogen deficiency.

Maturation index – The maturation index is the proportion of parabasal, intermediate, and superficial cells in each 100 cells counted on a smear of the upper two-thirds of the vagina. It is used to quantify the proportions of cell types of the vaginal epithelium. In premenopausal patients with adequate estrogen levels, intermediate and superficial cells predominate. The maturation index for these patients is typically 40 to 70 intermediate cells, 30 to 60 superficial cells, and 0 parabasal cells. In patients with vaginal atrophy, an increase in parabasal cells and a decrease in superficial cells are observed.

If vaginitis is suspected, microscopy or other testing should be performed. Yeast or clue cells may indicate need for treatment. If urinary tract infection is suspected, this should be evaluated as appropriate.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis – The differential diagnosis of GSM includes etiologies, other than loss of estrogen, that lead to urogenital symptoms such as: vaginitis; vulvar lichen sclerosus; vulvovaginal lichen planus; vulvar contact or irritant dermatitis; genital ulcers or fissures due to herpes lesions or systemic disease; genital tract bleeding due to trauma, infection, or malignancy; or urinary tract infection.

TREATMENT OPTIONS

1.Non-hormonal therapies

Often the first line of treatment for mild symptoms, or used in combination with hormonal therapy.

Vaginal lubricants: Used during sexual activity to reduce friction and discomfort.

Vaginal moisturizers: Applied regularly to increase moisture and improve tissue hydration.

Pelvic floor physical therapy: Can help with urinary symptoms and painful intercourse.

Sexual activity: Increases blood flow to the vagina, which can help maintain tissue health.

Vaginal dilators: Devices used to stretch and lengthen the vaginal canal.

2.Hormonal therapies

For moderate to severe symptoms, hormonal therapies are highly effective.

Local vaginal estrogen: Low-dose estrogen delivered directly to the vagina via creams, tablets, or rings is the "gold standard" for treating GSM. It provides effective relief with minimal systemic absorption.

Oral ospemifene: A non-estrogen oral medication that acts on estrogen receptors in vaginal tissue, specifically to treat painful intercourse.

Vaginal prasterone (DHEA): A vaginal insert that is converted into estrogen and testosterone within the vaginal cells.

Emerging therapies

Laser and radiofrequency therapy: These non-hormonal, in-office procedures use heat to stimulate tissue repair and collagen production.

. Laser has potential for three groups of women: 1. those for whom vaginal estrogens have failed, 2. those for whom vaginal estrogens, vaginal dehydroepi androsterone and ospemifene are contraindicated or less desirable compared with a non- hormonal therapy, such as those undergoing active treatment for breast cancer3. those who decline vaginal estrogens or other options. Further research and RCTs are necessary to evaluate and establish the long- term efficacy and safety of this technology before it can be

recommended for the management of GSM. The Er:YAG laser was approved by the Canadian FDA in August 2019 for use in 'GSM and stress urinary incontinence'. The most common adverse effects are: vaginal discharge (4%); oedema (3.4%); pain – during treatment only (1.4%); and pinpoint bleeding (1.2%). Symptoms are not long lasting and subside after 2 weeks.

REFERENCES

1. US Food and Drug Administration [cited 22 Apr 2021]. Available from: https://www.fda.gov/medic al- devic es/safet y- commu nicat ions/ fda- warns - again st- use- energ y- based - devic es- perfo rm- vagin al- rejuv enati on- or- vagin al- cosmetic

2. Lensen S, Archer D, Bell RJ, et al. A core outcome set for vasomotor symptoms associated with menopause: the COMMA (Core Outcomes in Menopause) global initiative. Menopause 2021; 28:852.

3. Lensen S, Bell RJ, Carpenter JS, et al. A core outcome set for genitourinary symptoms associated with menopause: the COMMA (Core Outcomes in Menopause) global initiative. Menopause 2021; 28:859.

4. The NAMS 2020 GSM Position Statement Editorial Panel. The 2020 genitourinary syndrome of menopause position statement of The North American Menopause Society. Menopause 2020; 27:976

5. SIP 27 Laser treatment for GSM

----------XXXX----------

04 Sleep, Mood, and Cognition in Midlife

Author-- Dr. Monika Gupta
West Zone Coordinator,
PAC committee FOGSI

Co- Author-- Dr Dipika Loganey
Senior Consultant OBGYN
Fortis Hospital Delhi

Introduction

The menopausal transition marks a pivotal neuroendocrine transition marked by dynamic fluctuations in estrogen and progesterone levels.While vasomotor symptoms(VMS) remain the most recognized manifestations, disturbances in sleep, mood, and cognition often dominate women's lived experience of midlife. Up to 40–60%of women report insomnia or poor sleep quality during the menopause transition (NAMS, 2023). Beyond inconvenience, sleep loss in this period carries significant metabolic, cardiovascular, and neuropsychological consequences.

Sleep disruption is not an isolated symptom; it frequently coexists with anxiety, depressive disorders, and cognitive complaints such as forgetfulness and impaired concentration—collectively described as the "insomnia–mood–cognition triad." This triad is cyclical: poor sleep exacerbates mood disturbance, which further-fragments sleep and diminishes cognitive clarity. For gynecologists, who often serve as the primary clinicians for midlife women, understanding and addressing this interplay is essential for comprehensive care.

Prevalence and ClinicalSignificance of Sleep Disturbance

Table 1. Causes and Mechanisms of Sleep Disturbance during the Menopausal Transition

Contributing Factor	Mechanism	Clinical Implication
Fluctuating estrogen & progesterone	Altered thermoregulation; neurotransmitter modulation	Night sweats, hot flashes, sleep fragmentation
Vasomotor symptoms (VMS)	Temporal association between hot flashes and arousals	Frequent nocturnal awakenings

Mood disorders (anxiety/depression)	Heightened arousal; cortisol dysregulation	Difficulty initiating and maintaining sleep
Age-related comorbidities	OSA, RLS, chronic pain	Secondary insomnia; non-restorative sleep
Lifestyle & psychosocial stressors	Caregiving, occupational strain, irregular routines	Poor sleep hygiene; insomnia perpetuation

Sleep complaints sharply increase during the menopausal transition. Population-based studies, including the SWAN (Study of Women's Health Across the Nation) cohort, report that nearly two- thirds of perimenopausal women experience poor sleep quality,compared with less than one-third of premenopausal peers. Polysomnographic studies reveal a reduction in total sleep time by approximately 40–50 minutes and increased nocturnal awakenings in menopausal women with insomnia.

The etiology of sleep disturbance in menopause is multifactorial. Fluctuating estrogen and progesterone levels influence thermoregulation and neurotransmitter systems involved in sleep regulation. Vasomotor symptoms—especially nocturnal hot flashes—are a primary cause of sleep fragmentation. Objectiverecordings demonstrate temporalassociation between hot flash episodes and arousals. Moreover, age-related comorbidities such as obesity, obstructive sleep apnea (OSA), and restless legs syndrome (RLS) contribute to chronic insomnia in this demographic.

Clinically, the impactof insomnia extendsfar beyond fatigue.Persistent sleep loss is associated with reduced cognitive performance, impaired executive function, mood dysregulation, and increased cardiometabolic risk.A multicenter randomized controlled trial (RCT) demonstrated that addressing insomnia in postmenopausal women led to marked improvements in daytime alertness, mood stability, and occupational functioning. Untreated insomnia, conversely, perpetuates a vicious cycle of daytime dysfunction and diminished stress resilience.

Mood Disorders in Midlife:Bidirectional Links with Sleep

Depression and anxiety peak in prevalence during midlife, paralleling the menopausal transition. Epidemiologic data suggest that up to one-third of perimenopausal and postmenopausal women experience depressive symptoms, and over half report significant anxiety. The hormonal milieu—particularly fluctuating estradiol levels—modulates serotonergic and noradrenergic neurotransmission, heightening vulnerability to affective disorders. Psychosocial stressors common to midlife (caregiving, occupational strain, health anxieties) further compound risk.

Sleep disturbance is both a symptom and a precipitant of mood disorders. NAMS recognizes sleep disturbance as a core symptom of clinical depression in menopause. Conversely, insomnia independently predictsthe onset or relapse of depressive episodes.SWAN data indicatethat women with persistent insomnia exhibit higher scores on depression and anxiety scales, and that sleep impairment mediates the association between vasomotor symptoms and mood disturbance.

From a clinical standpoint, a woman presenting with nocturnal awakenings, night sweats, and fatigue may be experiencing overlapping phenomena—vasomotor instability, insomnia, and mood dysregulation. Therefore, clinical assessment should be integrated. Treating depressive or anxiety symptoms often improves sleep quality, while alleviation of insomnia enhances mood. Therapies targeting vasomotor symptoms (e.g., hormone therapy, SSRIs/SNRIs) may indirectly improve both sleep and affective well-being.

Cognitive Complaints and "Brain Fog"

Subjective cognitive complaints are frequentamong perimenopausal women.Terms such as "forgetfulness," "poor concentration," and "brain fog" are commonlyused descriptors. Objective

cognitive testing in longitudinal studies reveals mild, transient reductions in verbal memory and processing speed duringthe perimenopausal phase,with recovery post-menopause. This pattern supports a transient, reversible phenomenon rather than neurodegenerative decline.

The pathophysiology is multifactorial. Estrogen has neuroprotective effects via modulation of cholinergic, serotonergic, and dopaminergic pathways and promotion of synaptic plasticity in the hippocampus and prefrontal cortex. However, recent findings emphasize the role of indirect mediators—particularly sleep disruption and mood disturbance. In SWAN analyses,sleep quality and depressive symptoms were stronger predictors of cognitive performance than hormonal levels.

In an Indian cohort study of 404 midlife women, depressive symptom severity correlated inversely with Mini-Mental State Examination (MMSE)scores, while hot flash frequencyshowed no significant association. Thus, cognitive complaints often reflect the downstream consequences of poor sleep and affective dysregulation rather than intrinsic neurodegeneration. Reassurance, coupled with correction of modifiable factors (sleep, stress, depression), is central to management.

The Insomnia–Mood–Cognition Triad

Table 2. The Insomnia–Mood–Cognition Triad:Clinical Features and Interconnections

Domain	Typical Clinical Features	Bidirectional Interactions
Sleep disturbance	Insomnia, frequent awakenings, non-restorative sleep	Worsens mood; impairs cognitive efficiency
Mood disturbance	Irritability, anxiety, depressive symptoms	Disrupts sleep continuity; reduces cognitive control
Cognitive dysfunction	Forgetfulness, poor focus, 'brain fog'	Heightened by poor sleep and low mood

The interconnection among insomnia, mood disturbance, and cognitive dysfunction constitutes a self-reinforcing cycle. Insomnia induces neuroendocrine and inflammatory changes that exacerbate anxiety and depression; these, in turn, heighten arousal and perpetuate sleeplessness. Cognitive inefficiency arises from impaired prefrontal and hippocampal functioning secondary to chronicsleep deprivation and mood dysregulation.

Clinically, this triad manifests as fatigue, irritability, emotional lability, and subjective cognitive decline. Recognizing this pattern is key— intervening at any single node (e.g., sleep) can yield improvements across domains. This reinforces the rationale for integrated, multidisciplinary care rather than symptom-specific interventions.

Cognitive-Behavioral Therapyfor Insomnia (CBT-I):The First-Line Treatment

All major guidelines—including those from the American Collegeof Physicians (ACP,2016), American Academy of Sleep Medicine (AASM, 2021), and the North American Menopause Society (NAMS, 2023)—recommend CBT-I as the first-line therapy for chronic insomnia. CBT-I is a structured, evidence-based intervention addressing the behavioral and cognitive perpetuators of insomnia without pharmacologic dependence.

Core Components of CBT-I

1.Sleep Restriction: Limiting time in bed to the actual averagesleep duration to enhance homeostatic sleep drive and consolidate sleep.

2.Stimulus Control: Reinforcing bed–sleep association by instructing patients to use the bed only for sleep and intimacy, and to leave it if unable to fall asleep within 10 minutes.

3.Cognitive Restructuring: Identifying and challenging maladaptive beliefs aboutsleep (e.g., catastrophizing consequences of poor sleep).

4.Sleep Hygiene Education: Establishing consistent sleep–wake schedules, limiting caffeine/alcohol, and creating a conducive sleep environment.

5.Relaxation Training: Incorporating progressive muscle relaxation, mindfulness, or diaphragmatic breathing to reduce pre-sleep arousal.

Efficacy Evidence

Meta-analyses of over 20 randomized controlled trials demonstrate that CBT-I reduces sleep latency by approximately 20 minutes, decreases wake time after sleep onset by 25 minutes, and increases sleep efficiency by 10%, with sustained benefitsup to one year. Importantly, the therapeutic gains of CBT-I equal or surpass those of hypnotic agents without tolerance, dependence, or cognitive side effects.

CBT-I in Midlife Women

Menopause-specific trials confirmits efficacy. In an RCT of 150 postmenopausal womenwith chronic insomnia, eight sessions of CBT-I significantly improved sleep quality, fatigue, and daytime functioning compared with sleep hygiene education alone. The benefits persisted at six months.

Notably,CBT-I also improvedemotional resilience and reduced perceivedstress.

The Menopause Strategies: Finding Lasting Answers for Symptoms and Health (MsFLASH) pooled analysis compared CBT-I, pharmacotherapy (SSRIs/SNRIs, gabapentin), yoga, and exercise. CBT-I yieldedthe largest reduction in insomnia severityindex (−5.2 points) and the greatest improvement in sleep quality indices. Exercise and low-dose venlafaxine showed modest benefits; estrogen therapy and yoga were least effective. These findings affirm CBT-I as the most robust nonpharmacologic therapy for midlife insomnia.

Even when deliveredremotely—via telephone or online modules—CBT-I remains effective, makingit practical for community and telehealth settings. For gynecologists, initiating or referring patients for CBT-I represents an evidence-based, durable solution.

Pharmacologic Management: Indications and Considerations

Table 3. Evidence-Based Management of Insomnia in Midlife Women

Approach	Core Elements / Examples	Key Advantages	Cautions
Non-pharmacologic (First-line)	CBT-I: Sleep restriction; stimulus control; cognitive restructuring; relaxation	Most effective; durable; no dependence	Requires adherence & trained facilitator
Adjunctive Behavioral	Sleep hygiene; exercise; mindfulness; yoga	Accessible; improves wellbeing	May be insufficient alone in chronic insomnia
Pharmacologic (Short-term)	Z-drugs; low-dose doxepin; melatonin agonists; SSRIs/SNRIs; gabapentin	Rapid symptom relief	Risk of tolerance; sedation; cognitive side effects

While CBT-I remains first-line, pharmacologic therapy has a role in selected cases—severe, refractory, or when behavioral interventions are inaccessible. Medications should be considered adjunctive, short-term measures.

Common Pharmacologic Options

- Benzodiazepine receptor agonists (zolpidem, eszopiclone, zaleplon): Effective for sleep initiation and maintenance but associated with tolerance, dependency, next-day sedation, and falls—especially in older women.
- Ramelteon (melatonin receptor agonist): Safe,non-sedating option for sleep-onset insomnia.
- Low-dose doxepin: Useful for sleep maintenance insomnia; minimal anticholinergic
- effects.
- Trazodone: Widely prescribed off-label, though evidence for efficacy is limited.
- Orexin receptor antagonists (suvorexant, lemborexant): Promising agentsthat promote sleep by inhibiting wake drive; cost and next-day somnolence limit use.
- SSRIs/SNRIs and gabapentin: May indirectly improvesleep by reducinghot flashes and anxiety.

Principles of Use

- Reserve pharmacotherapy for short-term or bridging use.
- Employ the lowest effective dose for the shortest possibleduration.
- Reassess periodically to avoid dependence.
- Avoid benzodiazepines in women >65 years or with fall risk.
- Address comorbid mood disorders concurrently; antidepressants may serve dual purposes.

Risks

All hypnotics carry potential adverse effects—cognitive blunting, next-day sedation, and psychomotor impairment. Continuous long-term use is discouraged. The AASM characterizes most insomnia drugs as "weak recommendations" due to limited long-term safety data.

Gynecologist's Role in Holistic Care

Gynecologists occupy a strategic position in identifying and managing sleep and mood disorders during midlife. Given that many women lack a primarycare provider or psychiatrist, the gynecologic consultation often serves as the first point of contact.

Clinical Responsibilities

1. Screening: Routinely inquire about sleep quality, mood, and cognition during menopause visits.Use validated tools such as the InsomniaSeverity Index (ISI),Patient Health Questionnaire (PHQ-9), and Generalized Anxiety Disorder Scale (GAD-7).
2. Education: Normalizemenopausal symptoms while emphasizing treatability. Explain the rationale and expectations of CBT-I and reinforce behavioral sleep hygiene.
3. Integrated Management: Address contributory factors—vasomotor symptoms, thyroid dysfunction, chronic pain,or psychosocial stress.Hormone therapy, when appropriate, may alleviate vasomotor-driven insomnia.
4. Medication Stewardship: Prescribe hypnotics judiciously; review ongoing need and emphasize discontinuation plans.
5. Interdisciplinary Collaboration: Coordinate with psychologists, sleep medicine specialists, and psychiatrists. For women with significant cognitivecomplaints, consider referralfor neuropsychological assessment.

Gynecologists must also advocate for patient empowerment—providing resources for CBT-I, digital sleep programs, and lifestyle interventions (regular exercise, stress management, diet regulation). Brief counseling during clinic visits can yield substantial long-term benefit.

Integrating Evidenceinto Practice

Implementing sleep and mood screening in gynecology practice can be streamlined through structured questionnaires. A brief two-question screener ("Do you have trouble falling or staying asleep?" and "Do you feel restedafter sleep?") identifies most women needing furtherassessment. Similarly, single-item mood and cognition screens can trigger timely referrals.

Educational materials on sleep hygiene, mindfulness, and relaxation can be incorporated into menopause counseling packages. For resource-limited settings, even partial behavioral interventions—such as stimulus controland relaxation—demonstrate measurable improvements. Telehealth CBT-I modules and guided self-help programs have proven effective, expanding accessibility. Gynecologists can direct patientsto these validated digital options, bridgingthe gap until specialized care is available.

Conclusion

Sleep, mood, and cognitive changes during the menopausal transition are interdependent dimensions of midlife health. Insomnia affects up to two-thirds of women in this stage and contributes to depression, anxiety,and subjective cognitivedecline. Conversely, mood and cognitive disturbances perpetuate sleep disruption.

Evidence strongly supportsCognitive-Behavioral Therapy for Insomnia (CBT-I)as the most effective and sustainable first-line treatment. Pharmacologic options remain secondary, reserved for short- term adjunctive use. Comprehensive management requires gynecologists to screen routinely, educate patients, and collaborate across disciplines.

By adopting an integrated biopsychosocial approach, gynecologists can alleviate the burden of the insomnia–mood–cognition triad, thereby restoring functional vitality and enhancing qualityof life for women navigating the menopausal transition.

References

1.North American Menopause Society.Menopause Practice: A Clinician's Guide. 2023.

2.American College of Physicians. Management of ChronicInsomnia Disorder in Adults: Clinical Practice Guideline. Ann Intern Med. 2016.

3.American Academy of SleepMedicine. Clinical PracticeGuideline for the Pharmacologic Treatment of Chronic Insomnia in Adults. J Clin Sleep Med. 2021.

4.Baker FC et al. “Sleep Disruption during the Menopausal Transition: Mechanisms and Management.” Lancet Neurology. 2018.

5.SWAN Collaborative Group. “Sleep,Mood, and Cognition across the Menopausal Transition.” Sleep Medicine Reviews. 2020.

6.Ensrud KE et al. “CBT-I and Sleep Restriction in Postmenopausal Women:A Randomized Trial.”Sleep. 2018.

7.MsFLASH Research Network. “Comparative Efficacy of Behavioral and Pharmacologic Therapies for Insomnia in Midlife Women.” Menopause. 2019.

8.Freeman EW, Sammel MD. “Depression, Sleep,and Menopause.” JAMA Psychiatry. 2021.

9.Sharma N et al. “Cognitive Functionand Depression amongMenopausal Women: An Indian Perspective.” J Midlife Health. 2022.

10.Kravitz HM et al. “Sleep Disturbance during the Menopausal Transition: A SWAN Analysis.” Sleep. 2017.

----------XXXXX----------

05 Bleeding in the Perimenopause; PALM-COEIN Work-up and Management

Author - Dr. Jyothi G. S.
MBBS, MD OBG, PGDMLE,
FICOG, FICMCH Professor and Head,
Department of Obstetrics & Gynaecology,
Ramaiah Medical College & Hospitals,
Bengaluru 560054

Co- Author - Dr. Kavana. S
MBBS, MS OBG,Senior Resident
Department of Obstetrics and Gynaecology, Ramaiah Medical College and Hospitals, Bengaluru 560054

Bleeding in the Perimenopause: Introduction

Abnormal uterine bleeding (AUB) during the perimenopausal years is one of the most frequent gynecological concerns worldwide. It accounts for nearly one-third of outpatient gynecology consultations among women aged 40–50. The perimenopausal transition, typically lasting four to eight years before menopause, is characterized by fluctuating ovarian function, irregular ovulation, and varying hormone levels. These physiological changes often lead to unpredictable bleeding patterns, which, while frequently benign, can also signal underlying pathology such as polyps, fibroids, endometrial hyperplasia, or carcinoma. Understanding the mechanisms, differential diagnoses, and appropriate evaluation of AUB is crucial for clinicians to provide safe, evidence-based care.

Understanding the FIGO PALM-COEIN Classification

The FIGO PALM-COEIN classification (2011) is now the global standard for categorizing causes of AUB in non-pregnant women of reproductive age. It divides causes into two broad groups—structural (PALM) and non-structural (COEIN)—to guide diagnostic evaluation and management.

- P – Polyp: Localized endometrial or endocervical growths that cause intermenstrual or post-coital spotting.
- A – Adenomyosis: Endometrial glands within the myometrium leading to painful, heavy, regular bleeding.
- L – Leiomyoma (fibroids): Benign smooth muscle tumors causing heavy, prolonged bleeding or pelvic pressure.
- M – Malignancy and Hyperplasia: Endometrial carcinoma or pre-malignant hyperplasia presenting as post-menopausal or persistent irregular bleeding.

The non-structural COEIN group includes:

- C – Coagulopathy: Systemic bleeding disorders (e.g., von Willebrand disease) affecting hemostasis.

- O – Ovulatory dysfunction: Anovulation due to fluctuating hormones during perimenopause.
- E – Endometrial causes: Local endometrial hemostatic imbalance without identifiable lesions.
- I – Iatrogenic: Caused by medications like anticoagulants, hormonal therapy, or intrauterine devices.
- N – Not yet classified: Emerging or unclassified etiologies.

Anovulatory versus Structural Bleeding

Anovulatory cycles are the hallmark of perimenopause and lead to irregular, often heavy bleeding. Estrogen levels fluctuate while progesterone secretion becomes inconsistent due to failed ovulation. This results in unopposed endometrial proliferation and unpredictable shedding. Such bleeding tends to be erratic, with prolonged amenorrhea followed by sudden heavy bleeding episodes.

Structural causes, conversely, involve physical abnormalities within the uterus, such as polyps or fibroids. These typically produce predictable yet heavy menstrual bleeding, intermenstrual spotting, or post-coital bleeding. The distinction is important because management differs—non-structural causes respond well to hormonal therapy, while structural lesions may need surgical correction.

Initial Evaluation and Work-Up

According to NICE NG88 and ACOG Practice Bulletin No. 128, evaluation should begin with a comprehensive clinical history and focused examination. Key elements include menstrual pattern, symptom severity, contraceptive use, comorbidities (such as thyroid disease or diabetes), and medications that affect bleeding.

Physical examination includes a general assessment for pallor or obesity, followed by a pelvic exam to identify uterine enlargement, tenderness, or cervical lesions. Laboratory tests are directed by clinical suspicion:

- **CBC**: Assess for anemia from chronic blood loss.
- **β-hCG**: Rule out pregnancy in reproductive-aged women.
- **TSH and Prolactin**: Evaluate for thyroid dysfunction or hyperprolactinemia.
- **Coagulation profile**: Indicated for suspected bleeding disorders.
- **Endometrial biopsy**: Mandatory for women ≥45 years or younger women with risk factors (obesity, PCOS, chronic anovulation, family history of endometrial cancer).

Imaging forms a cornerstone of evaluation. Transvaginal ultrasonography (TVUS) is the first-line tool for detecting endometrial thickness and focal lesions. If results are inconclusive or focal pathology is suspected, saline infusion sonohysterography (SIS) provides enhanced visualization of the cavity. In cases where imaging suggests intrauterine abnormalities or malignancy, diagnostic hysteroscopy remains the gold standard for both visualization and treatment.

Recognizing Red-Flag Symptoms

Certain bleeding patterns warrant urgent evaluation to rule out malignancy or serious pathology. Clinicians should investigate immediately when encountering:

- Intermenstrual bleeding
- Post-coital bleeding
- Post-menopausal bleeding
- Persistent irregular bleeding in women aged 45 years or older
- Known risk factors for endometrial carcinoma—including obesity, unopposed estrogen exposure, Lynch syndrome, or chronic anovulation.

NICE NG88 recommends prompt endometrial sampling for these presentations regardless of ultrasound findings.

Management Principles: Evidence-Based Interventions

Management depends on cause, symptom severity, comorbidities, and patient preference. Per NICE NG88 and ACOG Committee Opinion No. 557, medical management should always be first-line unless malignancy is suspected or medical therapy fails.

1. Medical Management (First-Line):

- **Levonorgestrel Intrauterine System (LNG-IUS)**: The most effective non-surgical therapy, reducing menstrual blood loss by 70–95%. It provides contraception and endometrial protection, making it ideal for perimenopausal women.
- **Tranexamic Acid**: An antifibrinolytic agent taken during menstruation to reduce bleeding volume; safe for women contraindicated for hormonal therapy.
- **Combined Oral Contraceptives (COCs)**: Regulate cycles, reduce flow, and alleviate perimenopausal symptoms, though contraindicated in smokers over 35 or women with hypertension.
- **Cyclical or Continuous Progestins**: Useful when LNG-IUS is declined or not tolerated. Oral medroxyprogesterone acetate or norethisterone helps restore hormonal balance and reduce bleeding.
- **GnRH analogues**: Considered short-term for refractory bleeding or large fibroids prior to surgery.

2. Procedural and Surgical Options:

For women unresponsive to medical therapy or with structural lesions, procedural options are considered:

- **Endometrial Ablation**: Minimally invasive, appropriate for women who have completed childbearing.
- **Polypectomy/Myomectomy**: Removes focal pathology confirmed on imaging.
- **Uterine Artery Embolization (UAE)**: Effective for symptomatic fibroids in women wishing to avoid hysterectomy.
- **Hysterectomy**: Definitive therapy for refractory cases, adenomyosis, or malignancy. ACOG recommends reserving hysterectomy for women who have failed less invasive treatments.

Unscheduled Bleeding on Hormone Therapy

During perimenopause, many women use hormone therapy (HT) for vasomotor symptoms. ACOG and NICE note that unscheduled bleeding is common in the first 3–6 months after starting HT. However, any bleeding after 6 months on continuous combined therapy or any unexpected change in sequential therapy requires investigation. The recommended approach includes TVUS to measure endometrial thickness, followed by biopsy if the lining exceeds 4 mm.

Counseling, Lifestyle, and Follow-Up

Beyond medical treatment, addressing contributing lifestyle factors enhances outcomes. Clinicians should counsel women on maintaining a healthy weight, limiting alcohol and caffeine, and ensuring adequate iron intake. Stress management, yoga, and regular exercise can improve overall hormonal balance and mood stability. Patient education regarding the natural variability of cycles during perimenopause helps reduce anxiety and encourages adherence to follow-up plans.

Summary Table: Work-Up and Management of Perimenopausal AUB

Step	Key Actions
History & Exam	Assess bleeding pattern, risk factors, medications, and perform pelvic exam.
Labs	CBC, β-hCG, TSH, prolactin, coagulation profile, endometrial biopsy as indicated.

Imaging	TVUS → SIS → Hysteroscopy if focal lesion or inconclusive results.
Medical	LNG-IUS (first-line), tranexamic acid, COCs, progestins, GnRH analogues.
Procedural	Ablation, polypectomy/myomectomy, UAE, hysterectomy if refractory.
Counseling	Address lifestyle, weight, stress, and iron intake; schedule follow-up.
Red Flags	Investigate intermenstrual, post-coital,

Clinical Pearls

- AUB in perimenopause is common but never to be ignored; always exclude malignancy first.
- The PALM-COEIN system simplifies diagnosis and ensures comprehensive evaluation.
- LNG-IUS is the cornerstone therapy for heavy menstrual bleeding and endometrial protection.
- TVUS remains the first-line imaging modality; reserve hysteroscopy for persistent or unclear findings.
- Shared decision-making and patient counseling improve compliance and satisfaction.
- Combine guideline-based management (NICE NG88, ACOG, FIGO) for best outcomes.

Takeaway

Perimenopausal bleeding, though common, requires a systematic and patient-centered approach. By adhering to international standards such as NICE NG88, FIGO PALM-COEIN, and ACOG guidance, clinicians can confidently distinguish benign from serious causes, optimize management, and improve women's quality of life during this transitional stage. Early identification of red-flag symptoms, individualized therapy, and holistic follow-up together form the cornerstone of effective perimenopausal care.

References

1. NICE (2018). Heavy Menstrual Bleeding: Assessment and Management (NG88). National Institute for Health and Care Excellence.

2. Munro MG, Critchley HOD, Broder MS, Fraser IS. (2011). FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in non-gravid women. Int J Gynecol Obstet, 113(1):3-13.

3. ACOG Practice Bulletin No. 128 (2012). Diagnosis of abnormal uterine bleeding in reproductive-aged women. Obstet Gynecol, 120(1):197-206.

4. ACOG Committee Opinion No. 557 (2013). Management of acute abnormal uterine bleeding in nonpregnant reproductive-aged women.

5. ACOG Clinical Consensus (2022). Management of Endometrial Intraepithelial Neoplasia or Atypical Hyperplasia. Obstet Gynecol, 140(4):711-724.

----------XXXXX----------

06

Contraception In The 40s – How/When To Stop

Author - Dr Priyanka Rai
Additional Professor and HOD, Department of Obstetrics and Gynaecology, AIIMS Deoghar, Jharkhand.

Author - Dr Divya M BAdditional Assistant Professor, Department of Obstetrics and Gynaecology, AIIMS Deoghar, Jharkhand.

Introduction

The perimenopausal years represent a transitional phase marked by fluctuating hormonal levels and declining fertility. Middle-aged women who wish to avoid getting pregnant need an effective method of contraception, even when their fertility is declining.The majority of women in this age group who have relationships or are married have vaginal intercourse. However, these populations have unique characteristics that influence their contraceptive choices. Women in their 40s are less likely to encounter contraception failure because they are less sexually active, have lower fecundity, and adhere to their contraceptive regimens more closely. Despite this, nearly one-third of unintended pregnancies in women over 40 occur due to discontinuation or inconsistent contraceptive use. Understanding contraceptive choices and knowing when to discontinue them is therefore critical for safe reproductive planning.

Contraceptive needs and counselling

There is a gradual decline in ovarian reserve and oocyte quality. Ovulation may still occur sporadically until menopause. Perimenopausal irregular cycles do not imply infertility. Contraceptive goals differ from those of younger women, which include a focus on safety, non-contraceptive benefits, and transition to menopause.

- **Should counsel regarding:**
  - Declining fertility but persistent pregnancy risk.
  - Increased risk of chromosomal abnormalities with age.
  - Medical comorbidities (hypertension, diabetes, obesity, thromboembolism, etc.) influencing the choice of contraception.
  - Should reassess method suitability regularly.

Middle-aged women still have the potential to become pregnant, although their fertility declines. If an older woman has no health issues that would prohibit her from using contraception, she can use any form of contraception to prevent unintended births until menopause. Should continue contraception until menopause is confirmed. The choice of contraception depends on comorbidities, preferences, and non-contraceptive benefits. Encourage partner involvement and dual protection if STI risk exists.

Contraceptive options in women more than 40 years

Various types of contraceptive methods include

A. Combined Hormonal Contraceptives (CHCs)

- It prevents the release of eggs from the ovaries.
- Types include pills, patches, and vaginal rings.
- Benefits: cycle regulation, relief of perimenopausal symptoms, and bone protection.
- It helps to protect against pregnancy, endometrial carcinoma, ovarian carcinoma, and symptomatic pelvic inflammatory disease.
- It reduces menstrual cramps, problems related to menstrual bleeding, symptoms of adenomyosis, and endometriosis.
- The failure rate is 3 per 1,000 women.
- Risks: avoid in smokers >35 years, hypertension, thromboembolism risk.
- There are risks of headaches, dizziness, breast tenderness, weight change, and mood changes.

B. Progestin-Only Methods

- It works mainly by thickening of cervical mucus (blocks sperm penetration in the uterine cavity) and disruption of the menstrual cycle, including prevention of ovulation.
- Types include pills, injectables (DMPA), implants, and levonorgestrel intrauterine system (LNG-IUS).
- Suitable for women with estrogen contraindications.
- There can be change in menstrual patterns like frequent, irregular, prolonged, or infrequent bleeding.
- Few side effects include headaches, dizziness, mood changes, breast tenderness, abdominal pain, and nausea.
- According to the WHO's recent updates in 2022, DMPA slightly decreases bone mineral density, and it may increase the risk of developing osteoporosis and fractures of bone later in life.
- The failure rate is 3 per 1,000 women.

C. Intrauterine Devices (Copper IUD, LNG-IUS)

- Highly effective and long-acting.
- The development of a spermicidal intrauterine environment has been suggested to be the mechanism of action for IUDs.
- The Copper and levonorgestrel IUDs are among the most effective contraceptives, better than some sterilization operations in middle-aged women. If STIs protection is not a concern, insertion of a copper and levonorgestrel IUD can provide very effective contraception until menopause.
- LNG-IUS offers the additional benefit of controlling heavy menstrual bleeding.
- LNG-IUS offers contraception and endometrial protection during perimenopause and HRT use.
- IUD-related bacterial infections can occur due to contamination of the endometrial cavity at the time of insertion.

D. Barrier Methods

- Male/female condoms; diaphragms.
- It provides protection against STIs and pelvic inflammatory disease.
- It is less reliable for pregnancy prevention.

E. Permanent Methods

- Tubal ligation or vasectomy (partner).
- Appropriate if the family is complete.
- The failure rate of female sterilization is 5 per 1,000 women over the first year after having the sterilization procedure.

The various types of contraceptive methods and associated risk factors are mentioned in Table 1.

Table 1 – Various contraceptive methods and risk factors

Contraceptive methods	**Risk factors**
1. Combined oral contraceptives	Severe hypertension, smokers, migraine, cardiovascular diseases, risks of cervical cancers

2. Progesterone only – like DMPA	Osteoporosis and chance of fracture of bones later
3. Copper IUCD	Menstrual irregularities
4. Condom	High failure rate

Non-Contraceptive Benefits of Contraceptives in the 40s

- Regulation of irregular or heavy menstrual bleeding.
- Reduction in dysmenorrhea.
- Relief from vasomotor symptoms.
- Decrease in risk of endometrial, ovarian, and colorectal cancers.
- Maintenance of bone density.

When to stop contraception?

According to the WHO 2022, most women experience menopause by the age of 55 years. A middle-aged woman can use any kind of contraception until menopause if she had no medical conditions that would prevent her from using them. The various contraceptive methods and the time to stop are mentioned in Table 2.

Table 2 – Contraceptive methods and time to stop contraception

Contraceptive methods	When to stop?
1. Combined oral contraceptives	50 years
2. Progesterone only – like DMPA	55 years
3. Copper IUCD	Safe up to menopause
4. Hormonal IUCD	Safe up to menopause
5. Condom	Safe up to menopause

Conclusion

Women in their 40s still require effective contraception despite declining fertility. The selection of methods should prioritize safety, convenience, and added health benefits. Discontinuation should be guided by age, menstrual history, and hormonal status. Clear counselling helps ensure a smooth transition from contraception to menopause management. A review of contraceptive methods is essential for women in their 40s.

References

1.Hugh S. Taylor, Lubna Pal, Emre Seli.Speroff's Clinical Gynaecologic Endocrinology and Infertility;9th ed:2020,p2028-2490.

2.Finer LB, Zolna MR, Declines in unintended pregnancy in the United States, 2008–2011, N Engl J Med 374:9, 2016.

3. Herbenick D, Reece M, Schick V, et al. Sexual behaviors, relationships, and perceived health status among adult women in the United States: results from a national probability sample. J Sex Med 2010;7(Suppl 5):277–90

4.Trussell J, Guthrie K. Choosing a contraceptive: efficacy, safety, and personal considerations. In: Hatcher RA, Trussell J, Nelson AL, et al. editors. Contraceptive technology. 20th ed Valley Stream (NY): Ardent Media Inc; 2011. p. 45–74.

5.Black A, Yang Q, Wu Wen S, et al. Contraceptive use among Canadian women of reproductive age: results of a National survey. J Obstet Gynaecol Can 2009;31:627-40.

6.World Health Organization department of sexual and reproductive health and research(WHO/SRH)and Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs(CCP)knowledge success. Family Planning :a global handbook for providers (2022 updates). Baltimore and Geneva:CCP and WHO;2022

7.BilianX, Chinese experience with intrauterine devices, Contraception75:S31,2007

8.Kaunitz AM, Meredith S, Inki P, Kubba A, Sanchez-Ramos L, Levonorgestrel-releasing intrauterine system and endometrial ablation in heavy menstrual bleeding. A systematic review and meta-analysis, Obstet Gynecol 113:1104, 2009.

9.Baldszti E, Wimmer-Puchinger B, Loschke K, Acceptability of the long-term contraceptive levonorgestrel- releasing intrauterine system (Mirena): a 3-yearfollow-up study, Contraception 67:87, 2003.

10.Bahamondes L, Petta CA, Fernandes A, Monteiro I, Use of the levonorgestrel-releasing intrauterine system in women with endometriosis, chronic pelvic pain and dysmenorrhea, Contraception 75:S134, 2007.

11.Bahamondes L, Ribeiro-Huguet P, de Andrade KC, Leon-Martins O, Petta CA, Levonorgestrel- releasing intrauterine system (Mirena) as a therapy for endometrial hyperplasia and carcinoma, Acta Obstet Gynecol Scand 82: 580, 2003

12.French PP, Latka M, Gollub EL, Rogers C, Hoover DR, Stein ZA, Use-effectiveness of the female versus male condom in preventing sexually transmitted disease in women, Sex Transm Dis 30:433, 2003.

13.Expanding choices and ensuring rights in a diverse and changing world: UNFPA Strategy for Family Planning, 2022–2030;p17-18.

14.Barone MA, Nazerali H, Cortes M, Chen-Mok M, Pollack AE, Sokal D, A prospective study of time and number of ejaculations to azoospermia after vasectomy by ligation and excision, J Urol 170:892, 2003.

15.Griffin T, Tooher R, Nowakowski K, Lloyd M, Maddern G, How little is enough? The evidence for post- vasectomy testing, J Urol 174:29, 2005.

----------XXXXX----------

07

Premature Ovarian Insufficiency (POI)

Author-- Dr Ginny Gupta
MBBS, MD, FICOG
(Ex-PGI Chandigarh)

POI is a clinical condition characterised by loss of ovarian function/activity before the age of 40yrs. The clinical features of irregular menstrual cycles are accompanied by biochemical evidence of ovarian failure with elevated gonadotropins and low estradiol.

Women with POI have unique needs and health risks from long term estrogen deficiency. POI effects bone health, cardio vascular health, sexual health, psychological health, neurological and cognitive function, significantly impacting their quality of life (QOL) and actual life span. Living with POI is a challenge for patients and their healthcare providers to meet their specific needs to ensure minimum health standards, life expectancy and QOL.

Causes of POI:
Iatrogenic POI: bilateral oophorectomy before 40 yrs, chemotherapy, pelvic radiations.
Genetic POI: chromosomal FMR1 permutation, Turners syndrome, mosaics
Autoimmune POI: isolated or with multiple endocrine organ failure {autoantibodies}

Idiopathic POI
Management of POI as per guidelines issued in 2024 by **ESHRE/ASRM/CRE-WHiRL** (Centre for Research Excellence in Women's Health in Reproduction Life and IMS) based on collected evidence, formulated and discussed with the guideline development group are summarized below:

The final guideline was built from a list of 40 key questions answered with 4 narrative views and 36 systematic reviews. Integrity review using RIGID METHODOLOGY was performed on 32 RCTs of treatments in POI specific population.

These guidelines aim to help healthcare professionals to apply best practice care for women with POI and cover clinical questions on diagnosis, including multi-system sequelae, general well-being and treatment options including hormone therapy. . Recommendations regarding genetic testing, estrogen doses and regimens, use of contraceptives and testosterone therapy are given.

Thus, provided here is clear advice on best practice in POI care based on data currently available.

THE DIAGNOSIS [and terminology]

Newer data indicates higher prevalence of POI than previously thought: 3.5 % As compared to before only one elevated FSH>25 IU along with irregular menses of at least 4 months is required for diagnosis of POI. Repeat FSH measurement and/or AMH may be required where diagnosis is uncertain.

Diagnose POI as follows

Disordered menses (spontaneous amenorrhea / irregular cycle for at least 4 months) & FSH level more than 25 IU/L [any day of cycle]

Use the term "premature ovarian insufficiency" in clinical practice and research. Make the diagnosis promptly, convey it in a sensitive manner and advocate shared decision making to create the best prescription suitable for every individual case . Thus, patient dissatisfaction and non-adherence to therapy is minimised and so avoiding poor outcomes and wide care variations.

FINAL DEFINITION : POI is a condition defined by loss of ovarian activity before the age of 40 years.

Cessation of ovarian function in women aged 40 yrs to 44 years will be termed : EARLY MENOPAUSE. (Early menopause is not in scope of these guidelines but evidence and recommendations may be relevant and extendable to women with early menopause) When diagnosing POI, pregnancy is to be ruled out . Use of hormonal therapy e.g. oral, injectable, may create irregular menses and need to be stopped before diagnosing POI.

WOMEN WITH BILATERAL OOPHORECTOMY BEFORE 40 YEARS OF AGE HAVE POI & NO ADDITIONAL TESTING IS NECESSARY . AMH or serum estradiol should/need NOT be used as primary diagnostic test for POI.

IDIOPATHIC POI: CHROMOSOMAL ANALYSIS IS RECOMMENDED FOR ALL and if needed additional genetic testing e.g next generation sequencing to identify other genes

FMR1 permutation is recommended for women of all ages in this category.

IDIOPATHIC POI : SCREENING FOR 21- HYDROXYLASE [21OH Abs] autoantibodies to be done.
THYROID STIMULATING HORMONE { TSH } testing to be done at diagnosis in this category and repeated every 5 years.[avoid measuring TPO antibodies]

POI WITH POSITIVE 21OH Abs to get endocrinology referral for adrenal evaluation.
WOMEN WITH GENETIC CAUSE OF POI MUST GET FEMALE RELATIVES COUNSELLED { TESTED FOR SIMILAR GENES } & informed possibility of requiring fertility preservation.

GUIDELINES FOR VARIOUS SEQUELAE OF POI: COUNSELLING AND ADVOCATING THERAPY

LIFE EXPECTANCY IN POI
WITHOUT HORMONE THERAPY POI HAS REDUCED LIFESPAN DUE TO CARDIOVASCUALR DISEASE.
With or without symtoms of estrogen deficiency HT is recommended till natural age of menopause in POI. Healthy lifestyle, avoid smoking, regular physical activity, maintaining healthy weight to be advised.

FERTILITY IN POI
Usually very low chances of natural conception [NIL in surgical POI] RARELY in non surgical POI a natural conception may occur. This category can use contraception if they don't want a conception. No interventions are reliable to increase ovarian activity / natural conception rates in POI.

POI patients can opt for OOCYTE DONATION to achieve pregnancy. Donor oocytes should preferably be taken from non relative [in non iatrogenic POI to avoid transmitting the genetic risks]

IATROGENIC POI : prior to treatment of the malignancy etc consider fertility preservation.

IN WOMEN WITH RISK OF POI : Discuss fertility preservation if possible as per their follicle pool.
Women with POI opting for oocyte donation need assessment of cardiometabolic and thyroid status for ability to carry on a safe pregnancy.

In some women with POI pregnancy may pose serious health risks e.g. in Turners syndrome with cardiac anomaly.

SKELETAL HEALTH IN POI POI

is associated with abnormal bone microarchitecture, reduced bone density ,increased risk of osteoporosis and fracture later in life . Osteoporosis risk to be assessed at diagnosis of POI and in ongoing care. Encourage to adopt a healthylifestyle ,weight bearing exercises ,avoid smoking,healthy diet and weight.

Dietary supplementation of calcium and Vitamin D Hormone Therapy is recommended to maintain bone density and prevent osteoporosis.

DAILY DOSE OF HT WITH AT LEAST 2 mg ORAL ESTRADIOL OR 100mcg transdermal estradiol to optimize bone density. Do not delay initiation of HT and adhere to therapy.

IF COC IS USED THEN CONTINUOUS OR EXTENDED REGIME IS ADVISED TO PROVIDE CONTINUOUS ESTROGEN.

Other therapy like bisphosphonates only from osteoporosis specialist.

BMD USING DEXA TO BE ASSESSED EVERY 1 TO 3 YEARS BASED ON RISK FACTORS.

SCREEN FOR SARCOPENIA AT POI DIAGNOSIS

ADVISE TO PERFORM REGULAR MUSCLE TRAINING ,STRENGTH ,RESISTANCE AND ENDURANCE TO IMROVE AND MAINTAIN MUSCLE MASS ALONG WITH DIETARY PROTIEN.

CARDIOVASCULAR RISKS IN POI

POI patients are at increased risk of cardiovascular ,coronary artery disease ,heart failure and stroke. Women with TURNERS SYNDROME should be evaluated by a cardiologist. Use of estrogen therapy has beneficial cardiometabolic effects and non-use of HT is associated with higher cardiac events and higher mortality from cardiac events.

HT is advised till the usual age of menopause .

LIPID PROFILE AND DIABETES SCREENING TO BE DONE AT DIAGNOSIS OF POI.

Frequency of repeat testing according to previous values and presence of risk factors .

POI AFFECT ON PSYCOLOGICAL WELLBEING AND QOL

ASSESSMENT OF PSYCOLOGICAL HEALTH AND PROVISION OF PERSONALISED CARE,counselling sessions , access to psychiatric services to be provided to all POI patients.

SEXUAL LIFE COSEQUENCES IN POI

POI patients may suffer significant negative impact on sexual well being and function. A sensitive approach ,personalised therapy, use of biopsychosocial model in dealing with sexuality issues is recommended.

Recommended is **TRANSDERMAL TESTOSTERONE THERAPY** in doses that approximate physiological premenopausal levels as it improves hypoactive sexual desire and overall sexual function. Vaginal estrogen therapy will improve dyspareunia in POI. Vaginal moisturisers and lubricants may be combined with HT for vaginal discomfort and dryness.

GENITOURINARY SYMPTOMS OF POI

Systemic estrogen therapy helps but vaginal estrogen will help if systemic therapy does not provide full relief. NO RECOMMENDATION FOR LASER AND THERMAL ENERGY AS standard of care FOR GENITOURINARY SYMPTOMS

COGNITION AND POI POI

IS ASSOCIATED WITH INCREASED RISK OF COGNITIVE IMPAIRMENT AND DEMENTIA

HT IS RECOMMENDED TO PROTECT NEUROLOGICAL FUNCTION even in absence of menopausal symptoms.

Encourage to adopt a healthy lifestyle ,avoid smoking, drug, alcoholism ,fitness and social interactions .

HORMONE THERAPY IN POI : PRINCIPLES AND INDICATIONS

HT IS RECOMMENDED IN WOMEN WITH POI UNTIL THE USUAL AGE OF MENOPAUSE

INDICATION: PRIMARY PREVENTION TO REDUCE RISK OF MORBIDITY AND MORTALITY

From Cardiovascular Disease, Osteoporotic Disease, Cognitive Decline And To Maintain Sexual And Genito-Urinary Health.

Ht Used Correctly Imparts General Well Being And Improves The Overall Quality Of Life In Poi Patients .
After Natural Age Of Menopause Is Attained Ht May Be Continued On A Personalised Risk Benefit Ratio.
Women On Ht May Concieve Due To Intermittent Ovarian Function In Natural Idiopathic Poi So Unless She Wants Fertility Contraception May Be Advised.

HT DOES NOT INCREASE THE RISK OF BREAST CANCER.

HT NOT RECOMMENDED IN BREAST CANCER SURVIVORS OR IN THOSE WITH BRCA 1 /2 CARRIERS UNLESS RISK REDUCING BSO IS DONE .

PROGESTERONE TO BE ADDED IN CASE UTERUS IS INTACT OR IF HISTORY OF ENDOMETRIOSIS [dose of progesterone is increased when higher doses of estrogen are used]

Migraine is not a contraindication to HT.
Survivors of Squamous cell CA of cervix, epithelial ovarian CA ,early stage endometrial CA may take HT.

HT NOT RECOMMENDED IN POI PATIENTS WITH FOLLOWING CANCERS
UTERINE SARCOMA
ENDOMETROID CA
OVARIAN CLEAR CELL CARCINOMA
OVARIAN GRANULOSA CELL TUMOR
SEX CORD STROMAL TUMORS
BREAST CANCER CURRENT OR PAST

Preparation Of Ht : Oral ,Transdermal ,Variety Of The Estrogen And Progesterone Is Decided As Per Comorbidities ,Patient Preference And Side Effects.
Sequential Combined Ht Vs Continuous Combined Ht To Be Decided Patient Wise.
Regular Clinical Review At Fixed Pre Informed Time Intervals To Be Done.
Unsheduled Bleeding In Continuous Combined Ht To Be Assessed.

From Cardiovascular Disease, Osteoporotic Disease, Cognitive Decline And To Maintain Sexual And Genito-Urinary Health.

Ht Used Correctly Imparts General Well Being And Improves The Overall Quality Of Life In Poi Patients .
After Natural Age Of Menopause Is Attained Ht May Be Continued On A Personalised Risk Benefit Ratio.
Women On Ht May Concieve Due To Intermittent Ovarian Function In Natural Idiopathic Poi So Unless She Wants Fertility Contraception May Be Advised.

HT DOES NOT INCREASE THE RISK OF BREAST CANCER.

HT NOT RECOMMENDED IN BREAST CANCER SURVIVORS OR IN THOSE WITH BRCA 1 /2 CARRIERS UNLESS RISK REDUCING BSO IS DONE .

PROGESTERONE TO BE ADDED IN CASE UTERUS IS INTACT OR IF HISTORY OF ENDOMETRIOSIS [dose of progesterone is increased when higher doses of estrogen are used]

Migraine is not a contraindication to HT.
Survivors of Squamous cell CA of cervix, epithelial ovarian CA ,early stage endometrial CA may take HT.

HT NOT RECOMMENDED IN POI PATIENTS WITH FOLLOWING CANCERS
UTERINE SARCOMA
ENDOMETROID CA
OVARIAN CLEAR CELL CARCINOMA
OVARIAN GRANULOSA CELL TUMOR
SEX CORD STROMAL TUMORS
BREAST CANCER CURRENT OR PAST

Preparation Of Ht : Oral ,Transdermal ,Variety Of The Estrogen And Progesterone Is Decided As Per Comorbidities ,Patient Preference And Side Effects.
Sequential Combined Ht Vs Continuous Combined Ht To Be Decided Patient Wise.
Regular Clinical Review At Fixed Pre Informed Time Intervals To Be Done.
Unsheduled Bleeding In Continuous Combined Ht To Be Assessed.

ROLE OF TESTOSTERONE THERAPY IN HT FOR POI

Main Role For Treatment Of Hypoactive Sexual Desire Short Term Transdermal Route Approximating Premenopausal Levels Advised Data Is Limited For Long Term

COMPLEMENTARY TREATMENTS IN POI

Chinese Herbal Medicine, Acupuncture Etc Are Not Recommended As There Is No Evidence Of Benefit Lifestyle Change Is An Indispensable Adjunct To Ht Advocate A Healthy Life Style Through Entire Lifespan With Or Without Ht

HOW SHOULD PUBERTY BE INDUCED ?

Puberty Be Induced Starting With Estradiol At Low Dose @ 11 Years With Gradual Increase Over 2 To 3 Years. After 2 Years Progesterone May Be Added

Shared Decision Making Thro The Years, Regular Meeting, Counselling, Providing Group Support, Emphasising Adherence To Therapy, Accomodating Change Of Doses All Go A Long Way To Bring Quality Of Life Of A Poi Patient At Par With A Normal Pre-Menopausal Woman.

----------XXXXX----------

08 Cardiometabolic Health in Menopause

Author - Dr. Urvashi Barman Singh Prof. & HOD Dept. of OBGY United Institute of Medical Sciences, Prayagraj

Introduction — why menopause matters for cardiometabolic health

Menopause is a biological transition with systemic metabolic consequences. Beyond vasomotor and genitourinary symptoms, the menopause transition is accompanied by changes in body composition (increase in central adiposity), lipid profile, glucose homeostasis, and blood pressure — all translating into an increased lifetime risk of atherosclerotic cardiovascular disease (ASCVD). The American Heart Association (AHA) scientific statement synthesizing the evidence emphasizes that the menopause transition (MT) is a vulnerable window when female-specific changes in cardiometabolic traits accelerate and provide an opportunity for early prevention and risk-modifying interventions. AHA Journals+1

Key principles:

- The MT is associated with rise in LDL, loss of HDL benefit, central weight gain, worsening glycemia, and blood pressure drift. This is partly hormonal (loss of estrogenic protection) and partly age- and lifestyle-related. AHA Journals

- Early prevention during MT — detection + active risk-factor control — may have outsized long-term benefits because atherosclerotic processes are modifiable in midlife. American College of Cardiology

Blood pressure in menopause

What changes and why

Blood pressure (BP) tends to rise with age in both sexes, but the MT can accelerate the development of hypertension in women. Estrogen loss, central weight gain, endothelial dysfunction, and increased sympathetic activity contribute to higher systolic BP and widening pulse pressure. Observational cohorts show a higher incidence of new hypertension in postmenopausal women compared with similarly aged men in some populations. AHA Journals

Clinical approach

1. Measurement: Home BP monitoring and repeat office measurements are important because white coat and masked hypertension are common.

2. Targets & thresholds: Use contemporary guideline thresholds (ACC/AHA 2017 guideline basis): consider antihypertensive therapy for:

- Stage 2 (≥140/90 mm Hg): start drug therapy in most adults.
- Stage 1 (130–139/80–89 mm Hg): consider pharmacotherapy if 10-year ASCVD risk ≥10% or other risk enhancers (diabetes, CKD, established ASCVD) or if BP remains elevated after a trial of lifestyle modification. AHA Journals+1

3. Menopause-specific considerations:

- Early/surgical menopause confers higher long-term cardiovascular risk — monitor BP earlier and more frequently in these women. American College of Cardiology

- Weight management and salt-reduction are particularly effective in midlife women with central adiposity.

Lipids in menopause

Pattern and mechanism

Menopause is associated with an atherogenic shift: LDL-C rises, HDL function may change, triglycerides may increase, and small dense LDL becomes more common. The hormonal milieu (loss of estrogen's favourable effects on hepatic lipid handling and lipoprotein lipase activity) together with central fat deposition drives this pattern. AHA Journals

Evaluation and risk stratification

- Perform a fasting or non-fasting lipid profile at least once around the time of menopause and earlier/more often when risk enhancers are present (family history of premature ASCVD, Lp(a), diabetes).

- Use pooled cohort equations or local calibrated risk tools to estimate 10-year ASCVD risk; include menopause-related risk enhancers (early menopause, premature ovarian insufficiency) when counselling and applying thresholds. AHA Journals+1

When to start statins (concise guidance)

Follow ACC/AHA primary prevention principles (2018–2019 guidance base) adapted to the menopausal context:

LDL ≥190 mg/dL (≥4.9 mmol/L): high-intensity statin for adults (regardless of age) unless contraindicated. AHA Journals

Age 40–75 with LDL 70–189 mg/dL: evaluate 10-year ASCVD risk.

- If 10-year ASCVD risk ≥20% (high) — start high-intensity statin.
- If 10-year ASCVD risk 7.5–19.9% (intermediate) — initiate moderate-to-high intensity statin after shared decision-making; risk enhancers (early menopause, central obesity, South Asian ethnicity) can sway toward treatment.
- If 10-year risk <7.5% — consider lifestyle and reassessment; treatment may be appropriate if other risk enhancers exist. AHA Journals

Practical note for South-Asian / Indian women: South Asian ethnicity is a recognized risk enhancer; therefore, a lower threshold for starting statin therapy during midlife may be appropriate after shared decision-making. Consider earlier statin initiation when there is central obesity, family history of premature CAD, or diabetes. AHA Journals+1

Weight, body composition and metabolic syndrome

Menopause-related body changes

The menopause transition typically involves redistribution from peripheral (gynoid) to central (android) fat, even without big changes in total weight. Central adiposity (increased waist circumference) amplifies insulin resistance, dyslipidaemia, and hypertension — core components of metabolic syndrome. South Asian women often accumulate visceral fat at lower BMI thresholds than other ethnicities, increasing risk. AHA Journals+1

Clinical elements

- Regularly measure weight and waist circumference (≥88 cm in women often used in western criteria; for South Asians lower cutoffs may be appropriate — e.g., ≥80 cm often used as concerning).
- Screen for metabolic syndrome in midlife women and after menopause (fasting glucose/HbA1c, lipid panel, BP, waist). PMC

Glucose metabolism and diabetes

Menopause is associated with an increased incidence of impaired glucose tolerance and type 2 diabetes (T2D), mediated by central adiposity and loss of estrogen effects on insulin sensitivity. Early menopause and premature ovarian insufficiency are linked to higher diabetes risk and cumulative CVD risk. Screen peri-/post-menopausal women more frequently for dysglycemia if risk factors present. AHA Journals+1

Screening frequency: baseline fasting glucose or HbA1c at menopause; repeat periodically (e.g., annually or every 3 years depending on risk), sooner if weight gain, family history, or other risk enhancers.

Early prevention — the midlife window

- The AHA statement frames the MT as an opportunity for early prevention: detect changes in BP, lipids, weight and glucose early and act aggressively on modifiable risk factors to alter long-term ASCVD trajectories. Key components:

- Routine risk screening at perimenopause and at menopause onset (BP, lipids, glucose, weight/waist, smoking status, family history).

- Risk reclassification using clinical risk scores plus menopause-specific enhancers (early menopause, POI). ⍰ Early lifestyle interventions and escalation to pharmacotherapy as indicated by guideline thresholds and individualized risk. AHA Journals+1

Hormone therapy (HT), the timing hypothesis and cardiometabolic effects The timing hypothesis

Observational data and secondary analyses suggest that **timing of HT initiation** matters: when HT is started **within 10 years of menopause onset or before age ~60**, the balance of benefits to risks is generally more favourable for symptomatic relief and bone protection and may be neutral or potentially beneficial for coronary risk. When HT is started late (>10 years since menopause or age >60), risk of stroke, venous thromboembolism (VTE) and CHD events appears higher. This "timing hypothesis" is central to NAMS 2022 recommendations. Lippincott Journals+1

Cardiometabolic effects of HT

- **Lipids:** Oral estrogen typically lowers LDL and raises HDL; transdermal estrogen has less impact on triglycerides and perhaps lower VTE risk.

- **Glucose:** HT can modestly improve insulin sensitivity in some women.

- **Blood pressure:** effects are variable; oral estrogens may increase hepatic-derived clotting factors and blood pressure in some subgroups.

- **Overall ASCVD:** Evidence from randomized trials (e.g., WHI) showed that older initiation was associated with increased risks; modern interpretation supports individualized HT for symptom control and not for primary CVD prevention — except possibly when started early in healthier women where the net cardiovascular risk may be neutral or slightly favourable. Lippincott Journals+1

NAMS 2022 position (practical points)

- **For symptomatic** healthy women <60 years or within 10 years of menopause onset, HT benefit-risk ratio is generally favourable for vasomotor and genitourinary symptoms and for bone health. Personalize HT choice (type, route, dose) and monitor. For women >60 or >10 years since menopause, risks increase and more caution is required. Shared decision-making is mandatory. Dutch Menopause Society+1

How HT fits into cardiometabolic care

- HT is not a substitute for guideline-based management of BP, lipids, or glucose but may be considered part of comprehensive care for symptomatic women when benefits outweigh risks.

- Consider transdermal estrogen in women at higher VTE risk, and use the lowest effective dose for the shortest duration needed to manage symptoms, with periodic reassessment. Dutch Menopause Society

Lifestyle prescription — concrete, midlife-focused plan

Lifestyle is the backbone of cardiometabolic risk reduction in menopause. An actionable prescription:

1. Diet

- Emphasize a heart-healthy pattern: vegetables, fruits, whole grains, legumes, lean protein (fish, pulses), nuts, and use of healthy oils. The Mediterranean/DASH patterns are evidence-based. Reduce refined carbs, added sugars, and trans fats

- Salt reduction to ≤2 g sodium/day (≈5 g salt) is beneficial for BP; for high-risk or BP-sensitive individuals, aim for 1.5 g sodium/day when feasible.

- In South Asia, counselling should include modifications of refined carbohydrate–heavy dishes and culturally acceptable substitutions (e.g., millets, more legumes, reduced ghee/clarified-butter where appropriate). AHA Journals+1

2. Physical activity

- At least 150–300 minutes/week of moderate-intensity aerobic activity or 75– 150 minutes of vigorous activity, plus 2 sessions/week of musclestrengthening. Emphasize activities that reduce central adiposity (aerobic + resistance training).

- Encourage simple, scalable options (walking, cycling, household activity) for midlife women with caregiving responsibilities.

3. Weight management

- Aim for 5–10% weight loss if overweight/obese — this yields measurable improvements in BP, lipids and glycemia. For South Asian women, recognize that cardiometabolic risk increases at lower BMI — treat earlier based on waist circumference and metabolic markers. BioMed Central

4. Tobacco & alcohol

- Complete tobacco cessation; limit alcohol (≤1 drink/day for women if used at all). Both have outsized cardiometabolic harms in midlife.

5. Sleep, stress, and mental health

- Screen for sleep apnea (especially with central obesity), manage insomnia and vasomotor symptoms (HT can help) — poor sleep worsens cardiometabolic risk. Address depression/anxiety as these influence adherence and lifestyle behaviours.

6. Periodic monitoring

- BP every visit or at home, weight and waist at least annually, lipid/glucose at baseline and every 1–3 years depending on risk.

India / South-Asia: epidemiology and specific considerations (table)

South Asian women have a higher burden of cardiometabolic risks at younger ages, with earlier central adiposity, insulin resistance, and higher prevalence of diabetes — all of which interact with menopause to accelerate ASCVD risk. The table summarizes representative patterns (ranges from regional studies and reviews). Use as a clinician's quick reference rather than a definitive national statistic.

Parameter	Typical pattern in South Asia / India (midlife women)	Clinical implication
Central obesity	High prevalence; waist circumferences concerning at lower cutoffs (e.g., ≥80 cm) (higher central fat at lower BMI). BioMed Central	Screen earlier; use waist as key metric.
Diabetes / prediabetes	Higher prevalence & earlier onset compared with many other regions; midlife transition increases incidence. BMJ Dravet Syndrome Journal	Screen at menopause; lower thresholds to consider pharmacotherapy.
Hypertension	Rising prevalence in midlife; many undiagnosed/untreated. PMC	Active screening and home BP encouraged.
Dyslipidemia	Increasing LDL and triglycerides in menopause; low HDL common; high Lp(a) prevalence reported in some Indian cohorts. PMC+1	Early lipid testing; consider statin sooner with risk enhancers.
Metabolic syndrome	Postmenopausal prevalence ranges widely (20–50% in many studies). PMC+1	Aggressive lifestyle and targeted risk-factor control.

Practical clinic algorithm for the menopausal woman

1. Baseline visit at perimenopause/menopause onset

- HPI: age at menopause/menopausal symptoms, surgical menopause, pregnancies, family history of premature ASCVD, smoking, physical activity, diet.

- Measurements: BP, weight, height, waist circumference.

- Labs: fasting lipid panel, fasting glucose or HbA1c, consider Lp(a) if family history of premature CAD.

- Risk calculation: pooled cohort equation or locally validated tool; annotate risk enhancers (early menopause, South Asian ethnicity, central obesity). AHA Journals+1

2. If abnormal findings

- **BP ≥140/90 →** initiate antihypertensive therapy plus lifestyle changes. Confirm with home/ambulatory BP as available. AHA Journals

- **BP 130–139/80–89 →** lifestyle trial + reassess; start meds if 10-yr risk high or other compelling indications. AHA Journals

- **LDL ≥190 →** start high-intensity statin.

- **LDL 70–189 & 10-yr ASCVD ≥7.5–20% →** moderate-to-high intensity statin after shared decision-making (lean toward treatment in South Asian women with risk enhancers). AHA Journals

- **Prediabetes/diabetes →** lifestyle + metformin if overweight/obese or glycemic thresholds met; intensify CVD risk factor management. BMJ Dravet Syndrome Journal

3. **Symptom management (HT)**

- For bothersome vasomotor/genitourinary symptoms: consider HT if <60 years or <10 years since menopause and no contraindications. Personalize route (transdermal often favoured if VTE risk) and dose; reassess periodically. HT is not a primary ASCVD prevention therapy. Dutch Menopause Society

4. Follow-up

- BP: every visit or home monitoring; lipids annually or as indicated; glucose yearly or per risk. Encourage and support lifestyle change — this is the greatest single modifiable influence.

Special topics & controversies

- **Early/premature menopause (POI)**: Women with menopause before age 45 have higher long-term ASCVD risk. Consider extended HT to the average age of menopause (with individualized risk assessment) and earlier, more aggressive riskfactor screening. American College of Cardiology

- **HT and CVD prevention**: HT is primarily for symptom control and bone health; it is not recommended solely for CVD prevention. However, starting HT early (timing hypothesis) may carry less cardiovascular harm and possibly some neutral/beneficial effect versus late initiation. Lippincott Journals+1

- **Statins in women**: Women are historically undertreated with statins despite similar benefit; midlife clinicians should proactively assess ASCVD risk and offer statins when indicated. Shared decision-making is essential. JACC

Practical patient talking points (for shared decision-making)

- "Menopause changes how your body stores fat and handles sugar and cholesterol — that's why we screen and take action in midlife."

- "Lifestyle changes now often prevent problems later — even 5–10% weight loss brings big benefits for blood pressure, lipids, and glucose."

- "Hormone therapy can help hot flashes and vaginal symptoms and may be reasonable for many women under 60, but it's not a replacement for statins or blood-pressure medicines when those are needed." Dutch Menopause Society+1

Summary: high-yield clinician takeaways

1. The menopause transition is a critical window for cardiometabolic risk detection and modification; act early. AHA Journals

2. Screen routinely for BP, lipids, glucose, and central obesity at perimenopause and menopause onset. American College of Cardiology

3. Start antihypertensives according to guideline thresholds (≥140/90 generally; consider earlier treatment in high-risk or persistent Stage 1). AHA Journals

4. Start statins per ACC/AHA primary prevention guidance — consider lower threshold in South Asian women and those with early menopause. AHA Journals+1

5. Use HT for symptom control with attention to the timing hypothesis (prefer initiation within 10 years of menopause or under age 60 when appropriate) and always weigh risks vs benefits. Dutch Menopause Society

6. Lifestyle interventions (diet, exercise, weight control, tobacco cessation, salt reduction, sleep and stress management) are foundational and should be prioritized for all women in midlife. AHA Journals

References (selected key sources used in this chapter)

- El Khoudary SR, et al. Menopause Transition and Cardiovascular Disease Risk: A Scientific Statement From the American Heart Association. Circulation. 2020. AHA Journals

- ACC: "Ten points to remember" summary of the AHA scientific statement (ACC online summary). American College of Cardiology

- The North American Menopause Society. 2022 Hormone Therapy Position Statement. Menopause. 2022. Dutch Menopause Society+1

- Arnett DK, et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease. Circulation. 2019. (statin guidance and risk-based treatment thresholds). AHA Journals

- Whelton PK, et al. 2017 ACC/AHA Hypertension Guideline. (BP thresholds and treatment indications). AHA Journals

- Regional and review articles on South Asian cardiometabolic risk and menopause (selected): Volgman AS et al., Atherosclerotic Cardiovascular Disease in South Asians; Satish P et al., Burden of cardiovascular risk factors in South Asia. AHA Journals+1

09 Surgical/iatrogenic menopause

Author - Dr. Sandhya Rani Panigrahy
MD, FICOG, MICOG, FICMCH, FCGP, FIAOG, CPIMS

Co- Author - Dr. Partha Sarathi Tripathy M.K.C.G Medical College

Definition of Surgical Menopause

(Iatrogenic Menopause) Surgical menopause (Iatrogenic menopause) happens when both ovaries are removed before the natural "switching off" of ovarian function.It can cause premature ovarian insufficiency where the menopause occurs in women before the age of 40.

Surgical menopause occurs when a woman's ovaries are removed through a surgical procedure leading to an immediate reduction or cessation of ovarian sex steroids hormone production rather than a gradual one as is the case in natural menopause. This typically happens during an oophorectomy which may be performed alone or alongside a hysterectomy. Menopause is often thought of as a natural part of aging but for some women it arrives earlier and more suddenly than expected due to medical interventions or surgical interventions.This is known as iatrogenic menopause.

Causes of Surgical Menopause

Bilateral Oophorectomy: The removal of both ovaries, often done to reduce cancer risk or treat certain medical conditions. Hysterectomy: Sometimes performed with oophorectomy to address issues like heavy bleeding or gynecological cancers. Hysterectomy is the most common major gynecologic surgery performed with roughly 433,000 surgeries reported in 2010.

Elective oophorectomy is performed in approximately 40% of women undergoing hysterectomy for benign disease. Adnexal surgery at the time of hysterectomy performed for benign indications is a part of preoperative patient counseling and has many consequences. Bilateral salpingo-oophorectomy (BSO) is the most definitive prevention against ovarian cancer which has a lifetime risk of 1.4%. With no screening method for ovarian cancer and poor prognosis at diagnosis oophorectomy is crucial.

Perimenopause which on average lasts 3.5 years refers to the reproductive stage immediately before menopause includes endocrine, biological, and clinical changes and ends in the year after the final menstrual period. Natural menopause (NM) occurs at an average age of 51 years and is the result of ovarian follicular depletion with decreases in ovarian hormone secretion resulting in very low estrogen levels and high follicle-stimulating hormone concentraton

Surgical Removal of Ovaries (Oophorectomy):
This is one of the most common causes of iatrogenic menopause. When one or both ovaries are removed—often due to conditions like ovarian cancer, endometriosis or severe pelvic inflammatory disease—hormone production is halted triggering menopause.

Cancer Treatments:
Chemotherapy and radiation therapy particularly those targeting reproductive organs can damage the ovaries leading to menopause. This is especially common in younger women undergoing cancer treatment for breast, ovarian, or other reproductive cancers.

Other Medical Interventions:
Some medications used for managing conditions like endometriosis or fibroids can temporarily suppress ovarian function causing menopausal symptoms. While these symptoms may reverse when treatment ends.

Symptoms of Surgical Menopause
The symptoms can be more intense than those experienced during natural menopause due to the sudden drop in hormone levels.

Common symptoms include:

- Hot flashes
- Mood changes
- Vaginal dryness
- Night sweats
- Weight gain

Risks of surgical menopause Surgical menopause carries several risks beyond those of menopause including:

• Mood changes
• Loss of bone density (osteoporosis)

- Low libido
- Cardiovascular (heart) disease
- Cognitive impairment, dementia, and Parkinson's disease

Surgical menopause also causes hormonal imbalances, which increase risk of developing a variety of conditions including heart disease and osteoporosis. The ovaries and adrenal glands produce progesterone and estrogen. When both ovaries are removed the adrenal glands can't produce enough hormones to maintain balance causing to enter menopause.

Impact of Iatrogenic Menopause

The effects of iatrogenic menopause extend beyond physical symptoms. Women often face emotional and psychological challenges as they adjust to this abrupt transition. The sudden onset of symptoms can make it difficult for women to continue their daily activities, manage their professional lives or maintain relationships.

Because iatrogenic menopause can occur at a much younger age than natural menopause it also brings unique concerns about long-term health including the increased risk of heart disease, osteoporosis, and cognitive decline due to the prolonged period of estrogen deficiency. This makes it critical to adopt a proactive approach to managing the symptoms and minimizing long term health risks.

Benefits of surgical menopause

For some people removing the ovaries and experiencing surgical menopause can be lifesaving. But some cancers thrive on estrogen which can cause people to develop cancer at an earlier age. People who have a history of ovarian or breast cancer in their families have a greater risk of developing these diseases because their genes may be unable to suppress tumor growth.

In this case oophorectomy can be used as a preventive measure to reduce the risk of developing cancer. Oophorectomy can also help reduce pain from endometriosis which causes uterine tissues to grow outside the uterus. This irregular tissue can affect the ovaries, fallopian tubes, or lymph nodes and cause significant pelvic pain.

Removing the ovaries can stop or slow estrogen production and reduce pain symptoms. Estrogen replacement therapy usually isn't an option for people with this history.

Why perform an oophorectomy?

In most cases removing the ovaries is a preventive measure against disease.

Some people are predisposed to cancer from family history. To reduce the risk of developing cancers affecting their reproductive health doctors may suggest removing one or both ovaries. In some cases they may also need their uterus removed. Other people may elect to remove their ovaries to reduce symptoms from endometriosis and chronic pelvic pain. While there are some success stories in oophorectomy pain management this procedure may not always be effective.

Other reasons people may want to remove both ovaries and induce surgical menopause are: ovary torsion orr twisted ovaries that affect blood flow
Recurrent ovarian cysts
Benign ovarian tumors
Management Options

Hormone Replacement Therapy (HRT) is often recommended to alleviate symptoms and reduce long-term health risks. HRT can help maintain bone density and heart health but it may not be suitable for everyone especially those with a history of certain cancers.

women who have undergone bilateral salpingo-oophorectomy (BSO) before the natural age of menopause strong consideration should be given to giving hormone replacement therapy (HRT) till the natural age of menopause at least.

Managing surgical menopause symptoms
To reduce the side effects of surgical menopause it may recommend HRT.
1.Hormone Therapy (HT): Hormone therapy is often considered the most effective treatment for managing severe symptoms like hot flashes and vaginal dryness. It involves supplementing the body with estrogen or a combination of estrogen and progesterone to replace the hormones that the ovaries no longer produce.

HT is typically recommended for younger women with iatrogenic menopause as it can also help protect against osteoporosis and heart disease. However it may not be suitable for all especially those with a history of certain cancers.

HRT counteracts the hormones lost after surgery. It also lowers the risk of developing heart disease and prevents bone density loss and osteoporosis. This is especially important for younger people who have removed their ovaries before natural menopause.

Support for Vaginal Health: Declining estrogen levels can lead to thinning of the vaginal tissues resulting in dryness, itching, and discomfort during intercourse. HT especially in localized forms like vaginal creams or rings can significantly improve vaginal moisture and comfort. People younger than 45 who have their ovaries removed and who aren't taking HRT are at an increased risk of developing:
Osteoporosis and osteopenia
Heart disease
Neurological diseases
Mood and Cognitive Function: Some studies suggest that MHT can help alleviate mood swings ,irritability and even depressive symptoms during the menopausal transition.

HRT has also been associated with an increased risk of breast cancer for people with a strong family history of cancer. MHT comes in various forms including pills, patches, creams, gels, and vaginal rings making it easier for women to choose the method that best suits their lifestyle and comfort.

2.Non-Hormonal Medications: For women who cannot use hormone therapy non-hormonal medications such as antidepressants or medications like gabapentin can help manage symptoms like hot flashes and mood changes. Vaginal moisturizers and lubricants can also ease discomfort due to vaginal dryness.

3.Lifestyle Modifications: Surgical menopausal can be manage by lifestyle changes that help reduce stress and alleviate pain. Adopting a healthy lifestyle can play a significant role in alleviating symptoms and improving overall well-being. Regular exercise such as weight-bearing activities helps maintain bone density and improves mood. A balanced diet rich in calcium and vitamin D can support bone health while techniques like yoga and mindfulness can help manage stress and anxiety. Try the following to reduce discomfort from hot flashes:
Carry a portable fan.
Drink water.
Avoid excessively spicy foods.
Limit alcohol intake.
Keep your bedroom cool at night.
Keep a fan at the bedside.

To relieve stress:
Maintain a regular
sleep cycle. Exercise.
Meditate.

Join a support group for pre- and postmenopausal women.

4.Bone Health Management: To mitigate the risk of osteoporosis women experiencing iatrogenic menopause should consider supplements such as calcium and vitamin D and potentially medications that strengthen bone density. Regular bone density screenings are also recommended for early detection and prevention of bone loss.

5.Support and Coping Strategies The journey through iatrogenic menopause can feel overwhelming but support and understanding are key to managing this life stage. Women should not hesitate to reach out to healthcare providers who specialize in menopause management for personalized guidance. Joining support groups or connecting with others going through a similar experience can also be a valuable way to share insights and feel less isolated Managing Iatrogenic Menopause for a Healthier Future

While iatrogenic menopause can be a challenging experience understanding its causes, symptoms and treatment options can empower women to manage this life stage more effectively. A combination of medical support, lifestyle changes, and emotional resilience can help women regain their balance and focus on long-term well-being.

Conclusion:- Surgical menopause is a significant medical event that requires careful management and support. Women experiencing this transition should consult healthcare professionals for personalized treatment options.

References

1.Menopause, wellbeing and health: A care pathway from the European Menopause and Andropause Society,Maturitas, Volume 163,2022,Pages 1-14, ISSN 0378-5122,

2. 2025, BMC Endocrine Disorders

3.Frontal Fibrosing Alopecia and Reproductive Health: Assessing the Role of Sex Hormones in Disease Development 2024, Journal of Personalized Medicine

4.Impact of Menopause in Patients with Multiple Sclerosis: Current Perspectives 2023, International Journal of Women S Health

5.Effects of Calcium Lactate-Enriched Pumpkin on Calcium Status in Ovariectomized Rats 2022, Foods

10 Preventive strategies for common menopausal problems

Author - Dr. Padmaja Veeramachaneni,
MBBS, MD, FCGP, FAMS, FICOG
Vijayawada

India is now the most populous country in the world, with an estimated population of over 1.46 billion people in 2025.Indian females currently have a higher life expectancy of 73.60 years compared to than 70.52 years for males, according to United Nations data .

With the average age of menopause in Indian women being around 46 years [1],women spend more than 1/3 of their life in menopause, making preventive strategies for common menopausal problems of vital importance.

The main health issues of menopause like osteoporosis , cardiac events , diabetes and cancers occur earlier in Indian women .

Osteoporotic fractures occur 10–20 years earlier in Indians than in Caucasians.

The first myocardial infarction (MI) occurs in 4.4% of Asian women at a younger age than in European women .So focus is needed on traditional cardio vascular disease prevention strategies : optimise lipids , BP , weight , physical activity , metabolic health.

In India, type 2 diabetes mellitus (T2DM) occurs a decade earlier than in Caucasians.

Breast cancer which is common cancer among Indian women has its incidence peaks before the age of 50 years .

To holistically address the preventive care for these health challenges, we need to adopt the six pillars of lifestyle medicine

The six pillars of lifestyle medicine are healthy eating, physical activity, mental well-being, avoidance of risky substances, restorative sleep, and healthy relationships .

Healthy Eating : "Dietary modifications can offer another layer of support during menopause, with approaches like the MedDiet and intermittent fasting showing promise. The MedDiet is broadly characterized by a high intake of vegetables, fruits, olive oil, nuts, and fish, with limited consumption of red meat[2]. Intermittent fasting has garnered substantial interest as a metabolic intervention. Common approaches include alternate-day fasting and the 5:2 protocol, which involves fasting for 2 days of the week with normal eating patterns on the remaining 5 days .

Dietary supplements : Current guidelines recommend a daily calcium intake of 700–1200 mg for women aged ≥50 years . There is age-related decline in cutaneous vitamin D synthesis. Therefore dietary sources such as oily fish and egg yolks are recommended. Existing guideline recommend vitamin D intake of 400–600 IU/day for older adults, increasing to 800–1000 IU in individuals with limited sunlight exposure [3].

Evidence of the efficacy of soy foods in improving menopausal symptoms is limited because of the small number of trials reporting conflicting results .

Physical activity

During menopause, an increase in central adiposity is linked to a 40% reduction in physical activity and reduced resting metabolism , compounded by the loss of estrogen during this transition period.

Resistance training, including yoga and tai chi, strongly benefits limited reduction or preservation of lean body mass and vasomotor symptoms[VMS] . Aerobic exercise may have stronger effects on improving vascular health; however, multi-component exercise combining aerobic and resistance exercises has benefits of both individual types of exercises. Consistent aerobic or resistance exercise for at least 3–4 months has been demonstrated to lower insulin levels, BMI, body fat percentage, and waist circumference in 6–12 months in postmenopausal women.

Similarly, the International Menopause Society (IMS) recommends at least 150 min of moderate-intensity aerobic activity and 2 days or more of strength or resistance exercise weekly [4].

Mental well-being

Stress and menopause

Midlife can be a stressful period for many women due to a combination of factors such as life events, physical changes, changes in health status, and the need to care for children and older parents simultaneously. The menopause transition in midlife results in physical, metabolic, and psychological changes, which leads to greater perceived stress. Several studies have found that stress is associated with menopausal symptoms and an increased frequency of VMS.

One effective solution is the incorporation of cognitive-based therapy and relaxation techniques.

Wearable fitness trackers also appear to be an effective means of supporting more autonomous motivation in adults.

Avoidance of risky substances

Substance use

Women appear to be more vulnerable to the harmful effects of alcohol and tend to develop alcohol-related diseases earlier in life [22]. The female population is catching up and exceeding men in substance use, highlighting the importance of gender issues in substance abuse research [5]

Onset of menopause can be another opportunity to motivate women for smoking cessation.

Restorative sleep:

Restorative sleep refers to the quality of sleep that leads to improved daytime function, including alertness, mood, energy, and overall well-being .

Sleep fragmentation and reduced sleep efficiency, common in menopausal women, accelerate neuroinflammation and oxidative stress, further promoting neurodegenerative progression

Sleep deprivation is known to heighten emotional reactivity, increase vulnerability to anxiety and depression, and impair social and executive functioning .

Insufficient or poor-quality sleep contributes to insulin resistance, impaired glucose tolerance, increased sympathetic nervous system activity, elevated cortisol levels, and altered appetite-regulating hormones (leptin and ghrelin). These mechanisms may promote central adiposity and contribute to the development of Metabolic Syndrome .

Disrupted sleep architecture may contribute to cardiovascular disease risk through pathways including sympathetic nervous system activation, elevated cortisol levels, systemic inflammation, and endothelial dysfunction [6].

Non-pharmacological strategies for optimizing sleep and achieving restorative sleep can be achieved by sleep hygiene, by taking measures to ensure maintaining a consistent sleep schedule, optimizing the sleep environment [cool, dark, and quiet], avoiding stimulating activities before bed, limiting screen time and blue light exposure, engaging in regular physical activity during the day, limiting or avoiding caffeine and alcohol before bedtime, mindful eating and drinking habits (avoiding large meals and reducing fluid intake in the evening), and avoiding late afternoon naps.
Cognitive Behavioral Therapy for Insomnia (CBT-I) is a structured, multicomponent treatment program that is effective as a first-line treatment for menopausal women with persistent sleep disturbance, with or without concurrent VMS .

Healthy relationships:
Studies have consistently shown that higher levels of social support and engagement are associated with positive health benefits in middle-aged and older adults which include improved control of chronic medical conditions, decreased risk of coronary heart disease, diabetes and osteoporosis, and lower overall risk of mortality [7]

For menopausal women, maintaining strong social support networks and nurturing healthy marital relationships can enhance quality of life, lower the risk of metabolic and cardiovascular disease, reduce the risk of osteoporosis and reduce the risk of mortality.

Urogenital and sexual health and well-being:
In contrast to VMS, which wane in both frequency and intensity in most women over time, genitourinary symptoms are chronic and progressive, affecting a substantial number of postmenopausal women. Symptoms caused by estrogen deficiency, such as vaginal dryness, sexual pain with any touch or penetration, overactive bladder symptoms, and increased risk of urinary tract infections, are common but mostly undertreated. Urinary tract infections are often treated repeatedly with antibiotics rather than addressing the underlying patho-physiology.

Vaginal estrogen therapy that alleviates vaginal dryness, dyspareunia, urinary urgency, and frequency, reduces the risk of urinary tract infections, has been shown to be safe with long-term use, and may also improve sexual function overall. Specifically, evidence supports the long-term endometrial safety of low-dose (10 µg twice weekly) vaginal estrogen . Additionally, vaginal dehydroepiandrosterone (DHEA; also called prasterone) and oral ospemifene are suitable alternatives that have been shown to improve dryness, dyspareunia, and distress . While laser therapy has been suggested to improve vaginal symptoms, the evidence remains contradictory and should only be undertaken in research settings. [8]

Conclusion

Menopause marks a significant physiological transition with far-reaching implications for women's long-term health and well-being, warranting personalized and holistic approaches to care. By embracing the six pillars of lifestyle medicine – healthy eating, physical activity, mental well-being, avoidance of risky substances, restorative sleep, and healthy relationships – women can be empowered to navigate menopause with resilience, autonomy, and vitality[9].

References :

1 Singh M. Early age of natural menopause in India, a biological marker of early preventive health programs. Climacteric 2012;15:581-6

2.Lobo RA, Davis SR, De Villiers TJ, et al. Prevention of diseases after menopause. Climacteric. 2014;17(5):540–556. doi: 10.3109/13697137.2014.933411.

3. Vitamin D. International Osteoporosis Foundation. Available from: https://www.osteoporosis.foundation/patients/prevention/vitamin-d.

4. Liu T, Chen S, Mielke GI, et al. Effects of exercise on vasomotor symptoms in menopausal women: a systematic review and meta-analysis. Climacteric. 2022;25(6):552–561. doi: 10.1080/
13697137.2022.2097865.

5. Anker JJ, Carroll ME. Females are more vulnerable to drug abuse than males: evidence from preclinical studies and the role of ovarian hormones. Curr Top Behav Neurosci. 2010;8:73–96.

6. Huang T, Zeleznik OA, Poole EM, et al. Habitual sleep quality, plasma metabolites and risk of coronary heart disease in post-menopausal women. Int J Epidemiol. 2019;48(4):1262–1274. doi: 10.1093/ije/dyy234.

7. Trudel-Fitzgerald C, Zevon ES, Kawachi I, et al. The prospective association of social integration with life span and exceptional longevity in women. J Gerontol B Psychol Sci Soc Sci.2020;75(10):2132–2141. doi: 10.1093/geronb/gbz116

8. James A. Simon, Susan R. Davis, Angelica Lindén Hirschberg, Ludwig Kiesel, Luciano de Melo Pompei, Jean-Yves Reginster, Tommaso Simoncini & Timothy Hillard (2025) State of the art in menopause: current best practice approaches from the IMS World Congress 2024, Melbourne, Climacteric, 28:2, 98-103, DOI: 10.1080/13697137.2025.2457993

9. Chika V. Anekwe, Antonio Cano, Jennifer Mulligan, Seng Bin Ang, Corinne N. Johnson, Nick Panay, Zoe Schaedel, Eftitan Y. Akam, Florence Porterfield, Emily Wang & Rossella E. Nappi (12 Sep 2025): The role of lifestyle medicine in menopausal health: a review of non-pharmacologic interventions, Climacteric, DOI: 10.1080/13697137.2025.2548806

----------xxxxx----------

(PART- B) INDEX- OSTEOPOROSIS

01 Who should be tested: case-finding & first visit checklist

Author - Dr Vishnupriya KMN
MBBS, MD (OBGYN) MRCOG (UK), FICOG, CIMP

DEFINITION

Osteoporosis is a skeletal disorder that progressively reduces bone mass and strength typically in trabecular bone and leads to higher fracture rates (1)

Proper diagnosis can help the patient to prevent osteoporosis. Diagnosing osteoporosis is beneficial because it allows for early detection before a fracture occurs, enables personalized risk assessment, and leads to timely intervention to prevent fractures and improve long-term health outcomes. By identifying low bone density, individuals can take proactive steps like lifestyle changes and medical treatment to strengthen bones, reduce fracture risk, preserve independence, and avoid costly complications.

DIAGNOSTIC CONSIDERATION:

Detailed assessment of individual fracture risk
Personal and family history
Physical examination
Focoused study to rule out secondary causes of bone fragility

FRACTURE RISK ASSESMENT:

All post menopausal women aged 50 years and older should be evaluated for osteoporosis risk ,and need for BMD testing or vertebral imaging.because the more risk factors ,the more likely a patient will break a bone.Since there are no warning sings,many people with osteoporosis are not diagnosed until a fracture occurs.Factors that have been associated with an increased risk of osteoporosis related.So patients must be evaluated soon after a fracture and receive appropriate treatment to optimize risk reduction

CLINICAL RISK AND TRIGGERS ....

- Women aged 65 and older or post-menopausal women
- Low body weight (low BMI)
- Prior fracture
- Adults with a fragility fracture
- Adults with a disease or condition associated with low bone mass or bone loss
- Adults taking medications associated with low bone mass or bone loss
- Anyone being considered for pharmacologic therapy
- Anyone being treated, to monitor treatment effect

Lifestyle Factors

- Low calcium intake, Vitamin D insufficiency, Excess vitamin A
- High caffeine intake, High salt intake, Aluminum (in antacids)
- Alcohol (3 or more drinks/d), Inadequate physical activity, Immobilization
- Smoking (active or passive) Falling Thinness

Genetic Disorders

- Cystic fibrosis, Homocystinuria, Osteogenesis imperfecta

High Bone Turnover

- Ehlers-Danlos, Hypophosphatasia, Porphyria
- Glycogen storage diseases, Idiopathic hypercalciuria, Riley-Day syndrome
- Gaucher's disease, Marfan syndrome
- Hemochromatosis, Menkes steely hair syndrome

Hypothalamic and Hypogonadal States

- Androgen insensitivity, Hyperprolactinemia, Athletic amenorrhea
- Anorexia nervosa and bulimia, Panhypopituitarism, Premature ovarian failure
- Turner's & Klinefelter's syndromes

Endocrine Disorders

- Cushing's syndrome, Hyperparathyroidism, Thyrotoxicosis
- Adrenal insufficiency, Diabetes mellitus

Gastrointestinal disorders

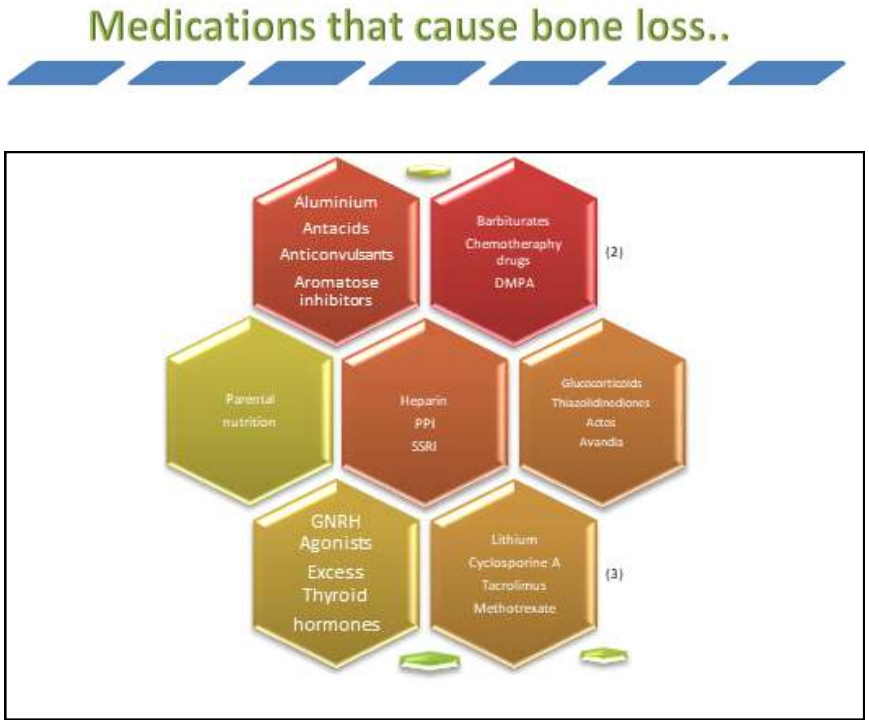
- GI surgery, Malabsorption, Primary biliary cirrhosis
- Inflammatory bowel disease, Celiac disease, Pancreatic disease
- Gastric bypass

Hematologic disorders

- Hemophilia, Multiple myeloma, Systemic mastocytosis
- Leukemia and lymphomas, Sickle cell disease, Thalassemia
- Rheumatic and auto-immune diseases
- Ankylosing spondylitis, Lupus Rheumatoid arthritis

Miscellaneous diseases

- Alcoholism, Emphysema, Multiple sclerosis
- Amyloidosis, End stage renal disease, Muscular dystrophy
- Chronic metabolic acidosis, Epilepsy, Post-transplant bone disease
- Congestive heart failure, Idiopathic scoliosis, Sarcoidosis
- Depression, Prior fracture as an adult (2),(4),(5),(6)



MAJOR RISK FACTORS FOR FALLING:

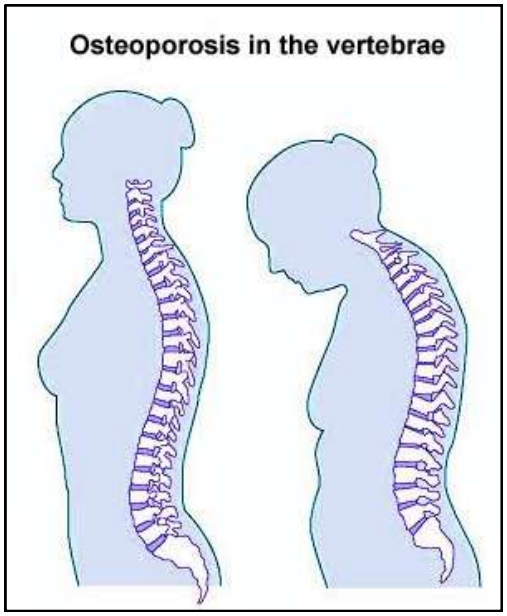
MEDICAL RISK FACTORS
- Advanced age
- Arthritis
- Female gender
- Poor vision
- Urinary urgency or incontinence
- Previous fall
- Orthostatic hypotension
- Impaired transfer and mobility
- Medications

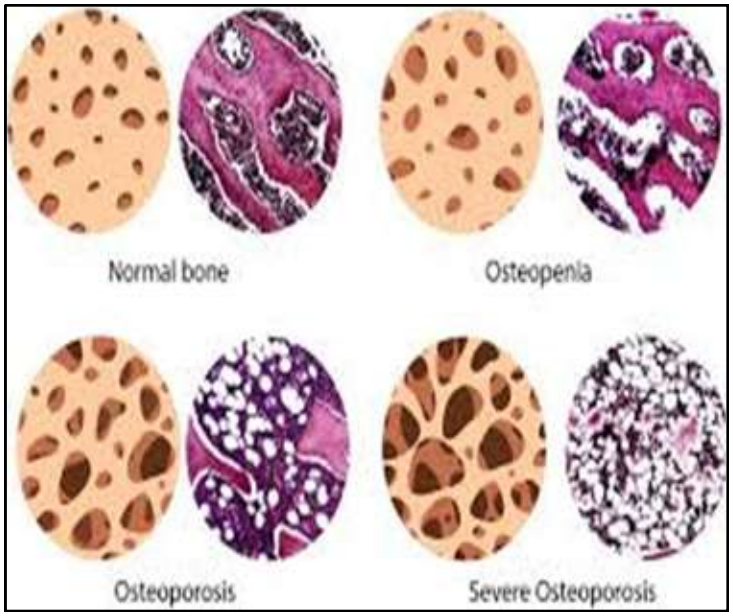
NEUROLOGICAL AND MUSCULOSKELATAL RISK FACTORS
- Poor balance
- Weak muscles/sarcopenia
- Gait disturbances
- Kyphosis (abnormal spinal curvature)
- Reduced proprioception
- Diseases and/or therapies that cause sedation, dizziness, weakness, or lack of coordination
- Alzheimer's/other dementia, delirium, Parkinson disease, and stroke

Environmental risk factors
- Low-level lighting
- Obstacles in the walking path
- Loose throw rugs
- Stairs
- Lack of assistive devices in bathrooms
- Slippery outdoor conditions
- PSYCHOLOGICAL RISK FACTORS
- Anxiety and agitation
- Depression
- Diminished cognitive acuity
- Fear of falling

HEIGHT LOSS, KYPHOSIS:

Osteoporosis can cause height loss and kyphosis because weakened vertebrae (spine bones) are prone to compression fractures, where the bone collapses and flattens. This loss of height is a result of the spine shortening, and kyphosis, or a "hunchback" posture, develops when these fractures cause the spine to curve forward.





SECONDARY OSTEOPOROSIS:

Secondary osteoporosis is caused by other health conditions. Up to 30% of osteoporosis cases in postmenopausal women are estimated to be from a secondary cause. Premenopausal women, and perimenopausal women if vitamin D deficiency is included as a secondary cause.

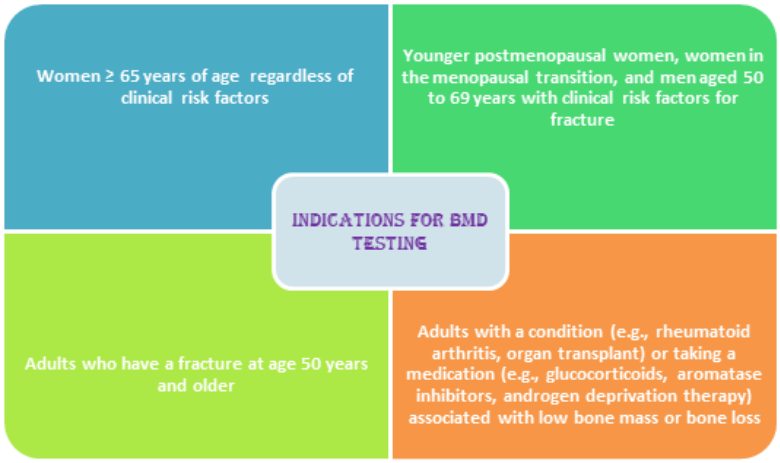
In addition to performing a history and physical examination, expert consensus suggests a basic laboratory evaluation for all newly diagnosed patients to determine if there are contraindications for certain osteoporosis medications and to identify the more common secondary causes. The most commonly recommended laboratory tests include serum 25-hydroxyvitamin D, calcium, creatinine, and thyroid-stimulating hormone levels

LAB EVALUATION: (7)

Primary hyperparathyroidism	Serum levels of: parathyroid hormone calcium phosphorus alkaline phosphatase
Secondary hyperparathyroidism from chronic renal failure	Renal function tests
Hyperthyroidism or excess thyroid hormone treatment	Thyroid function tests
Increased calcium excretion	24-hour urine collection for calcium and creatinine concentrations
Hypercortisolism, alcohol abuse, and metastatic cancer	Careful history and when indicated appropriate laboratory studies
Osteomalacia	Serum levels of: calcium phosphorus alkaline phosphatase 1,25-dihydroxyvitamin D

CONSIDER IN SELECTED PATIENTS

- Serum protein electrophoresis (SPEP)
- serum immunofixation
- serum free kappa and lambda light chains
- Thyroid-stimulating hormone (TSH) +/− free T4
- Tissue transglutaminase antibodies (and IgA levels)
- Iron and ferritin levels
- Homocysteine (to evaluate for homocystinuria)
- Prolactin level
- Tryptase
- Biochemical markers of bone turnover
- Protein electrophoresis (UPEP) and kappa and lambda light chains
- Salivary cortisol and/or Urinary free cortisol level
- Urinary histamine



INDICATIONS FOR VERTEBRAL IMAGING :

- All women aged ≥ 65 years
- Postmenopausal women
- Fracture during adulthood (age ≥ 50 years)
- Historical height loss of 1.5 in. or more
- Prospective height loss of 0.8 in. or more
- Recent or ongoing long-term glucocorticoid treatment
- Medical conditions associated with bone loss such as hyperparathyroidism

References:

1)Berek, Jonathan S. Williams Gynecology. 4th ed., McGraw-Hill Education, 2016, p. 487.

2). Cosman F, de Beur SJ, LeBoff MS, Lewiecki EM, Tanner B, Randall S, Lindsay R. Clinician's Guide to Prevention and Treatment of Osteoporosis. Osteoporos Int. 2014;25(10):2359-2381. doi: 10.1007/s00198-014-2794-2.

3).Khosla S, Hofbauer LC. Osteoporosis treatment: recent developments and ongoing challenges. Lancet Diabetes Endocrinol. 2017;5(11):898-907. doi: 10.1016/s2213-8587(17)30188-2.

4), Jeremiah MP, Unwin BK, Greenawald MH, Casiano VE. Clinician's Guide to Prevention and Treatment of Osteoporosis. Washington, DC: National Osteoporosis Foundation; 2014.https://www.aafp.org/pubs/afp/issues/2015/0815/p261.html

5)U.S. Department of Health and Human Services. Bone Health and Osteoporosis: A Report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Office of the Surgeon General, 2004.

6)NationalOsteoporosisFoundation.HealthProfessional'sGuidetoRehabilitation of Patients with Osteoporosis. 2003. Copyright NOF, Washington, DC

7)Berek, Jonathan S. Williams Gynecology. 4th ed., McGraw-Hill Education, 2016, p. 489.

02 Reading a DXA Report (and VFA): a clinician's guide for everyday practice

Author - Dr Asha Jain
Chairperson, Food, Drugs & Medicosurgical Equipment Committee, FOGSI & President Raipur Menopause Society Raipur CG

Co-Author - Dr. Purvi Agrawal
MBBS, DGO, DNB, FETAL MEDICINE.Consultant And Director
Krishna Fetal Medicine Center
Jannani Diagnostics, Raipur- 492001

When the DXA report lands in your inbox, it is much more than a number with a minus sign. Read well, it tells you where the skeleton is weakest, how reliably it was measured, what to watch out for in the images, and when to come back. And when paired with a Vertebral Fracture Assessment (VFA), the same sitting can convert an "osteopenia?" into a clear osteoporosis management plan. This article walks through how to read (and demand) a good DXA + VFA report—covering sites to use or avoid, positioning essentials, precision/LSC, T-scores versus Z-scores, imaging artefacts, VFA and vertebral morphometry basics, and follow-up timing—strictly aligned with the official positions and practice guidelines in the supplied references.

1) Start with the right places—and know what not to use

For diagnosis in postmenopausal women and men ≥50 years, the gold standard remains central DXA with T-scores derived from young adult reference data. Measure BMD at both the PA lumbar spine (L1–L4) and the hip in all patients; if hip or spine cannot be measured/interpreted (or in specific clinical scenarios such as primary hyperparathyroidism, or very obese patients over table limits), measure the 33% (one-third) radius of the non-dominant forearm. Do not use Ward's area or greater trochanter to make a diagnosis. And while lateral spine images can be invaluable for monitoring or VFA, the **lateral spine should not be used for diagnosis.**

On the hip image, the regions of interest should include the **femoral neck** and **total hip** with correct placement of the femoral neck box; this seems simple, but it is fundamental to report quality.

For the **reference database** behind your T-scores, look for a uniform White female normative database (NHANES III) for hip T-scores in everyone (women and men, all ethnicities), with manufacturer-specific databases for the lumbar spine. Local databases, where available, are appropriate for **Z-scores** but **not** for T-scores. This ensures consistency and avoids "apples vs oranges" when you compare across time or machines.

2) Positioning: the quiet hero behind a trustworthy number

Even a perfectly chosen site can betray you if positioning is sloppy. High-quality DXA requires consistent positioning, correct analysis, and a functioning quality-control (QC) programme (phantom scanning, calibration logs, thresholds for service). These are not "nice-to-haves"; they are the minimum standard that underpins any clinical inference from the scan.

For serial comparisons, insist that follow-up scans are done in the **same facility**, on the **same system and software**, with the **same positioning** and the **same hip/forearm** side. Modern systems offer a "copy" feature to clone prior acquisition parameters; ensure the centre uses it. Comparisons must be made on **absolute BMD values (g/cm²)**, not T- or Z-scores.

Where relevant, small details—like retracting a large abdominal panniculus in the same way at baseline and follow-up—matter, because soft-tissue distribution can change apparent BMD. This is part of good acquisition practice and reduces false change.

3) Precision and the Least Significant Change (LSC): when is a change real?

Every DXA centre must measure its in-vivo precision error and calculate an LSC (the smallest change you can trust). The practical formula is:

LSC (at 95% CI) = 2.77 × precision error.

ISCD gives practical thresholds and methods (e.g., 15 patients × 3 scans or 30 × 2 scans with repositioning; minimum acceptable technologist precision ≈1.9% lumbar spine and ≈1.8% total hip, translating to LSC ≈5.3% and 5.0%, respectively).

What this means for you: if your centre's LSC at the total hip is ~5.0%, a reported +2% at one year is statistical noise; a +6% is likely real. Do not treat paper changes smaller than the LSC as treatment success or failure.

If a scanner is replaced or another device is added, cross-calibration is mandatory before you compare numbers across machines; else you must set a new baseline and LSC.

4) T-scores versus Z-scores: who gets what?

For **postmenopausal women and men ≥50 years, use T-scores** and the WHO categories (normal, low bone mass/osteopenia, osteoporosis). A T-score ≤ −2.5 at the femoral neck (or at lumbar spine or total hip) defines densitometric osteoporosis; the reference remains young adult women from NHANES III for the hip.

For **premenopausal women, men <50, and children/adolescents**, interpret with **Z-scores**. ISCD defines Z ≤ −2.0 as **"below the expected range for age,"** and discourages applying the terms osteopenia/osteoporosis on BMD alone in these younger groups. (IOF nuances exist, but ISCD convention is widely used in densitometry reports.)

In reports for younger adults, a simple interpretive key helps: Z > 0 above average; Z between 0 and −2 below average; Z < −2 low for age—embedded in the structured reporting standards.

5) Artefacts and "what can go wrong" at the spine and hip

DXA interpretation is not just a number readout; images and meta-data must be scanned for **pitfalls**. Adopt a flow such as **PARED**: Positioning, Artefacts, Regions of interest, Edge detection, Demographics. Common problems—rotation, scoliosis, osteophytes, aortic calcification, cement, hardware, poor centring—can inflate or deflate BMD. If a vertebra is clearly abnormal or there is a **>1.0 T-score** discordance with its neighbour, **exclude** it from the L1–L4 mean and use the remaining evaluable vertebrae; if only one vertebra remains evaluable, base diagnosis at a different valid site.

Reports should say so when a site is invalid or excluded, and document technical quality, manufacturer/model/software, BMD (g/cm²), T-/Z-scores at each site, and any limitations. A one-page "components checklist" in the structured reporting recommendations is a useful yardstick for quality.

6) What a good VFA adds—and how to read it

Most vertebral fractures are **silent**. Catching them matters because a prevalent vertebral fracture **reclassifies risk**, can **change the diagnostic category**, and justifies treatment even when hip/spine T-scores are not yet osteoporotic. That is precisely why vertebral imaging —by lateral radiograph or by **DXA-VFA**—is recommended in high-risk groups.

VFA is performed in the same sitting on most modern DXA machines at **very low additional** radiation and cost, and is pragmatic to integrate into routine pathways. Real-world data show that introducing routine VFA can uncover a substantial burden of missed vertebral deformities; even when BMD looked "normal," VFA identified abnormalities that changed risk assessment and decision-making.

Indications are explicit. Consider VFA (or lateral spine radiography) when T-score is < −1.0 and the patient is: **women ≥70 or men** ≥80, has **historical height loss >4 cm, self-reported but undocumented prior vertebral fracture, or ≥3 months of ≥5 mg prednisolone-equivalent** therapy.

How to **read** the VFA: ISCD endorses **visual** diagnosis with severity grading using the **Genant semi-quantitative method**; morphometry can confirm deformity degree, but **morphometry alone** is not recommended for diagnosis. The report should state **which method** was used.

Why VFA changes the conversation: in older women, a VFA-identified vertebral fracture **independently** predicts future fractures and **substantially increases** 10-year MOF probability compared with models that ignore prevalent VF—translating into better risk stratification and timelier therapy.

Professional societies now encourage centres to systematically evaluate any spine visible on imaging and to embed vertebral imaging pathways (e.g., through FLS models), precisely because these fractures are under-recognised and prognostically rich.

7) Putting DXA + VFA together in the report

A structured DXA/VFA report should read like a crisp discharge summary—**concise, complete, comparable.** Alongside patient identifiers and indications, it should list the **scanner make/model/software, technical quality/limitations, sites and ROI, BMD in g/cm², T-/Z-scores**, and, where available, **FRAX** or other absolute risk with the calculator named. For follow-ups, show **absolute BMD change** and state if it meets the **LSC**. For VFA, specify the **visual method**, affected vertebrae and **grade** of deformity. If an anatomical site is invalid (e.g., degenerative lumbar spine), **explain** and shift diagnostic emphasis to valid sites (hip or 33% radius).

8) When to repeat: individualise, and don't chase noise

Follow-up DXA should be done with **clear objectives**, and when results are likely to **change management**. Repeat scanning is warranted if the patient sustains a **new fracture** or develops **new risk factors**, and to prepare for or during a planned **bisphosphonate holiday**. The interval is individualised by age, baseline BMD, treatment type, and clinical factors associated with rapid bone change (e.g., glucocorticoids, AIs, ADT, malabsorption, severe inflammatory disease, prolonged immobilisation, bariatric surgery, surgical menopause).

Practically, because many anti-resorptives change BMD modestly year-to-year and the LSC at hip/spine is ~5%, significant changes are often not seen before ~3 years (anabolics can show earlier change at the spine). Build that reality into your recall cadence.
And remember: a patient keeps the diagnosis of osteoporosis even if later T-scores improve above −2.5; repeat DXA monitors trajectory—it does not erase a prior diagnosis.

9) A practical reading routine you can use tomorrow

1. **Identify the sites** used (PA L1–L4, total hip/femoral neck; 33% radius when indicated). If Ward's area shows up in the diagnosis, challenge it.
2. **Scan the images** (spine and hip) before numbers: positioning symmetric? correct ROI? any visible artefacts or degenerative change that could falsely raise spine BMD? Exclusions stated?
3. **Check the reference**: T-scores should cite the correct young-adult database; Z-scores for younger patients.
4. **Look for VFA** (or lateral radiographs) in all who meet indications; verify that the Genant method is used for diagnosis and grading.
5. **For follow-ups, ask for absolute BMD change** and **whether it exceeds LSC**. If machines changed, look for cross-calibration or accept that you are setting a new baseline.
6. **Document management implications:** a VFA-positive vertebral fracture often shifts risk into treatment range, even with "osteopenic" hip/spine BMD—note that explicitly.

10) A word on service quality—and your patient's safety

Behind every reliable report is a service with QC: routine phantom scanning and calibration, internal peer-learning for reporting quality, and a culture of auditing LSC and recall intervals. If your centre does not provide its **precision/LSC** values, ask for them; if they cannot, consider referring to a centre that can.

Fracture prevention begins with identifying the right patients, measuring the right places, and trusting the numbers. Read the report with this framework and you will extract every bit of actionable intelligence a modern DXA + VFA can offer.

Annex: quick anchors you will see in good reports

- **Sites**: PA L1–L4 mean (with exclusions justified), total hip + femoral neck; 33% radius if indicated.
- **What not to diagnose on**: Ward's area, greater trochanter; lateral spine (for diagnosis).
- **Reference database**: NHANES III (hip); manufacturer-specific (spine). Z-scores use local references if available.
- **Precision/LSC**: Centre-specific, LSC ≈ 2.77×precision; typical max acceptable LSC ~5.0% hip, 5.3% spine.
- **VFA**: Indications (age, height loss, steroids, prior VF); diagnose using Genant visual semi-quantitative grading; morphometry supports severity.
- **Repeat DXA**: Individualise; often 2–3 years (sooner with rapid bone loss risks; later if low risk and stable). Do not over-scan to chase sub-LSC noise.

Medical References

1. International Society for Clinical Densitometry (ISCD). 2023 ISCD Official Positions – Adult. Middletown (CT): ISCD; 2023.

2. LeBoff MS, Greenspan SL, Insogna KL, Lewiecki EM, Saag KG, Singer AJ, et al. The clinician's guide to prevention and treatment of osteoporosis. Osteoporos Int. 2022;33:2049–2102.

3. National Osteoporosis Guideline Group (NOGG). Clinical guideline for the prevention and treatment of osteoporosis. Updated December 2024. Sheffield (UK): NOGG; 2024.

4.Johansson L, Johansson H, Axelsson KF, Harvey NC, Liu E, Leslie WD, et al. Improved fracture risk prediction by adding VFA-identified vertebral fracture data to BMD by DXA and clinical risk factors used in FRAX. Osteoporos Int. 2022;33:1725–1738.

5. Carey JJ, Yang L, Erjiang E, Wang T, Gorham K, Egan R, et al. Vertebral fractures in Ireland: A sub-analysis of the DXA HIP Project. Calcif Tissue Int. 2021;109:534–543.

6. Slart RHJA, Punda M, Ali DS, Bazzocchi A, Bock O, Camacho P, et al.; International Working Group on DXA Best Practices. Updated practice guideline for dual-energy X-ray absorptiometry (DXA). Eur J Nucl Med Mol Imaging. 2025;52:539–563.

7. El Miedany Y, El Gaafary M, Gadallah N, Sulimani R, AlAli NS, Alzoubi Z, et al. Standards for structured reporting of dual-energy X-ray absorptiometry scans: best practice recommendations by the Pan Arab Osteoporosis Society. Egypt Rheumatol Rehabil. 2023;50:49.

8. Greene L, Shah D, Laver K, Holton K, Manuel K, Bajger B. Quality improvement initiative: implementing routine vertebral fracture assessments into an Australian Fracture Liaison Service. BMJ Open Qual. 2023;12:e002303.

03

Nutrition for bones (India-specific)

Author - Dr. Sreedevi Vellanki
Vijaywada AP

Osteoporosis literally means ‘porous bone’. It is a condition where bones become thin and lose their strength, as they become less dense and their quality is reduced. This can lead to broken bones, which cause pain, disability, and make everyday activities extremely difficult.

Around the world, one in three women and one in five men over the age of fifty will suffer a broken bone due to osteoporosis. Osteoporosis is often called the ‘silent disease’ because most people don’t know they have osteoporosis until they suffer a broken bone from a minor fall or bump.

Osteoporosis can be prevented by leading a bone healthy lifestyle and taking balanced diet rich in Nutrients for Bone at all stages of life.

Osteoporosis prevention begins in childhood, when a bone-healthy diet and plenty of exercise helps children achieve their highest possible ‘peak bone mass’. This is important because the more bone mass an individual has on reaching adulthood, the less likely he/she has weak and breakable bones at older age. For women early prevention is especially important. Bone loss occurs rapidly after menopause, at around the age of 50, when the protective effect of oestrogen is lost. As an adult, one can do many things to help maintain healthy bones and to avoid premature bone loss. Making simple changes in the diet, taking enough exercise, and kicking bad lifestyle habits will not just help prevent osteoporosis, but will also benefitgeneral well-being.

Ensure a healthy diet which includes enough calcium and protein, two key nutrients for bone health. Enough vitamin D - made in the skin after exposure to sunlight, the average young adult needs about 15 minutes of daily sun exposure. vitamin D intake can be boosted through some foods like oily fish, eggs, mushrooms, and fortified dairy foods or juices. Maintain a healthy body weight - being too thin (BMI under 19) is damaging to bone health.

Take regular weight-bearing and muscle strengthening exercise. Avoidance of smoking and heavy drinking Awareness about osteoporosis **risk factors**, and getting an early diagnosis, and **treatment** if needed.

Osteoporosis prevention strategies in seniors

Older adults are at highest risk of osteoporosis, with nearly 75% of hip, spine and wrist fractures occurring in people aged 65 years old or over. The prevention advice listed above applies to all adults, but at older age one should pay special attention to the following:

Ensuring enough calcium, protein, vitamin D and other nutrients:

With age, ability to absorb vitamins and minerals may be reduced. In fact, older adults often suffer from malnutrition as they may not be eating enough and getting enough protein and vitamins in their diets. A calcium and vitamin D supplement should be considered when dairy consumption is low, and little time is spent outdoors.

Participating in exercise activities that improve balance, posture, coordination, and muscle strength. In addition to regular weight-bearing physical activity, older adults should choose exercises which help improve balance and muscle strength.

The following are the main Nutrients for Bone and their various sources.

CALCIUM. Calcium is a major building-block of bone – the skeleton houses 99% of the body's calcium stores. The calcium in bones also acts as a reservoir for maintaining calcium levels in the blood, which is needed for healthy nerves and muscles.

Calcium needs change at different stages in life. In teenage years, more calcium is needed because bones are growing rapidly. At an older age, the body's ability to absorb calcium declines, which is one of the reasons why seniors also require higher amounts.

Age	Calcium Recommended daily Intake (mg/day)
0-6 mnt	200
6-12 mnt	260
1-3 yrs	700

4-8 yrs	1000
9-13 yrs	1300
14-18 yrs	1300
19-50 yrs	1000
51-70 yrs	Females 1200 Males 1000
> 70 years	1200

Calcium rich Foods

Daily Calcium intake must be obtained from various sources of Calcium rich foods.

Milk and dairy products (such as milk,paneer, yoghurt, and cheese).Dairy foods have the additional advantage of being good sources of protein and other micronutrients important for bone health.

Other sources of calcium include:

Green vegetables like spinach,Methi,Amaranth,broccoli, cauliflower, cabbage,curly kale, and bok choy etc.

Some fruits such as custard apple,oranges, apricots, and dried figs

Canned fish with soft, edible bones (the calcium is in the bones) such as sardines, pilchards, and salmon

Nuts, especially almonds,walnuts.Sesame seeds/Til Calcium-set Tofu, Soy milk & soy based foods.

Millets like Ragi
Some calcium-fortified bread, cereals, fruit juices, soy beverages and several brands of mineral water also contain significant amounts of calcium. These can boostcalcium intake and provide an alternative for lactose-intolerants or vegans.

Lactose intolerants may not need to eliminate dairy consumption completely: lactose-reduced milks, yogurts with live cultures, and some hard cheeses are normally tolerated. Another alternative is to take lactase tablets or drops along with dairy foods.

Vitamin D
Vitamin D plays three key roles in bone health: Helps with calcium absorption from food in the intestine Ensures the correct renewal and mineralization of bone
Helps to keep muscles strong and so reduces the risk of falling Vitamin D is made in the skin when the skin is exposed to UV-B rays in sunlight. Only a limited number of foods contain vitamin D, so exposing the skin to sunlight is how we get 70-80% of the vitamin D our body needs.

The type of vitamin D made in the skin is called vitamin D3 (cholecalciferol) and the form of vitamin D that we get through our diet is either vitamin D3 or a closely related molecule of plant origin known as vitamin D2 (ergocalciferol).

How much target sun exposure is needed to get enough Vit.D?
10–20 minutes of sun exposure to bare skin (face, hands, and arms) outside peak sunlight hours (before 10 AM and after 2 PM) daily – without sunscreen – and taking care not to burn.

Sunlight is not always a reliable source of vitamin D. The season and geographic latitude, use of sunscreen, city smog, skin pigmentation, and a person's age are just some of the factors that will affect how much vitamin D is produced in the skin through sunlight.
Because many of us spend most of our times indoors, low levels of vitamin D have become a worldwide problem and there is concern that this is having a negative impact on bone health.

Sources of Vitamin D in foods

Very few foods are naturally rich in vitamin D. As a result, in some countries, certain food and drinks such as margarine, breakfast cereals, and orange juice are fortified with vitamin D. Natural food sources of vitamin D include oily fish (such as salmon, sardines and mackerel), eggs, mushrooms and liver.

Vegetarian sources of Vit.D:

Mushrooms[Shiitake,Maitake,or Oyster Mushrooms especially UV treated. Fortified plant based milk[Almond,soy, oat, coconut milk] Fortified cereals and Orange juice, Vitamin D supplements[vegan option available], UV exposed portobello mushrooms.

Recommended target vitamin D intake

There is no common definition of 'optimum' vitamin D intake and that's one reason why dietary recommendations for vitamin D are approximate. Many countries recommend a dietary intake of 200 IU/day (5 µg/day) for children and young adults, and 400-600 IU/day (10-15 µg/day) for older persons, to boost the amount of vitamin D that is made in the skin from sun exposure.

It is very common for seniors to have low vitamin D levels. This is because they tend to stay indoors or avoid sunshine. Also, in the elderly, the skin produces less vitamin D when exposed to the sun as compared to younger people.

As a result, IOF recommends that seniors aged 60 years and over take a supplement at a dose of 800 to 1000 IU/day to benefit bone health and help reduce the risk of falls.

For people with osteoporosis, combined calcium and vitamin D supplements are recommended to ensure that they are getting enough of these important nutrients and to maximize the benefits of osteoporosis treatment.

Vitamin D deficiency

Severe vitamin D deficiency can lead to bone deformities known as rickets in children. In adults, the same condition is known as osteomalacia. In industrialised countries, rickets and osteomalacia are relatively rare. However, low levels of vitamin D are common, affecting bone health and osteoporosis risk. Having enough vitamin D during pregnancy is important too because there is some evidence that a deficiency during pregnancy can lead to children with reduced bone mass, which could, in turn, be a risk factor for osteoporosis later in life.

A position paper authored on behalf of the International Osteoporosis Foundation (IOF) Vitamin D Working Group[1] summarises the burden of vitamin D deficiency and public health approaches for its prevention in global populations, addressing key issues such as global variations in vitamin D concentrations, methodological issues with testing, guidelines, screening, supplementation and food fortification.

Vitamin D levels at the population level differ markedly around the world, and are dependent on a range of factors such as diet, skin pigmentation, covering, latitude, effective sun exposure, and supplement use. We know that vitamin D is important for overall health and that severe vitamin D deficiency in some individuals may lead to serious health issues such as rickets or osteomalacia. In these patients, prompt vitamin D repletion is needed. However, at the level of public health, the role of vitamin D supplementation presents a different set of considerations. Here the goal is to keep vitamin D levels high enough, on average, to reduce the risk of health problems overall.

Building on recently published work from the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases[2], the position paper 'Optimisation of vitamin D status in global populations' concludes that:
Maintenance of adequate vitamin D status at the population level is obtained preferably through diet and lifestyle measures. Food fortification, as practiced in some countries, may provide an alternative route to optimising vitamin D status. Vitamin D supplementation in modest daily dosing is another approach to meeting the intake requirement. Importantly, any intervention should account for individual population characteristics, including, for example, habitual calcium intake.

Based on the current evidence base, there is insufficient justification for screening for vitamin D deficiency in the general population. Screening and/or routine supplementation may be appropriate in high-risk populations, for example older individuals in residential care and those with pigmented skin living in northerly latitudes.
At the individual patient level, where clinical symptoms suggest vitamin D deficiency, testing is likely to be indicated, together with a more aggressive approach to vitamin D repletion.

Where supplementation is recommended by a medical professional it should be in the form of a licensed product to ensure consistency between prescribed and actual dose. Owing to evidence of associated increased risk of falls and fractures, in general, bolus doses are not recommended unless there is a specific need for rapid correction.

The authors also point to the clear gaps in documentation of vitamin D deficiency worldwide, describing key methodological issues such as assay variability and lack of standardization in reporting. In terms of future studies on vitamin D epidemiology, and to strengthen future guidelines, the authors recommend that standardised measures of 25(OH)D, as per the Vitamin D Standardization Programme, should be reported in all studies and publications.

Protein and other nutrients

Protein is a building block for strong bones and muscles. It provides the body with a source of essential amino acids necessary for health. It is important for young people to eat enough protein-rich foods so their bones develop and grow optimally. In seniors, protein plays a role in preserving bone and muscle. Lack of protein robs the muscles of strength, which heightens the risk of falls, and contributes to poor recovery in patients who have had a fracture. Protein rich foods : Lean red meat, poultry and fish, as well as eggs and dairy foods, are excellent sources of animal protein.

Vegetable sources of protein include legumes (e.g. lentils, kidney beans), soya products (e.g. tofu), grains, mushrooms,panneer,nuts and seeds.

The currently recommended daily allowance for healthy adults is 0.8 g of protein per kilogram (kg) of body weight, per day.

Poor protein intake is often related to undernutrition. The ideal body mass index (BMI) should be between 20–25 kg/m2, and a BMI below 19 kg/m2 is a risk factor for osteoporosis.

Both plant and animal sources of protein promote strong bones and muscles. Milk and dairy products, as part of a balanced diet, are excellent sources of calcium, protein and other nutrients.

Other vitamins and minerals

_Fruits and Vegetables

Vitamin K

Magnesium

Zinc

Carotenoids

B Vitamins and Homocysteine

Foods that can negatively affect bone health

Caffeine and salt can increase calcium loss from the body and should not be taken in excessive amounts. A good rule of thumb is to drink caffeine-containing coffee in moderation and increase calcium intake to counterbalance the potential for calcium loss.

Excessive alcohol intake is a risk factor for osteoporosis and more than two units per day can increase the risk of suffering a fragility fracture. Moderation is again the key word - up to two 120 ml glasses of wine per day do not negatively impact on bone health.

There is no firm evidence that fizzy soft drinks (e.g. cola drinks) weaken bones, but here too, it's best not to overdo it - especially as such drinks tend to 'displace' nutritious drinks like milk in the diets of children and teenagers.

Sugary foods cause inflammation and hinder Calcium absorption.

FOOD FORTIFICATION:

Food fortification is the process of adding micronutrients to foods. As defined by the World Health Organization (WHO) and the Food and Agricultural Organization of the United Nations, fortification refers to ‘the practice of deliberately increasing the content of an essential micronutrient, that is, vitamins or minerals in a food, irrespective of whether the nutrients were originally in the food before processing or not, so as to provide a health benefit.

Importance of food fortification for reducing risk of bone fragility:

Bone is a living tissue, and as such all essential nutrients are needed to maintain bone integrity throughout the life cycle. When dietary intakes do not meet needs, nutrient gaps can be filled by means of supplementation and/or fortification. The fortification of milk and/or other dairy products with calcium is warranted for subjects whose daily portion size is insufficient to meet the recommended dietary allowance values. . Calcium and vitamin D are the fortificants most often added, whereas milk and dairy-related products are the most frequently used fortified foods. Evidence was obtained that, in postmenopausal women and elderly, food fortification with calcium and vitamin D substantially improves vitamin D status, provides a greater prevention of secondary hyperparathyroidism and significantly reduces accelerated bone turnover. The pattern of these biochemical effects can be interpreted as beneficial to the global prevention of osteoporosis and fragility fractures with aging.

Indian food is a vibrant blend of flavors, spices, and nutrients, offering much more than just a feast for the senses. With its rich variety of grains, vegetables, legumes, and dairy, Indian cuisine provides essential nutrients that promote overall health.

Among these, “Indian Food for Strong Bones” is especially important, as it is packed with calcium, vitamin D, and other bone-boosting elements. Whether it’s a hearty serving of palak (spinach), a bowl of lentils, or a glass of buttermilk, Indian food plays a vital role in building and maintaining bone strength.

Simple Indian Meal swaps for Strong Bones Yogurt

Yogurt is rich in calcium and probiotics, which aid in calcium absorption and support bone health. Regular consumption of yogurt helps maintain strong bones, boosts digestion, and strengthens muscles, making it a valuable part of the diet.

Milk

A classic source of calcium and vitamin D, milk is crucial for building and maintaining bone density. Consuming milk regularly ensures bones remain strong and helps in preventing conditions like osteoporosis, promoting overall bone strength.

Soy Milk

Soy milk is a great dairy alternative, packed with calcium and vitamin D. It promotes bone health and supports calcium absorption, making it an ideal option for those seeking non-dairy sources of nutrition for strong bones.

Eggs

Eggs are rich in protein and vitamin D, which play an essential role in calcium absorption and bone strength. Including eggs in diet helps maintain bone density and supports muscle health, contributing to overall skeletal wellness.

Cheese, Paneer

Cheese, especially paneer, is an excellent source of calcium and protein, both vital for strong bones. It supports bone density, promotes muscle function, and is a great addition to any diet focused on strengthening bones and muscles.

Tofu

Tofu, made from soybeans, is loaded with calcium and protein, crucial for maintaining bone strength. A versatile food that can easily be added to various Indian dishes, making it an excellent option for bone health.

Whole Grains

Whole grains like brown rice, barley, and quinoa are packed with minerals such as magnesium and phosphorus, essential for bone health. Including whole grains in diet supports bone density and promotes overall skeletal strength and function.

Walnuts and Avocados

Walnuts and avocados are rich in omega-3 fatty acids and antioxidants, which help reduce inflammation and support calcium absorption. These foods promote strong bones by nourishing body with essential nutrients and boosting overall bone health.

Almonds

Almonds are an excellent source of calcium, magnesium, and vitamin E, crucial for bone development and maintenance. Regular consumption helps strengthen bones, support muscle function, and enhance overall bone health.

Fishes

Fatty fish like salmon and mackerel are rich in omega-3 fatty acids and vitamin D, which are essential for healthy bones. These nutrients reduce the risk of bone disease, promote bone growth, and help maintain bone density.

Green Leafy Vegetables

Green leafy vegetables like spinach,fenugreek & amaranth are high in calcium and iron, crucial for strengthening bones. These veggies provide essential nutrients that improve bone density and promote overall skeletal health, especially when included in daily meals.

Oranges

Oranges are packed with vitamin C, which is important for collagen production and bone health. They enhance calcium absorption, support bone growth, and help maintain bone strength.

Sesame Seeds

Sesame seeds are an excellent source of calcium, magnesium, and phosphorus, which are essential for strong bones. They are perfect for boosting bone strength and can easily be incorporated in diet for added nutritional benefits.

Strong Bones Diet Plan

For strong bones, a balanced diet rich in calcium, vitamin D, and other bone-strengthening nutrients is essential. A diet plan could include milk or soy milk in the morning, yogurt at lunch, and leafy greens or whole grains at dinner, with nuts as snacks.

Meal	Food Items	Nutrients
Breakfast	Milk or Soy Milk	Ca 2+,Vit.D
	Yogurt with fruits	Protein,Ca2+.
Lunch	Green Leafy Vegetables (Spinach, Fenugreek)	Calcium, Iron
	Whole Grains (Brown Rice, Quinoa)	Mg,Phosphorus
	Tofu or Paneer	Ca,Protein
Snacks	Almonds, Walnuts, or Sesame Seeds	Ca,protein,Om3
Dinner	Fatty Fish (Salmon, Mackerel)	Omega-3 Fatty Acids, Vitamin D
	Avocados	Omega-3 Fatty Acids, Antioxidants
Additional Tips	Drink a glass of Orange Juice	Vitamin C
	Include Egg in your meal	Vit.D Protein

Conclusion

Incorporating food for strong bones into daily diet is essential for maintaining healthy bones throughout life. Traditional Indian cuisine offers a wealth of nutrient-rich options, such as dairy, leafy greens, legumes, and nuts, which are naturally packed with calcium, vitamin D, and other bone-strengthening nutrients. A balanced diet with these foods helps in preventing bone-related issues, supports bone growth, and enhances overall skeletal health. By focusing on these nutrient-dense foods, one can improve bone density, reduce the risk of fractures, and ensure optimal bone strength.

REFERENCES:

1.IOF Vitamin D position Paper 2o24

2.ICMR -NIN Dietary guidelines for Indians 2024

3.Food Fortification for Bone Health in Adulthood pmc.ncbi,nlm,nih.gov

4.Indian Food for Strong Bones Orthopedics 6 th August 2025

5.International Osteoporosis Foundation- Prevention of Osteoporosis.

----------xxxxx----------

04

Exercise For Stronger Bones And Fewer Falls

Author - Dr Sugandha Goel Infertility Specialist and Laparoscopic Surgeon Director of Kamla Nagar Hospital (100 bedded DNB OBS GYNAC AFFILIATED, NABH & NABL Accredited Hospital)

Co-Author - Dr Neha Agrawal (MBBS, DGO, DNB 1st year) Kamla Nagar Hospital

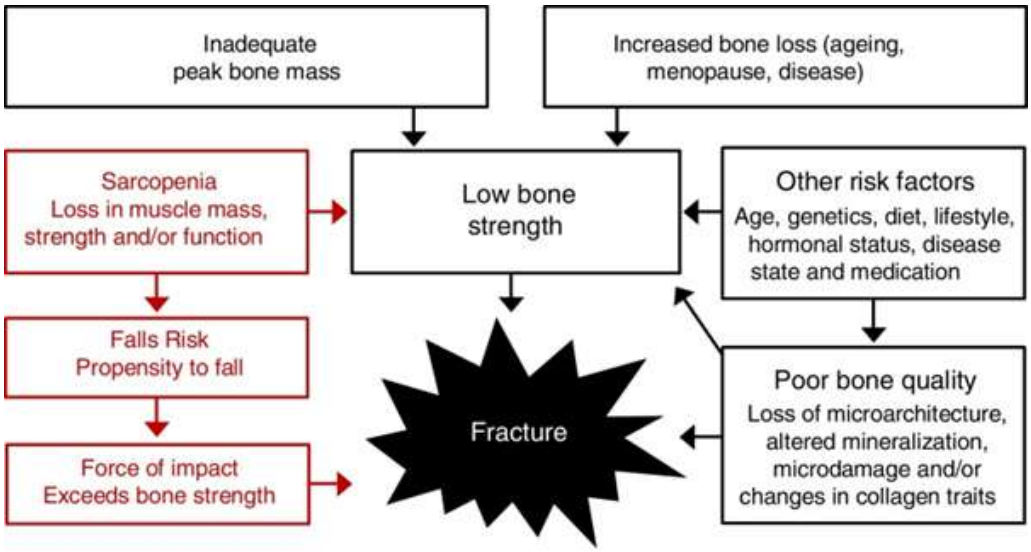
Introduction

Osteoporosis is a global clinical and public health problem because it is associated with an increased risk for fragility fractures which can lead to pain, disability, loss of functional independence and increased morbidity and mortality. It is more common in women than men, with the prevalence increasing markedly after the menopause.[1]

Pharmaceutical agents targeting bone mineral density (BMD) are the first line of treatment for osteoporosis because they reduce the risk of fractures by approximately 20–60%.[2]

Pharmaceuticals have no effect on key fracture risk factors, such as muscle strength, muscle power, dynamic balance, coordination and overall functional performance, all of which have been associated with an increased risk for falls and fracture .Exercise training is the only strategy that can improve all modifiable fracture risk factors (bone strength, fall risk, fall impact), but it must be appropriately prescribed and adherence needs to be maintained. [3]

The focus is on the prevention, rather than management, of osteoporosis and fractures.



The social scenario of senior women in our country is sadly that of reduced activity. Women often exercise less when they enter menopause, which can lead to weight gain. To further complicate matters, the metabolism is also decreased. One reason of this metabolism decline with age is the loss of muscle mass (about half-a-pound a year). Muscle burns more calories than fat, so whenever the muscle is not preserved with weight training exercise, the body simply does not burn as many calories. There is also a tendency to increase the intake of calories. As the metabolism drops, many women do not adjust their calories accordingly, which often leads to weight gain. The prevalence of the metabolic syndrome is reported to be significantly higher in postmenopausal women in India.[4]

It is never too late to start exercising.

The key is to start slowly and do things one enjoys such as walking, cycling, vigorous yard work, swimming, cardio machines or attending group fitness classes. Regular exercising can help in improving the overall wellbeing. Even moderate physical activity like simply moving the body enough to get the heart pumping brings great health benefits including more energy. The activity should be fast enough to get the heart pumping without being out of breath or exhausted.

HOW MUCH TO DO????

To determine the maximum heart rate for exercise one has to subtract the woman's age from 220. For the target heart rate range, multiply maximum heart rate by 50/100 and 80/100. When starting an exercise program, aim at the lowest part of the target zone (50 percent) during the first few weeks. Gradually build up to the higher part of the target zone (75 percent). After six months or more of regular exercise, one may be able to exercise comfortably at up to 85 percent of one's maximum heart rate.

Women on antihypertensive drugs should be cautioned of the fact that few high blood pressure medications,lower the maximum heart rate. Such women should consult their physicians to find out if they need to use a lower target heart rate.

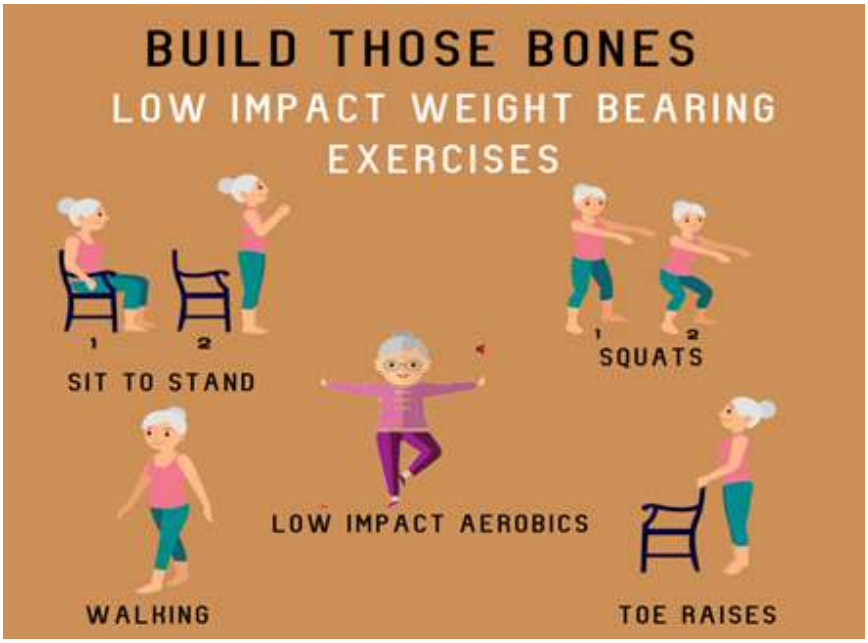
The talk test provides a convenient alternative for tracking the exercise intensity. Moderate intensity exercise, for example walking at 3.5 mph, allows a woman to talk, but not sing and should not be breathless. During vigorous aerobic exercise, such as step aerobics, she should be able to speak a few words, but not carry on a conversation. The benefit of exercising at the target heart rate increases the fitness and conditions the lungs, heart, circulation, and muscles.

VARIETIES OF EXERCISES [5]

Exercises that can help in building and maintaining the bone density and mass are as follows:

Weight bearing, high impact exercises: Includes dancing, high impact aerobics, running / jogging, jumping rope, stair climbing, and sports like tennis, basketball, volleyball or gymnastics. These are best for those who are not osteoporotic, not have low bone mass, and are not frail.

Weight bearing, low impact exercises: Are walking (treadmill/outside), elliptical training machines, stair step machines, and low impact aerobics. This group of exercises may be opted to build bones, by women who cannot do high impact exercises.



Weight or strength training or resistance training exercises: Include lifting weights, using elastic bands or weight machines for exercise, using simple functional movements such as standing or lifting the own body weight.

Nonweight bearing, nonimpact activities: Are cycling, swimming, stretching, and flexibility exercises. These should be included as components of a comprehensive exercise program. Alone these do not help building up the bones.

Non Impact exercises: Involve exercises that help in the balance posture and attitude, for example, T'ai Chi.

Menopause friendly exercise prescription: The exercise program for postmenopausal women should include, endurance exercise (aerobic), strength exercise, and balance exercise. Out of these aerobics, weight bearing, and resistance exercises are all effective in increasing the bone mineral density of the spine in postmenopausal women.[6]

An effective exercise prescription may be resistance and weight bearing exercise three days a week (on alternate days). Care should be taken to do the exercise for all the muscle groups by rotation preferably with a trainer. Brisk walking at the speed of five to six kilometres per hour, cycling, treadmill, gardening or dancing may be done on the remaining days of the week.[7]

Warming up beforehand can help to reduce exercise related injuries and pain following exercise. One should aim for two hours and 30 minutes of moderate

aerobic activity each week. Other deep breathing, yoga, and stretching exercises can help to manage the stress of life and menopause-related symptoms.

CONCLUSION

Exercise training for postmenopausal women is an effective approach to improve multiple fracture risk factors, but the benefits are dependent on the type and dose prescribed. At present, the optimal training program to prevent osteoporosis and related fractures has not been determined, but there is a growing body of evidence supporting the role of multimodal programs that incorporate short bouts of novel or diverse weight-bearing impact loading activities, progressive resistance exercises targeting muscles attached to or crossing the hip and spine, and functionally challenging balance and mobility activities. Despite these guidelines, further dose-response studies in humans are needed to refine the osteogenic loading characteristics and to quantify the minimum (or optimal) dose of exercise required to improve or preserve skeletal integrity and prevent fragility fractures. To gain a greater insight into the magnitude and distribution of bone strains within the proximal femur and spine, and the specific muscles contributing to such strains, further studies should apply advanced musculoskeletal modelling approaches with three-dimensional imaging techniques in a range of cohorts at varying fracture risk.

REFERENCES

1.Wright N.C., Looker A.C., Saag K.G. The recent prevalence of osteoporosis and low bone mass in the United States based on bone mineral density at the femoral neck or lumbar spine. J Bone Miner Res. 2014;29(11):2520–2526. doi: 10.1002/jbmr.2269.

2.Crandall C.J., Newberry S.J., Diamant A. Comparative effectiveness of pharmacologic treatments to prevent fractures: an updated systematic review. Ann Intern Med. 2014;161(10):711–723. doi: 10.7326/M14-0317.

3.Cawthon P.M., Fullman R.L., Marshall L. Osteoporotic Fractures in Men Research G Physical performance and risk of hip fractures in older men. J Bone Miner Res. 2008;23(7):1037–1044. doi: 10.1359/JBMR.080227

4.Pandey S, Shrinivas M, Agashe S, Joshi J, Galvankar P, Vaidya R, et al. Menopause and metabolic syndrome: A study of 498 urban women from western India. J Mid-Life Health. 2010;1:63–9. doi: 10.4103/0976-7800.76214.

5.Shah R. Approches to the prevention of bone health throughout life, Target Osteoporosis. IMS insight. 2009;(issue 3):39–46.

6.Bonaiuti D, Cranney A, Iovine R, Kemper HH, Negrini S, Robinson V, et al. Effects of exercise programme on quality of life in osteoporotic and osteopenic postmenopausal women:a systemic review and meta-analysisis. Cochrane Database Syst Rev. 2002;2:CD000333. doi: 10.1002/14651858.CD000333

7.Ahuja M. Strong Bones Exercise Programme. FOGSIFOCUS-Women and Osteoporosis. Jan 08;:25–27.

----------XXXXX----------

05 Understanding FRAX®: Interpreting Fracture Risk with Precision

Author - Dr. Sonal Gupta
MBBS, MD
Faridabad Hariyana

Introduction

In clinical practice, we frequently encounter middle-aged and older adults at uncertain fracture risk — not yet diagnosed, but clearly not low-risk either.

The **FRAX® tool** (Fracture Risk Assessment Tool), developed by the University of Sheffield, is designed to fill that gap.

It estimates a patient's **10-year probability of a major osteoporotic fracture (MOF)** and **hip fracture**, based on easily obtainable clinical variables — and, optionally, bone mineral density (BMD).

Understanding how to use FRAX correctly, interpret the numbers, and apply guideline thresholds like those from **NOGG 2024** transforms it from a calculator into a true decision-support instrument.

1. What FRAX Measures

FRAX estimates:

1. **10-year probability of a Major Osteoporotic Fracture (MOF)** – includes hip, clinical spine, forearm, or humerus fractures.
2. **10-year probability of a Hip Fracture** – a subset focusing only on the hip.

Both probabilities are expressed as percentages — representing the chance of at least one fracture event over the next decade.

2. The FRAX Inputs

The tool integrates **clinical risk factors** that independently contribute to fracture risk. These include:

Risk Factor	Input type
Age and Sex	Continuous variables
Weight and Height	For BMI calculation

Previous fracture	Yes/No
Parental hip fracture	Yes/No
Current smoking	Yes/No
Glucocorticoid use	Yes/No
Rheumatoid arthritis	Yes/No
Secondary causes of bone loss	Yes/No
Alcohol ≥3 units/day	Yes/No

Femoral neck BMD (optional) Continuous T-score input

The model then combines these parameters with **country-specific fracture and mortality data** to compute a 10-year probability.

3. Using FRAX With and Without BMD

FRAX can be calculated with or without the femoral neck bone mineral density value:

- **Without BMD**: Useful as an initial screening tool or when DXA is unavailable. Provides a reasonable estimate based solely on clinical factors.
- **With BMD**: Enhances accuracy — especially in borderline cases or when results are near intervention thresholds.

Best practice:

Start without BMD to stratify risk. If the calculated value lies near a treatment threshold, repeat FRAX with the patient's BMD input for greater precision.

4. Country-Specific Models

Fracture risk and life expectancy differ between populations, so FRAX offers **country-calibrated models.** Each version is based on national epidemiological data for fractures and mortality.

- Always select the **appropriate country model** (e.g., FRAX-Germany, FRAX-India, FRAX-Czech Republic) for accurate estimation.

If a country-specific model is unavailable, use a regional equivalent suggested by the FRAX developers — ideally one with similar fracture incidence and life expectancy patterns

5. Understanding the 10-Year Probabilities

FRAX outputs two key figures:

Probability	Interpretation
MOF (%)	10-year probability of a major osteoporotic fracture (spine, hip, humerus, forearm)

Hip (%)	10-year probability of a hip fracture alone

These probabilities are **absolute**, not relative — meaning, for example, a "20% MOF risk" indicates a **1 in 5 chance** of sustaining a fracture within 10 years.
Both values are considered separately, as some patients may have a modest overall MOF risk but a disproportionately high hip risk.

6. Thresholds and the NOGG 2024 Approach

The **National Osteoporosis Guideline Group (NOGG 2024)** offers a simple visual method to interpret FRAX outputs and guide management.
The NOGG chart plots **fracture probability (y-axis)** against age **(x-axis)** and defines three zones:

Risk zone	**Action**
Below the assessment line	Low risk → reassure and reinforce lifestyle measures.
Between the lower and upper line	Intermediate risk → measure BMD and recalculate FRAX.
Above the upper line	High risk → consider intervention or specialist referral.

This "traffic light" style approach (green–amber–red) provides clear direction and supports consistent, data-driven decisions.

7. Clinical Adjustments and Nuances

FRAX assumes **average risk exposure** for certain factors, so adjustments are necessary for some clinical situations:

Scenario	**Adjustment or Note**
High-dose glucocorticoids (>7.5 mg prednisone/day)	Multiply MOF by ~1.15 and Hip risk by ~1.20 (per Sheffield guidance).
Multiple prior fractures	FRAX underestimates risk — treat more aggressively.
Low BMI (<19 kg/m²)	May underestimate risk; interpret conservatively.
Type 2 diabetes	Risk is higher than FRAX predicts; consider as equivalent to a positive "secondary cause" box.
Frequent falls or frailty	FRAX does not incorporate falls; use additional clinical judgment.

These modifiers ensure FRAX is interpreted in real-world clinical context rather than as a standalone number.

8. How to Communicate FRAX Results

Clear communication helps patients understand their risk and engage with prevention strategies.

Instead of quoting a percentage, translate it into relatable terms:

"Your FRAX result shows a 10-year risk of 18% for a major fracture — that means about one in six people like you would experience a significant fracture in that time. The good news is we can substantially reduce that risk through treatment and lifestyle measures."

This approach converts data into meaningful, motivational language.

9. Integrating FRAX into Clinical Workflow

Practical steps for clinics

1. Identify patients for risk assessment (typically women ≥65 or those with known risk factors).
2. Run FRAX without BMD initially.
3. If intermediate/high risk → order DXA and repeat FRAX with BMD.
4. Compare results with NOGG 2024 thresholds.
5. Document and communicate clearly with patients.

10. Common Pitfalls

- Using the wrong country model → inaccurate estimates.
- Entering total hip or spine T-score instead of **femoral neck BMD.**
- Ignoring secondary factors (steroids, diabetes, falls).
- Relying on FRAX alone without clinical context.

Confusing MOF with hip risk — both have different clinical implications

11. Key Takeaways

- FRAX is a validated, evidence-based **fracture probability calculator**, not a diagnostic test.
- It can be used **with or without BMD** for flexibility in different settings.
- **Country-specific models** are essential for accurate interpretation.
- **NOGG 2024** provides actionable thresholds to support treatment decisions.
- **Adjust** FRAX estimates for glucocorticoids, diabetes, and frailty.
- Communicate results in patient-friendly language to drive engagement.

12. References

1. **FRAX® Official Tool.** University of Sheffield, UK. https://www.sheffield.ac.uk/FRAX
2. **National Osteoporosis Guideline Group (NOGG 2024)**. Clinical guideline for the prevention and management of fragility fractures.
3. **Kanis JA et al**. FRAX and the assessment of fracture probability in clinical practice: Overview and recent developments. University of Sheffield, 2024.

Conclusion:

FRAX represents a shift from intuition-based to probability-based fracture risk estimation.

By integrating straightforward clinical data and, when available, BMD results, it provides an individualized 10-year fracture probability that can be directly linked to action.

When used correctly — with the right country model, adjusted for key modifiers, and interpreted through NOGG's practical framework — FRAX becomes more than a calculator: it becomes a reliable partner in risk-based decision-making.

06 Pharmaco Therapy Of Menopause & Pharmacodynamics Of Bisphonates

Author - Dr.M.Chandra Ponnusamy
MBBS,DGO,FICOG,D.R.M(Germany),
consultant & clinical director,
Chandra nursing home,Chandra
fertility research centre,Namakkal,Tamilnadu

Osteoporosis is characterized by a loss of bone density and mass causing an increased risk of fractures.[1] Postmenopausal osteoporosis affects millions of women each year.
Initial treatment is based on many factors including T-score, fracture risk assessment tool score, and risk factors for fractures. The most recent additions to treatment are aimed at those who are considered to be at higher fracture risk AACE/ACE guidelines recommend

Lifestyle modifications and Non pharmacologic therapies for all patients diagnosed with osteoporosis as firstline.Laboratory values for calcium and vitamin D should be evaluated prior to initiating pharmacotherapy..
Goal serum 25-hydroxy vitamin D levels should be maintained at 30-50 ng/mL, and patients older than age 50 years should have a target intake of 1,000-2,000 IU of vitamin D_3 daily Calcium intake should be evaluated and maintained at 1,200 mg per day for women older than age 50 years. Overall, dietary intake of vitamin D_3 and calcium is preferred over supplements; However, if this is not feasible, supplement use should be recommended.

Current Medication Therapies

The 2019 Journal of Clinical Endocrinology and Metabolism (JCEM) Clinical Practice Guidelines for pharmacological management of osteo porosis in postmenopausal women state that
oral bisphosphonates such as **alendronate** and **risedronate** should be considered as first-line therapy for those at high fracture risk(Table 1 lists medications and dosages for postmenopausal osteoporosis)

Table 1

Medications for Postmenopausal Osteoporosis

Drug	Treatment Dose
Abaloparatide	80 mcg SC daily for 2 years
Alendronate	70 mg po once weekly 10 mg po daily
Calcitonin	200 IU intranasally daily 100 IU SC daily
Denosumab	60 mg SC every 6 months
Estrogen	No specified dosing recommended
Ibandronate	150 mg po once monthly 3 mg IV every 3 months
Raloxifene	60 mg po daily
Risedronate	150 mg po once monthly 35 mg po once weekly 5 mg po daily
Romosozumab	210 mg SC every month for 1 year
Teriparatide	20 mcg SC daily for 2 years
Zolendronic acid	5 mg IV once yearly

Source: Reference 3.

JCEM guidelines recommend denosumab, teriparatide, or abaloparatide for patients at high to very high fracture risk.

High risk is described as a prior spine or hip fracture;

a T-score at hip or spine of <-2.5 or below (the more negative the number, the greater the risk);

10-year hip fracture risk >3%; or risk of major osteoporotic fracture >20%.

Patients are considered at very high risk if a history of multiple spinal fractures is present, along with a diagnostic T-score.

Other reasons injectable medications can be recommended over oral bisphosphonates include nonadherence to oral therapy, esophageal disease that could be exacerbated by oral bisphosphonates, or gastrointestinal problems that would prevent absorption.[3,4]

AACE/ACE guidelines identify alendronate, risedronate, zoledronic acid, and denosumab as initial choices for therapy for those with no history of low-impact fractures or a moderate fracture risk Denosumab is the agent of choice for patients with renal insufficiency, because it is not renally excreted.[3]

Alternate treatment options could include ibandronate or raloxifene. Patients with a history of prior fragility fractures or higher fracture risk should consider denosumab, teriparatide, or zoledronic acid as first-line treatment options.[3]

Higher fracture risk is identified by a combination of advanced age, frailty, history of long-term glucocorticoid use, very low T-scores, or increased fall risk. Other risk factors that can be considered when assessing fracture risk are premature menopause, primary or secondary amenorrhea, Asian or Caucasian ethnicity, family or personal history of a low-impact fracture, low body weight, smoking history, excess alcohol use, long-term immobilization, and poor diet.[5]

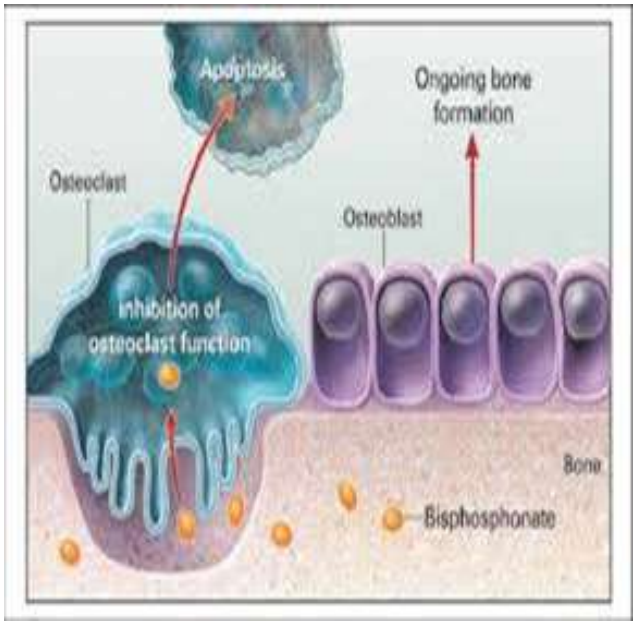
BISPHOSPHONATES :-

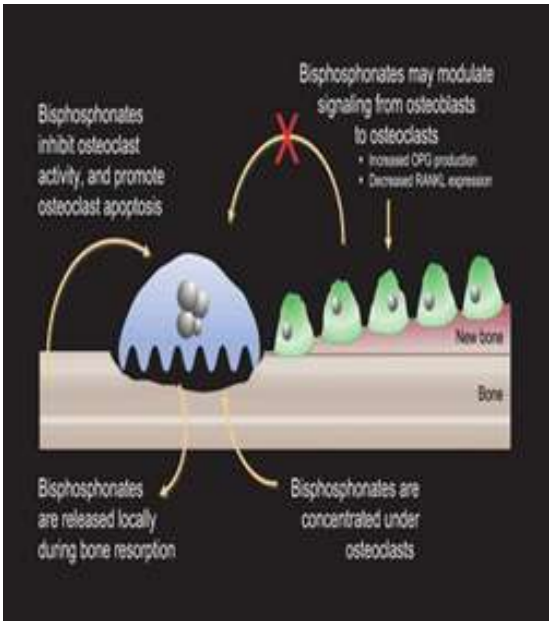
Bisphosphonates are a class of drugs that slow bone loss by inhibiting bone-resorbing cells called osteoclasts, making them a primary treatment for osteoporosis and related conditions like Paget's disease and hypercalcemia of malignancy.

Common bisphosphonates include oral medications like alendronate and risedronateand an intravenous form called zoledronic acid..

They work by strengthening bones and reducing the risk of fractures, but can require long-term use and carry risks like esophageal irritation and osteonecrosis of the jaw.

How They Work





Inhibit Osteoclasts:

Bisphosphonates bind to bone minerals and specifically target osteoclasts, the cells responsible for breaking down bone tissue.

- **Slow Bone Loss:** By inhibiting osteoclasts, bisphosphonates slow down the rate at which bone is lost, helping to increase bone density and strengthen bones.

Common Uses

- **Osteoporosis:** The most common use, treating osteoporosis in both men and women to reduce the risk of fractures.

- **Paget's Disease:** To treat Paget's disease of the bone, where bone is remodeled abnormally.
- **Bone Metastases:** Used in cancer treatment to manage bone metastases (cancer that has spread to the bone) and associated hypercalcemia.

Common Bisphosphonate Drugs

- **Oral:**
  - Alendronate:
  - Risedronate:
  - Ibandronate

- **Intravenous:**
  - Zoledronic Acid: h

Important Considerations

- **Administration:-** Oral bisphosphonates must be taken on an empty stomach with a full glass of water and the patient must remain upright for at least 30 minutes afterward to prevent esophageal irritation.

- **"Drug Holidays":**

Because bisphosphonates accumulate in bone and maintain their effects for some time after therapy is stopped, doctors may recommend temporary breaks from treatment to reduce potential long-term risks.

.: If the patient has a significant decrease in BMD or a new fragility fracture despite current treatment, this is considered as treatment failure.

Though less commonly used due to reduced efficacy or increased risk of adverse effects, raloxifene, calcitonin, and estrogen may be used to treat postmenopausal osteoporosis.[3,] .[3] Raloxifene can be used if the patient cannot use bisphosphonates or denosumab, is at low risk of venous thromboembolism, and has a high risk of breast cancer.[4]

Nasal-spray calcitonin may be beneficial to reduce the risk of vertebral fractures only.

Estrogen therapy may be used to prevent postmenopausal osteoporosis and reduce fracture risk. Due to the risk of thromboembolism, estrogen should be used in the lowest effective dose for the shortest amount of time possible.

New Medication Therapies

Abaloparatide: The FDA approved abaloparatide for treatment in postmenopausal women at high fracture risk in April 2017. This adds another parathyroid hormone analogue to the market in addition to teriparatide.[6,7] Abaloparatide binds with a much higher affinity to the transient RG conformation of the parathyroid hormone type 1 receptor, compared with teriparatide. This mechanism may increase bone formation and decrease bone resorption more than teriparatide.[8]

The dosing for abaloparatide is 80 mcg injected subcutaneously daily.[7] Reported adverse effects include dizziness, hypercalcemia, hyperuricemia, and injection-site reactions, which occurred in more than 10% of the population receiving abaloparatide.[7] It is recommended that abaloparatide be administered in a setting where the patient can sit or lie down if an episode of hypotension occurs.

Abaloparatide is available as a 2,000 mcg/1 mL solution pen containing 1.56 mL for a total of thirty 80-mcg doses.[7] Pens should be stored at a refrigerated temperature long-term but can also be stored at temperatures up to 77°F if used in 1 month. This differs from teriparatide, which must be refrigerated at all times.[7,10] Patients should be trained on proper injection technique as abaloparatide is administered at home. Injections should occur in the periumbilical region of the abdomen and injection sites rotated daily.[6] Owing to the possibility of hypercalcemia and urolithiasis, serumcalcium and uric acid should be monitored during therapy.

The FDA requires a boxed warning on abaloparatide for an increased risk of osteosarcoma that occurred in rats.Although this effect has not been seen in humans, use of abaloparatide should be limited to 2 years in all patients and is not recommended in patients with Paget's disease or who are at increased risk of osteosarcoma.[6] Following 2 years of therapy with either teriparatide or abaloparatide, it is recommended to use antiresorptive agents such as bisphosphonates or denosumab to preserve BMD gains.[3,4]

Romosozumab: In April 2019, the FDA approved romosozumab for osteoporosis in postmenopausal women at high fracture risk. Prescribing information for romosozumab defines high fracture risk as a history of osteoporotic fracture, multiple risk factors for fracture, and having failed or been intolerant to other therapies.

Romosozumab is a humanized monoclonal antibody and sclerostin inhibitor, promoting the Wnt pathway that increases bone formation and decreases bone resorption. Sclerostin is responsible for inhibiting the Wnt pathway and decreasing overall bone formation.[13] Dosing is 210 mg via SC injection once monthly for 12 months. Use is limited to 12 months as studies evaluating bone turnover markers demonstrated a waning effect after this treatment period.[12] Romosozumab is supplied as a 105 mg/1.17 mL prefilled syringe solution for injection. Two syringes should be administered consecutively in-office by a healthcare provider monthly.[11] This product must be kept refrigerated when not in use and must be disposed of if left at room temperature for 30 days or longer.

Side effects occurring in more than 10% of the population receiving romosozumab include antibody formation and arthralgia.

The FDA requires a boxed warning for this medication owing to a higher rate of major adverse cardiac events.

Therefore, romosozumab should not be administered to those who have had a myocardial infarction or stroke in the previous year, and it should be used with caution in those who have cardiac risk factors

Romosozumab is contraindicated in hypocalcemia and in those with a known hypersensitivity to romosozumab or any ingredient present in the solution. Serum calcium must be monitored during treatment with romosozumab.[12]

CONCLUSION

Postmenopausal osteoporosis is a chronic condition affecting millions of women worldwide. Use of newer agents for osteoporosis treatment such as abaloparatide and romosozumab offer alternatives for those for whom traditional therapy has not been successful or who are at a high fracture risk. A patient's individual risk factors for fracture and history of prior treatment failure, the high cost of these new medications, and potential serious adverse reactions are all factors that are imperative to consider when selecting an appropriate osteoporosis treatment.

REFERENCES

1. National Osteoporosis Foundation. Learn what osteoporosis is and what causes it. www.nof.org/patients/what-is-osteoporosis/. Accessed August 14, 2019.
2. National Osteoporosis Foundation. What women need to know. www.nof.org/preventing-fractures/general-facts/what-women-need-to-know/. Accessed August 14, 2019.

3. Camacho PM, Petak SM, Binkley N, et al. AACE/ACE clinical practice guidelines. American Association of Clinical Endocrinologists. Published November 13, 2018. www.aace.com/publications/guidelines. Accessed August 14, 2019.
4. Eastell R, Rosen CJ, Black DM, et al. Pharmacological management of osteoporosis in postmenopausal women: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2019;104:1595-1622.
5. Kanis JA. Diagnosis of osteoporosis and assessment of fracture risk. Lancet. 2002;359(9321):1929-1936.
6. Tymlos (abalopariride) prescribing information. Waltham MA: Radius Health Inc; 2017.
7. Abaloparatide. Clinical pharmacology. [Internet database]. Tampa, FL: Gold Standard. 2019. www.clinicalpharmacology.com/. Accessed August 14, 2019.
8. Cosman F. The evolving role of anabolic therapy in the treatment of osteoporosis. Curr Opin Rheumatol. 2019;31(4):376-380.
9. Miller PD, Hattersley G, Riis BJ, et al. Effect of abaloparatide vs placebo on new vertebral fractures in postmenopausal women with osteoporosis. JAMA. 2016;316(7):722-733.
10. Forteo (teriparatide) prescribing information. Indianapolis, IN: Eli Lilly and Co; 2002.
11. Romosozumab. Clinical pharmacology [Internet database]. Tampa, FL: Gold Standard. 2019. www.clinicalpharmacology.com/.
12. Evenity (romosozumab aqqg) prescribing information. Thousand Oaks, CA: Amgen, Inc; 2019.
13. Lim SY, Bolster MB. Profile of romosozumab and its potential in the management of osteoporosis. Drug Des Devel Ther. 2017;11:1221-1231.
14. Cosman F, Crittenden DB, Adachi JD, et al. Romosozumab treatment in postmenopausal women with osteoporosis. N Engl J Med. 2016;375(16):1532-1543.
15. Saag KG, Petersen J, Brandi ML, et al. Romosozumab or alendronate for fracture prevention in women with osteoporosis. N Engl J Med. 2017;377(15):1417-1427.
16. Langdahl BL, Libanati C, Crittenden DB, et al. Romosozumab (sclerostin monoclonal antibody) versus teriparatide in postmenopausal women with osteoporosis transitioning from oral bisphosphonate therapy: a randomised, open-label, phase 3 trial. Lancet. 2017;390:1585-1594.

07 Anabolic Therapy and Sequencing in the Management of Postmenopausal Osteoporosis

Author - Dr Deepti Gupta
MS, DNB, FICOG, FMAS
Associate Professor, Department of Obstetrics & Gynecology, NSCB MCH Jabalpur Consultant & Unit Head, Ankur Fertility Clinic & IVF Center, Jabalpur

Co- Author - Dr Neelam Khare
Senior Resident, Department of Obstetrics & Gynecology, NSCB MCH Jabalpur

INTRODUCTION : The Burden of Postmenopausal Osteoporosis

Osteoporosis is a systemic skeletal disease characterized by impaired bone microarchitecture and reduced bone mass, leading to increased fracture susceptibility. In postmenopausal women, the rapid decline in estrogen levels triggers an acceleration of bone remodeling where bone resorption outpaces formation, resulting in progressive bone loss. This imbalance poses a substantial clinical burden, with approximately one in three women experiencing an osteoporotic fracture after age 50. Vertebral and hip fractures, in particular, are associated with significant morbidity, mortality, and diminished quality of life. While antiresorptive medications like bisphosphonates and denosumab have been first-line treatments for decades, they primarily suppress bone breakdown and cannot restore lost bone structure. This limitation has propelled the development of osteoanabolic therapies that actively stimulate new bone formation, offering particular benefit for women at the highest fracture risk.

ANABOLIC AGENTS: Mechanisms and Clinical Profiles

Osteoanabolic drugs represent a revolutionary approach to osteoporosis treatment by directly stimulating osteoblast activity to build new bone tissue. The three currently available agents—teriparatide, abaloparatide, and romosozumab—each have distinct mechanisms of action, pharmacological properties, and clinical considerations (Table 1).

Table 1: Comparison of Anabolic Agents for Osteoporosis in Postmenopausal Women

Property	Teriparatide	Abaloparatide	Romosozumab
Molecule Type	Recombinant PTH (1–34)	Synthetic PTHrP analog	Humanized monoclonal
Mechanism of Action	PTH receptor agonist	Selective PTH receptor agonist	Sclerostin inhibitor

accessibility. The American College of Obstetricians and Gynecologists (ACOG) guidelines for osteoporosis (2022) suggest teriparatide for postmenopausal osteoporosis with a high risk of fracture. 2023 American College of Physicians guidelines for osteoporosis recommend that clinicians prescribe teriparatide followed by bisphosphonate to decrease the risk of fractures in females with primary osteoporosis having a very high risk of fracture.

2.Abaloparatide: A Selective PTH Receptor Agonist

Abaloparatide is a synthetic analog of parathyroid hormone-related protein (PTHrP) designed to achieve more selective activation of the PTH1 receptor pathway. This selective activation aims to decouple bone formation from resorption, potentially reducing adverse effects like hypercalcemia and minimizing transient bone loss at cortical sites observed with teriparatide.

In the ACTIVE phase 3 trial, abaloparatide demonstrated 86% reduction in new vertebral fractures and 43% reduction in nonvertebral fractures compared to placebo. Subgroup analyses suggested potentially greater increases in hip bone mineral density (BMD) compared to teriparatide, though fracture outcomes between the two agents have not been directly compared in large trials. A 2023 meta-analysis reported that abaloparatide produced significantly greater BMD improvements at most skeletal sites except the lumbar spine at 24 weeks, with a 51% lower incidence of hypercalcemia compared to teriparatide.

3. Romosozumab: Dual-Action Sclerostin Inhibition

Romosozumab represents a mechanistically distinct approach to anabolic therapy. This humanized monoclonal antibody targets sclerostin, a glycoprotein produced by osteocytes that inhibits Wnt signaling—a crucial pathway for bone formation. By binding sclerostin, romosozumab simultaneously stimulates bone formation while reducing bone resorption, creating a unique "dual effect" that distinguishes it from PTH receptor agonists.

Clinical trials have demonstrated impressive efficacy. The FRAME study showed 73% reduction in new vertebral fractures and 36% reduction in clinical fractures versus placebo at one year. The ARCH trial, which enrolled higher-risk women, compared romosozumab to alendronate and found superior fracture reduction—a 37% lower risk of vertebral fractures and 28% lower risk of clinical fractures after one year.

Notably, when patients transitioned from romosozumab to alendronate in years two and three, those initially treated with romosozumab maintained significantly lower fracture rates.

Romosozumab carries a unique safety consideration—a warning to avoid use in patients with myocardial infarction or stroke within the past year due to a small increased incidence of cardiovascular events observed in the ARCH trial. This effect was not seen in the FRAME study, creating uncertainty that requires careful patient selection and consideration of cardiovascular risk factors.

TREATMENT SEQUENCING : Maximizing Anabolic Benefits

The temporal limitation of anabolic therapy (12-24 months, depending on the agent) necessitates subsequent treatment to maintain and enhance gains. Evidence strongly supports a sequential approach beginning with an anabolic agent followed by an antiresorptive rather than the reverse order.

1. Anabolic-to-Antiresorptive Sequencing

Transitioning from an anabolic agent to an antiresorptive (most commonly denosumab or a bisphosphonate) consolidates BMD gains and provides sustained fracture protection .In the ACTIVExtend trial, patients who received abaloparatide for 18 months followed by alendronate for 24 months maintained significantly higher BMD and continued to show reduced fracture incidence. Similarly, the FRAME extension demonstrated that transitioning from romosozumab to denosumab produced continuous BMD increases and further fracture risk reduction.

This sequencing strategy capitalizes on the "foundation effect" of building new bone with an anabolic agent, which is then preserved and strengthened with antiresorptive therapy. A 2025 network meta-analysis confirmed that sequential anabolic-to-antiresorptive therapy represents the optimal strategy for high-risk patients, with anti-sclerostin antibody (romosozumab) followed by anti-RANKL antibody (denosumab) showing particularly robust outcomes.

2. Antiresorptive-to-Anabolic Sequencing

Transitioning from antiresorptive to anabolic therapy presents greater challenges. Bone formation markers may be blunted due to the suppression of bone turnover by antiresorptives, potentially attenuating the anabolic response. The DATA-Switch study illustrated this concern, showing that switching from denosumab to teriparatide resulted in progressive or transient bone loss, particularly at the hip. This occurs because teriparatide stimulates bone remodeling, which is suppressed by prior antiresorptive use.

However, the VERO trial demonstrated that teriparatide still provides substantial anti-fracture efficacy even in patients previously treated with bisphosphonates, with no significant difference in effect between treatment-naïve and pre-treated patients. For patients requiring transition from antiresorptives to anabolics, combination therapy or overlapping treatment may mitigate bone loss, though this approach requires further study.

Clinical Application in Postmenopausal Women

1.Identifying Candidates for Anabolic Therapy

Anabolic agents are recommended for postmenopausal women at very high fracture risk rather than as first-line treatment for all osteoporotic patients . Clinical scenarios warranting consideration include:

- Severe osteoporosis (T-score ≤ -3.0) where antiresorptives are unlikely to achieve treatment targets
- Multiple vertebral fractures or a single vertebral fracture with low BMD
- Incident fractures while on antiresorptive therapy
- Very high fracture risk based on FRAX scores exceeding region-specific intervention thresholds
- Glucocorticoid-induced osteoporosis with high fracture risk

These high-risk populations derive the greatest absolute benefit from the rapid fracture risk reduction provided by anabolic agents.

2.Practical Considerations and Barriers

Despite demonstrated efficacy, anabolic therapy faces implementation barriers. Cost concerns have traditionally limited use, though the availability of generic teriparatide and biosimilars is improving accessibility. Administration burdens, including daily subcutaneous injections for teriparatide and abaloparatide, and monthly healthcare professional-administered injections for romosozumab, may affect patient acceptance and adherence. Additionally, treatment duration limits (24 months for teriparatide/abaloparatide, 12 months for romosozumab) and specialist-initiation requirements in many healthcare systems create access challenges.

CONCLUSION

Anabolic therapies represent a significant advancement in managing postmenopausal osteoporosis, offering the unique ability to restore bone mass and microstructure rather than merely preventing further loss. Teriparatide, abaloparatide, and romosozumab each provide robust fracture protection through distinct mechanisms, with romosozumab demonstrating particularly potent effects through its dual action on bone formation and resorption.

The sequential approach of initiating treatment with an anabolic agent followed by an antiresorptive has proven superior for high-risk patients, creating a foundation of new bone that can be maintained with subsequent therapy . This strategy acknowledges the self-limited nature of anabolic effects while maximizing long-term outcomes.

As treatment paradigms evolve, anabolic agents are increasingly recognized as initial therapy for the highest-risk postmenopausal women rather than as last-line options. Future research should focus on head-to-head comparisons of treatment sequences, long-term safety beyond 36 months, and outcomes in diverse patient populations. For clinicians managing postmenopausal osteoporosis, understanding the distinct properties, efficacy profiles, and optimal sequencing of these powerful bone-building agents is essential for reducing the devastating consequences of osteoporotic fractures in this vulnerable population.

REFERENCES

- Robert M. Neer, Claude D. Arnaud, Jose R. Zanchetta, Richard Prince, Gregory A. Gaich, Jean-Yves Reginster, Anthony B. Hodsman. Effect of Parathyroid Hormone (1-34) on Fractures and Bone Mineral Density in Postmenopausal Women with Osteoporosis. N Engl J Med 2001;344:1434-1441. DOI: 10.1056/NEJM200105103441904. VOL. 344 NO. 19
- Kontogeorgos G, Krantz E, Trimpou P, Laine CM, Landin-Wilhelmsen K. Teriparatide treatment in severe osteoporosis - a controlled 10-year follow-up study. BMC Musculoskelet Disord. 2022 Nov 24;23(1):1011. doi: 10.1186/s12891-022-05987-2. PMID: 36424580; PMCID: PMC9686095.
- Cosman F, Crittenden DB, Ferrari S, Lewiecki EM, Jaller-Raad J, Zerbini C, Milmont CE, Meisner PD, Libanati C, Grauer A. Romosozumab FRAME Study: A Post Hoc Analysis of the Role of Regional Background Fracture Risk on Nonvertebral Fracture Outcome. J Bone Miner Res. 2018 Aug;33(8):1407-1416. doi: 10.1002/jbmr.3439. Epub 2018 May 11. PMID: 29750828.
- McCloskey EV, Fitzpatrick LA, Hu MY, Williams G, Kanis JA. Effect of abaloparatide on vertebral, nonvertebral, major osteoporotic, and clinical fractures in a subset of postmenopausal women at increased risk of fracture by FRAX probability. Arch Osteoporos. 2019 Feb 5;14(1):15. doi: 10.1007/s11657-019-0564-7. PMID: 30719589; PMCID: PMC6373333.
- Lane J, Langdahl B, Stone M, Kurth A, Oates M, Timoshanko J, Wang Z, Libanati C, Cosman F. Romosozumab in patients who experienced an on-study fracture: post hoc analyses of the FRAME and ARCH phase 3 trials. Osteoporos Int. 2024 Jul;35(7):1195-1204. doi: 10.1007/s00198-024-07049-w. Epub 2024 Apr 4. PMID: 38573517; PMCID: PMC11211143.

Effect on Bone Formation	Increases more than resorption	Increases	Increases
Effect on Bone Resorption	Increases	Increases	Decreases
Administration	20 µg SC daily	80 µg SC daily	210 mg SC monthly
Treatment Duration	24 months (maximum in	24 months (maximum in	12 months
Key Fracture Risk Reduction	Vertebral: 65–69% Non-vertebral: 53–54%	Vertebral: 86% Non-vertebral: 43%	Vertebral: 73% Clinical: 36%

1.Teriparatide: The Pioneer Anabolic Agent

Teriparatide, a recombinant fragment of parathyroid hormone (PTH 1-34), was the first anabolic agent approved for osteoporosis treatment. Its development followed the observation that intermittent PTH administration produces a predominant bone formation response, in contrast to the bone resorption seen with continuous exposure . This anabolic effect occurs through preferential activation of modeling-based bone formation and remodeling-based bone formation, ultimately increasing osteoblast number and activity .

The landmark Fracture Prevention Trial established teriparatide's efficacy, demonstrating 65-69% reductions in vertebral fractures and 53-54% reductions in nonvertebral fractures compared to placebo over 18 months . Subsequent head-to-head trials confirmed teriparatide's superiority over oral bisphosphonates. The VERO trial showed a 56% relative risk reduction in vertebral fractures and 34-52% reductions in nonvertebral and clinical fractures compared to risedronate in women with severe osteoporosis . Teriparatide also demonstrates particular efficacy in glucocorticoid-induced osteoporosis, reducing fracture risk by 90% compared to alendronate .

Safety considerations include a black box warning regarding osteosarcoma risk based on rodent studies, though this side effect has not been observed in human post-marketing surveillance . Other adverse effects may include transient hypercalcemia (occurring in approximately 3% of patients), nausea, headache, and dizziness . Treatment is typically limited to 24 months due to safety concerns, though generic versions and biosimilars have improved

08 Glucocorticoid-Induced Osteoporosis

Author - Dr Monica Umbardand,
consultant, Mangalya Nursing Home and Atharva Fertility Center, Solapur

Gynaecology Practice Glucocorticoids (GCs) are widely used in obstetrics and gynaecology for multiple indications including autoimmune disorders, inflammatory diseases, and foetal lung maturation during preterm labour. However, long-term, or systemic glucocorticoid therapy is a major cause of secondary osteoporosis, known as glucocorticoid-induced osteoporosis (GIOP), and is associated with increased morbidity due to fractures. Recognition and management of GIOP is essential in obstetric and gynaecologic care to reduce adverse outcomes in women receiving glucocorticoids.

Pathophysiology of Glucocorticoid-Induced Osteoporosis:

Glucocorticoids disrupt bone remodelling primarily by inhibiting osteoblast proliferation, increasing osteoblast and osteocyte apoptosis, and impairing osteogenic differentiation. Simultaneously, they prolong osteoclast lifespan and enhance bone resorption, leading to net bone loss 9(1,2). This imbalance predominantly affects trabecular bone causing rapid loss at the vertebrae and increased risk of vertebral fractures (3,4).

Furthermore, glucocorticoids reduce intestinal calcium absorption and impair sex hormone production, compounding bone loss (5). These effects can begin early, with bone mineral density (BMD) decreasing by 3–27% within the first 6–12 months of therapy (6)

+Epidemiology and Risk in Indian Population:

The prevalence of GIOP in India reflects a significant but underrecognized health challenge. A prospective observational study in a tertiary Indian hospital found that among patients on glucocorticoids, 44.8% had moderate to high risk of hip fractures, yet only 15.5% were evaluated for osteoporosis and just 7.8% received bisphosphonate treatment (7). This reflects a wide treatment gap despite clear evidence of risk.

Patients with chronic inflammatory disorders such as rheumatoid arthritis (RA), commonly treated with glucocorticoids, show a 41.6% prevalence of osteoporosis in India (1). The incidence of osteoporotic fractures, particularly vertebral fractures, is also notable in glucocorticoid users (8). In obstetrics and gynaecology, glucocorticoids are used in conditions like lupus, idiopathic thrombocytopenic purpura, and prevention of preterm labour complications. Given that these patients often receive prolonged or repeated courses of steroids, awareness, and proactive management of GIOP is critical.

Clinical Presentation and Diagnosis:

GIOP is often silent until fractures occur, which may result in chronic pain, deformity, and reduced quality of life. Vertebral fractures are the most common initial presentation, followed by hip and other fractures.

Diagnosis involves clinical risk assessment including age, sex, glucocorticoid dose and duration, and fracture history. Tools such as the Fracture Risk Assessment Tool (FRAX) integrate these factors with BMD to stratify fracture risk (7,5). Dual-energy X-ray absorptiometry (DXA) measures BMD at the lumbar spine and hip and remains the gold standard for diagnosis (5).

Recent Indian studies have emphasized the need for routine BMD evaluation before and during glucocorticoid therapy (7). Identifying high-risk patients enables timely prophylaxis and treatment.

Prevention and Management Strategies

Prevention of GIOP includes minimizing glucocorticoid dose and duration where possible. In obstetrics, while antenatal corticosteroids are typically short-course, conditions requiring longer-term glucocorticoids require additional care.

Non-pharmacological measures are foundational: adequate calcium (>1000 mg/day) and vitamin D supplementation, regular weight-bearing exercise, smoking cessation, and limiting alcohol intake (5). Correcting vitamin D deficiency is particularly important, given its high prevalence in Indian women.

Pharmacological options are recommended for patients at moderate to high fracture risk, or those expected to use glucocorticoids for more than 3 months at doses ≥2.5 mg prednisolone equivalent daily (5,9). Bisphosphonates (alendronate, risedronate, zoledronate) remain first-line agents (5,9). Teriparatide or denosumab may be considered in cases resistant to bisphosphonates or in those with contraindications (2,10).

Indian guidelines echo international recommendations but highlight the need for improved clinician awareness and adherence to treatment protocols (7,11). Despite advances, studies show low use of osteoporosis prophylaxis in steroid-treated patients (8).

Special Considerations in Obstetrics and Gynaecology

Pregnant and lactating women are generally excluded from pharmacological osteoporosis treatments due to safety concerns. Therefore, prevention efforts focus on minimizing steroid exposure, optimizing nutrition, and physical activity. For women with chronic conditions requiring long-term glucocorticoids, coordination with rheumatologists and endocrinologists is advised. In perimenopausal and postmenopausal women treated with steroids, osteoporosis risk is additive, necessitating early screening and treatment. Conditions such as premature ovarian insufficiency induced by autoimmune processes treated with steroids also compound fracture risk (11).

Emerging Therapies and Research

Recent Indian case reports have documented effectiveness of newer agents like denosumab in glucocorticoid-induced osteoporosis resistant to bisphosphonates (10). Romosozumab, a sclerostin inhibitor, is under investigation for high-risk patients (12).
Ongoing research in India focuses on epidemiology, fracture risk assessment validation, and cost-effective treatment strategies appropriate for resource-limited settings (1,7)

Conclusion

Glucocorticoid-induced osteoporosis is a common yet underrecognized complication in women receiving steroid therapy in obstetrics and gynaecology practice. Early risk assessment, patient education, and preventive treatment are crucial to reducing fracture risk and improving outcomes. Obstetricians and gynaecologists must be vigilant in screening at-risk patients and coordinated in multidisciplinary management to address this silent epidemic effectively.

References

1.Agrawal KA, Rath PD, Chouhan S, et al. Assessment of glucocorticoid-induced osteoporosis treatment in Indian patients. Eur J Rheumatol. 2025;12(3):0046. doi:10.5152/eurjrheum.2025.24046

2.Agrawal KA, Rath PD, Chouhan S, et al. Evaluation of fracture risk and treatment gap in glucocorticoid-treated patients: a prospective Indian study. Eur J Rheumatol. 2025;12(3):0046

3.Cherian KE, Solomon S. Glucocorticoid-induced osteoporosis. Indian J Endocrinol Metab. 2017;21(5):730–6

4.Saigal R, Singh GK. Glucocorticoid-induced osteoporosis: Mechanisms and management. Indian J Med Res. 2006;124(1):103-12

5.Laurent MR, et al. Prevention and treatment of glucocorticoid-induced osteoporosis: the Belgian Bone Club updated recommendations. Front Endocrinol. 2022;13:908727. doi:10.3389/fendo.2022.908727

6.Tanaka Y, et al. 2023 guidelines for the management and treatment of glucocorticoid-induced osteoporosis. J Bone Miner Metab. 2024;42(3):467-478.

7.Song X, Zhang Y, Yang H, et al. Advances in the study and treatment of glucocorticoid-induced osteoporosis: a review. Medicine (Baltimore). 2025;104(22):e42668.

8.Gera C, Vij AS. Glucocorticoid-induced osteoporosis: unawareness or negligence in India? Int J Rheum Dis. 2009;12(3):230-3.

9.Bajpai S, Gupta A. Denosumab response in glucocorticoid-induced osteoporosis resistant to bisphosphonate therapy in an adolescent with minimal change disease: Indian case report. Indian J Nephrol. 2024.

10.American College of Rheumatology. Glucocorticoid-induced osteoporosis guideline. 2024.Hofbauer LC, Brueck CC, Singh SK, et al. Osteoporosis in glucocorticoid-treated patients. Lancet Diabetes Endocrinol. 2025;13(5):357-368.

11.Krishnamurthy V, Ghosh A, Kamboj S, et al. Indian Rheumatology Association guidelines for the management of glucocorticoid-induced osteoporosis. Indian J Rheumatol. 2011;6(2):67-75.

12.Oak J. Preventing steroid induced osteoporosis. Indian J Dermatol Venereol Leprol. 2008;74(6):625-9.

13.PubMed Central articles and studies accessed October 2025 via NCBI and European Journal of Rheumatology databases.

09

Denosumab Discontinuation avoiding Rebound Fractures

Author- Dr Archana Singh
FICOG Fellowship in reproductive medicine (Germany),
Fellowship in Day Care Endoscopy
Hyderabad

Abstract

Denosumab (anti-RANKL monoclonal antibody) is highly effective in increasing bone mass and reducing fracture risk in postmenopausal osteoporosis. However, its discontinuation is associated with rapid rebound in bone turnover, loss of bone mineral density (BMD), and increased risk of vertebral fractures, often multiple. Recent studies have elucidated mechanistic underpinnings (e.g. osteomorph accumulation, osteocyte changes in OPG expression), and clinical trials have tested sequential antiresorptive strategies, especially with zoledronate.

Introduction

Postmenopausal osteoporosis remains a major cause of morbidity globally, particularly vertebral fractures. Denosumab, administered subcutaneously every six months, has become a central therapy due to its robust reductions in vertebral, nonvertebral, and hip fractures, with substantial BMD gains over time. However, unlike bisphosphonates, denosumab does not bind permanently to bone mineral; its pharmacodynamic effect declines once serum levels fall. Discontinuation or delayed dosing leads to a rebound in bone resorption, with clinical consequences including multiple vertebral fractures (so-called rebound associated vertebral fractures, RAVFs), rapid loss of BMD, and potential for significant morbidity.

Because many patients may need to stop denosumab—due to cost, side effects, comorbidity, patient preference—or may inadvertently miss doses, understanding how to safely transition off denosumab is of growing clinical importance. Recent mechanistic and clinical trial data (2020-2024) allow refining recommendations.

Mechanistic Insights into Rebound after Denosumab

The Osteomorph/osteoclast precursor pool

- A recent report in Current Osteoporosis Reports describes that under denosumab therapy, active osteoclasts may undergo fission into smaller "osteomorphs." These remain inactive under RANKL inhibition but accumulate. When denosumab is stopped, these osteomorphs can fuse and differentiate rapidly into active osteoclasts, contributing to a surge in bone resorption.

- Importantly, the availability of this "primed" pool accelerates the rebound phenomenon compared to naïve baseline levels. Thus, the duration and depth of suppression during therapy partly determine the size of this pool. 1

- **Osteocyte dysfunction, OPG suppression**
- Another recent mechanistic study (in humanized RANKL mice) shows that long-term denosumab therapy reduces osteoprotegerin (OPG) expression by osteocytes (and also fewer osteoblast/osteocyte later in the course), while pre-osteoclast or bone marrow progenitor levels remain relatively unalteredThe study suggests that osteocyte aging or death (empty lacunae), reduced OPG expression, may be contributors to rebound resorption. 2

Kinetics of biomarkers and BMD loss

- Clinical observations confirm that bone turnover markers (BTMs; e.g., CTX, P1NP) rise above baseline within ~6-9 months of the last denosumab dose. BMD loss begins relatively early, particularly at the lumbar spine, and cumulative losses may approximate pre-treatment levels after ~1–2 years without sequential therapy.

- Rebound vertebral fractures are typically reported between ~7 to 12 months after the "missed" dose or discontinuation, though earlier and later reports exist. Risk is higher the longer denosumab has been used, and in those with prior vertebral fracture(s).

Clinical Evidence: Sequential Therapies & Outcomes

Recent trials and observational studies provide more precise data on how well various strategies mitigate BMD loss and fracture risk after denosumab discontinuation.

Randomized trials: Zoledronate to prevent BMD loss

1.DST Trial (Taiwan; "Zoledronate Sequential Therapy After Denosumab Discontinuation")

- Design: Prospective, open-label, parallel-group randomized clinical trial; participants had received denosumab ≥2 years; then one arm continued denosumab; other arm received a single dose of zoledronate (5 mg) after discontinuation.
- oFindings: In the first year, those switched to zoledronate had a **significant median decrease in lumbar spine BMD** (≈ -0.68%) compared to those continuing denosumab (+1.30%, P = .03). Total hip and femoral neck BMD were preserved (i.e., not significantly different). Subgroup analysis showed that patients with longer duration of prior denosumab (≥3 years) lost more LS-BMD after switching. 3

2. "Treatment With Zoledronate Subsequent to Denosumab" randomized timing study (61 subjects)

- Participants discontinued denosumab (mean ~4.6 years of treatment), and were randomized to receive zoledronate at 6 months, 9 months after last denosumab, or an "observation" ogroup where therapy given when BTMs or BMD decline triggered. After 24 months: BMD at lumbar spine was maintained with minimal loss (≈ +0.9 ± 0.9% in 6-month group, +0.4 ± 0.8% in 9-month group, +0.3 ± 0.7% in observation) with **no significant differences** between groups. 4

- Suggests that timing (within a window) of zoledronate injection (6 mo vs 9 mo) may not make large differences in some settings, if BTM or BMD monitoring are used for "rescue".

Observational / "real-world" data

- **Effects of Zoledronate after long-term denosumab (≥5 years)**: Retrospective cohort of 282 women who discontinued denosumab and received zoledronate 6 months later showed that bone loss after switch was greater in those with many prior denosumab injections (≈10), compared to those with fewer (~5). However, plateau in bone loss was observed beyond ~10 injections; a second zoledronate infusion in those with elevated BTMs after the first dose lowered BTMs, but did not produce significantly better preservation of BMD in lumbar spine or femoral neck than one infusion.

- **Five-year effect of single zoledronate infusion:** In women treated with denosumab for ~2.4 years, who had become osteopenic, a single 5 mg zoledronate infusion given 6 months after last denosumab dose maintained BMD gains in most subjects for up to 3 years; in the 5-year extension, more than half remained osteopenic without needing further treatment, although some (7 of 19) had become osteoporotic again. 5

- **Repeated zoledronate infusions guided by CTX levels**: A study measured CTX at baseline and at 6 months post-denosumab; patients with CTX ≥ threshold got a second zoledronate. Even in those with two infusions, some spine BMD decline persisted. High CTX at 6 months strongly predicted BMD loss; prior BMD gain per denosumab exposure was also a predictive factor. PubMed

Comparative fracture risk data

Registry-based cohort (Osteoporosis International, 2023) examined fracture incidence among patients on denosumab vs those on bisphosphonates (alendronate, ibandronate, zoledronate) or both sequentially.

Denosumab was associated with greater vertebral and overall fracture risk reduction compared to alendronate or ibandronate; no significant difference with zoledronate. Sequential therapy showed risk patterns that depended on timing and adherence. Case reports and smaller series continue to report multiple vertebral fractures after denosumab discontinuation, especially when no sequential antiresorptive therapy is given or when switch is late or insufficient. (These are not new randomized data but help characterize risk.)

Practical Strategies and Best Practices

Based on recent data, here are refined recommendations (for clinicians experienced in osteoporosis management) for minimizing rebound risk when stopping denosumab.

Step	Key Considerations	Recommended Actions
1. Evaluate whether to continue	If patient remains high risk (very low BMD, previous vertebral fractures, frailty), the risks of discontinuation Long-term denosumab may be preferable if	Reassess fracture risk, patient preferences, safety issues. In high-risk, aim for long-term therapy unless contraindicated.
2.If discontinuation unavoidable, plan sequential therapy	side effects, cost, comorbid issues allow. Timing is crucial; the window ~5-7 months after the last denosumab dose when effect wanes but before large BMD loss and fracture risk peaks. IV zoledronate shows the strongest data; oral bisphosphonates are	Plan switching to an antiresorptive (preferably zoledronate) around 6 months post last dose. Ensure calcium & vitamin D are adequate.
3. Choice of sequential agent	options if IV not feasible but may be less effective for spine in long-term denosumab users. Single infusion may suffice in some with shorter denosumab exposure; multiple	Use IV zoledronate (5 mg) first; if contraindications or patient preference, consider high-adherence oral alendronate/risedronate.

Step	Key Considerations	Recommended Actions
4.Number of infusions / durations	infusions or "rescue" dosing may be needed if BTMs remain elevated. Duration of antiresorptive follow-up should be at least 1-2 years, longer in high risk.	Monitor; give second zoledronate dose at ~12 months if BTMs high. Continue bisphosphonate therapy for 1-2 years or more based on risk.
5. Biomarker & BMD monitoring	BTMs (e.g. CTX, P1NP) are helpful to detect early rebound; BMD especially at lumbar spine tends to fall first.	Measure BTMs at ~3-6 months after switch; BMD at baseline, then annually. Use thresholds (e.g. CTX rise) to guide additional infusions.
6. Manage fracture risk emergently	If vertebral fractures occur during rebound, may need more aggressive or combination therapy.	Consider re-initiating denosumab in selected cases; consider anabolic therapy (e.g. teriparatide) plus antiresorptive; specialist input recommended.

Evidence-Based Comparative Efficacy and Limitations

Strengths of current strategies

- **Zoledronate** has emerged as the best studied sequential agent. Multiple trials and observational studies show it preserves hip and femoral neck BMD, reduces the steepness of lumbar spine decline—even if not completely preventing it in longer-term users.
- Monitoring BTMs and using thresholds for "rescue" infusions enhances ability to tailor therapy and possibly avoid over-treatment.
- Single infusion of zoledronate may maintain gains for several years in patients with shorter denosumab exposure who have become osteopenic.

Limitations and areas of incomplete efficacy

- Lumbar spine BMD tends to decline more than hip sites after transition, particularly in patients on denosumab ≥3 years. In the DST trial, those with ≥3 years prior denosumab had larger LS-BMD loss after switch. Even with rescue bisphosphonate dosing, some patients continue to lose BMD or suffer vertebral fractures, especially if the switch is delayed or if the rebound of BTMs is steep. Evidence from real-world settings suggests the plateau of BMD loss beyond certain duration but not full preservation. 6

- There is no high-quality RCT evidence on non-zoledronate agents (e.g. oral bisphosphonates, or sclerostin inhibitors, or other anabolics) in the specific context of denosumab discontinuation. Comparisons of fracture outcomes (not just BMD) are also sparse.

Proposed Clinical Algorithm

Below is a suggested algorithm for managing denosumab discontinuation in postmenopausal women, integrating recent evidence.

1. **Baseline assessment**
   - Fracture history (vertebral/nonvertebral)
   - Duration of denosumab therapy
   - Baseline BMD (especially lumbar spine, hip)
   - Baseline BTMs if possible

2. **Risk stratification**
   - High risk: prior vertebral fracture; denosumab duration ≥3 years; very low baseline BMD; frail or comorbid.
   - Lower risk: no prior vertebral fracture; denosumab duration <2.5 years; moderate baseline BMD; otherwise healthy.

3. **Decision node: Continue vs Discontinue**
   - If high risk and no contraindication, consider continuing denosumab.
   - If discontinuation is necessary, proceed to sequential therapy.

4. **Sequential therapy plan**
   - Primary choice: IV zoledronate 5 mg administered ~6 months after last denosumab dose.
   - For high risk, consider closer monitoring and possible second zoledronate infusion ~12 months if BTMs elevated.

- Alternative if IV zole not feasible: oral bisphosphonate with high adherence.

5. **Monitoring**
   - BTMs (e.g. CTX, P1NP): at 3 and 6 months post-switch; use thresholds (e.g. CTX doubling or exceeding local lab upper limits) to decide on rescue infusions.
   - BMD: baseline at switch, then annually (spine, hip).
   - Clinical evaluation for vertebral fracture symptoms, back pain, height loss.

6. **Rescue / adjust**
   - If CTX or P1NP persistently elevated, or BMD declines significantly (e.g. >5% at spine), consider additional antiresorptive dose (zoledronate).
   - In fractures, especially vertebral, consider adding or switching therapy: e.g. consider re-initiating denosumab (if safe) or combining with anabolic agents.

7. **Duration of sequential therapy**
   - At least 1-2 years, longer in high-risk settings.
   - Reassess risk and consider possibility of further drug holidays only with careful monitoring.

Recent Advances & Emerging Areas

- **Mechanistic deepening**: The findings about osteocyte OPG suppression, osteomorph accumulation, and precursor biology help explain why longer duration denosumab causes a worse rebound and why certain skeletal sites (spine) are more affected. These might guide novel interventions targeting these pathways. **Tailoring via biomarker-guided rescue**: Studies showing that CTX thresholds at 6 months predict who will lose BMD more, and that giving second doses of zoledronate in such patients reduces BTM and mitigates BMD loss. 7

- **Long-term durability of single zoledronate infusion:** Evidence extending to 3-5 years shows in some patients (with moderate prior denosumab exposure, becoming osteopenic) a single zoledronate dose may suffice to maintain gains for years. Can inform decisions in lower-risk settings.

- **Real-world data confirming greater risk with longer denosumab duration** and the diminishing returns of sequential therapy at very long durations. This helps in counseling.

Avoiding fractures

- When stopping, using IV zoledronate (5 mg) approximately 6 months after the last denosumab dose.
- Monitoring bone turnover markers (CTX, P1NP) at ~3 and 6 months; consider "rescue" additional bisphosphonate (e.g. second zoledronate) if elevation beyond acceptable thresholds.
- Counselling about some lumbar spine BMD loss, especially in patients with denosumab duration ≥3 years;
- If patient has high prior fracture risk, vertebral fractures, low BMD, it may be advisable to maintain denosumab longer if no contraindications.
- Ensuring calcium and vitamin D repletion throughout.
- BMD monitoring annually; clinically suspected vertebral fractures (e.g. new back pain, height loss) to be investigated promptly.

Conclusion

Denosumab remains a powerful tool in the management of postmenopausal osteoporosis; but its discontinuation carries nontrivial risk of rebound bone resorption, rapid bone loss—especially at the spine—and increased vertebral fracture incidence. New mechanistic insights (osteomorphs, osteocyte OPG suppression) help explain why risk correlates with duration of therapy. Recent randomized and observational data support that IV zoledronate, given at the right time, can significantly reduce, though not always entirely prevent, BMD loss and fracture risk. Biomarker-guided rescue infusions are promising.

Thus stopping denosumab without a plan is high risk. A tailored sequential antiresorptive strategy, careful monitoring, and patient counseling are essential. Future trials are needed to fill the remaining gaps—particularly for long-term users, for comparison of different agents, and for establishing thresholds of rebound risk.

References

1. Treatment With Zoledronate Subsequent to Denosumab in Osteoporosis: A 2-Year Randomized Study. NCT03087851; 61 postmenopausal women & men, ZOL at 6 or 9 months or observation; findings: LS BMD maintained over 24 months with minimal loss. PubMed

2.Effects of zoledronate on bone mineral density and bone turnover after long-term denosumab therapy (real-world, 282 women) — magnitude of loss greater in those with ≥10 denosumab injections; rescue ZOL when BTMs elevated. PubMed

Avoiding fractures

- When stopping, using IV zoledronate (5 mg) approximately 6 months after the last denosumab dose.
- Monitoring bone turnover markers (CTX, P1NP) at ~3 and 6 months; consider "rescue" additional bisphosphonate (e.g. second zoledronate) if elevation beyond acceptable thresholds.
- Counselling about some lumbar spine BMD loss, especially in patients with denosumab duration ≥3 years;
- If patient has high prior fracture risk, vertebral fractures, low BMD, it may be advisable to maintain denosumab longer if no contraindications.
- Ensuring calcium and vitamin D repletion throughout.
- BMD monitoring annually; clinically suspected vertebral fractures (e.g. new back pain, height loss) to be investigated promptly.

Conclusion

Denosumab remains a powerful tool in the management of postmenopausal osteoporosis; but its discontinuation carries nontrivial risk of rebound bone resorption, rapid bone loss—especially at the spine—and increased vertebral fracture incidence. New mechanistic insights (osteomorphs, osteocyte OPG suppression) help explain why risk correlates with duration of therapy. Recent randomized and observational data support that IV zoledronate, given at the right time, can significantly reduce, though not always entirely prevent, BMD loss and fracture risk. Biomarker-guided rescue infusions are promising.

Thus stopping denosumab without a plan is high risk. A tailored sequential antiresorptive strategy, careful monitoring, and patient counseling are essential. Future trials are needed to fill the remaining gaps—particularly for long-term users, for comparison of different agents, and for establishing thresholds of rebound risk.

References

1. Treatment With Zoledronate Subsequent to Denosumab in Osteoporosis: A 2-Year Randomized Study. NCT03087851; 61 postmenopausal women & men, ZOL at 6 or 9 months or observation; findings: LS BMD maintained over 24 months with minimal loss. PubMed

2.Effects of zoledronate on bone mineral density and bone turnover after long-term denosumab therapy (real-world, 282 women) — magnitude of loss greater in those with ≥10 denosumab injections; rescue ZOL when BTMs elevated. PubMed

10 Osteoporosis Preventive Strategies Across the Lifespan and Secondary Prevention

Author - DR PRABHDEEP KAUR
M.B.B.S, D.G.O, D.N.B
JLNHRC BHILAI
CHHATTISGARH

Introduction

Osteoporosis is a systemic bone disorder marked by reduced mass and structural decline, resulting in higher fracture risk. Fragility fractures cause considerable health issues and expenses, making prevention vital both before and after initial fractures. This review outlines strategies across the lifespan and post-fracture care, with emphasis on the Indian context, including Fracture Liaison Services, falls programs, performance metrics, educational resources, and guidelines from IOF, BHOF, and NICE NG249 (2025).

Lifecourse Prevention: From Peak Bone Mass to Healthy Aging

Rationale and Theoretical Basis

Bone strength depends on both the peak bone mass attained in early adulthood and the rate of bone loss over time. Interventions during childhood, adolescence, and young adulthood are effective at increasing bone reserve, while later life strategies focus on minimizing bone loss and reducing fall risk. A life course approach incorporates nutrition, physical activity, lifestyle modifications, screening, and risk management across different stages of life.

Strategies by Life Stage

Childhood & Adolescence

Nutrition & Micronutrients: Calcium intake can be optimized with dairy products, fortified foods, and green vegetables. Vitamin D sufficiency is necessary; studies in India indicate significant deficiency rates (70–90%) due to factors such as lifestyle, skin pigmentation, and clothing.

Physical Activity: Weight-bearing, high-impact, and resistance exercises during growth periods improve bone geometry and strength.

Healthy Lifestyle: Early initiation of smoking and excessive consumption of cola beverages should be discouraged. Adequate protein and energy intake support bone health.

Young Adulthood (20s–30s)
Sustained intake of calcium, vitamin D, and protein is recommended.
Regular participation in resistance and impact training is advised.
Screening for secondary causes of bone loss (e.g., malabsorption, endocrine disorders, chronic diseases) may be indicated.
Limiting alcohol and tobacco use is beneficial.
Midlife (≈ 40s–60s)
Women may experience accelerated bone loss due to menopause-related estrogen deficiency.
Muscle strengthening, balance training, and continued weight-bearing activity are recommended.
Managing chronic conditions (glucocorticoid use, thyroid disease, rheumatoid disease) is important.

Bone mineral density (BMD) screening may be considered for high-risk individuals (family history, early menopause, prior fracture).
Older Age (≥ 65 years)

Fracture risk reduction becomes paramount by integrating bone and fall risk strategies.
Dual-energy X-ray absorptiometry (DXA) scans may be used in selected high-risk adults.
Pharmacotherapy (bisphosphonates, denosumab, anabolic therapies) can be initiated when indicated.

Falls risk assessment and prevention should be prioritized (strength, balance, environment, medication review).
Medications that affect bone or balance (sedatives, antihypertensives) should be reviewed periodically.

Monitoring therapy adherence and regular evaluation are recommended.
In India, barriers to optimal life course prevention include low dietary calcium (< 500 mg/day compared to the recommended 1,000–1,200 mg), widespread vitamin D deficiency, limited awareness of osteoporosis, and restricted access to screening. Public health measures—such as food fortification, supplementation programs, exercise promotion in schools, awareness initiatives, and integration into national health policies—are recommended.

Secondary Prevention: Post-Fracture Care Pathway & Fracture Liaison Services

After a fragility fracture, the probability of subsequent fractures increases significantly. Systematic post-fracture management is essential to address this care gap.

The Role of Fracture Liaison Services & the Capture the Fracture Framework

The International Osteoporosis Foundation's Capture the Fracture (CtF) initiative provides a Best Practice Framework (BPF) of 13 standards for Fracture Liaison Services (FLS).[1] Standards cover:

- Patient identification
- Fracture risk evaluation
- Assessment timing
- Falls risk assessment
- Secondary cause investigation
- Osteoporosis therapy initiation
- Follow-up monitoring
- Data collection and registry maintenance
- Communication protocols
- Organizational structure
- Service integration
- Education and training
- Continuous improvement

FLS services adhering to these standards may seek Best Practice Recognition (gold, silver, bronze).[2] [3] Benchmarking data indicate variations in implementation but confirm feasibility in diverse settings.[4] Coordinated FLS pathways aim to identify fractures and prevent subsequent ones.

Post-Fracture Pathway: Identify → Investigate → Initiate → Adhere

The "4-I" model underpins post-fracture care: **Identify → Investigate → Initiate → Adhere.**

Identify

Patients with fragility fractures are identified through radiology records, orthopaedic logs, emergency referrals, or registries. Vertebral fractures, often asymptomatic, require inclusion. This aligns with BPF Standard 1.[1]

Investigate / Evaluate

DXA scanning and biochemical tests (calcium, PTH, vitamin D, TSH, renal function, bone markers) are performed. Evaluation for secondary causes (hyperparathyroidism, celiac disease, kidney disease) and falls risk (gait, balance, vision, medications, home environment) follows. Recommendations specify DXA completion within 12 weeks.[1]

Initiate Treatment

Anti-osteoporosis pharmacotherapy (bisphosphonates, denosumab, anabolic agents) is commenced if patients meet risk criteria. Non-pharmacologic interventions include calcium/vitamin D supplementation, exercise, and lifestyle counseling. Referral to falls prevention services completes the step. These actions accord with medication initiation, risk factor treatment, and falls programme linkage standards.[1]

Adhere / Follow-Up

Patient adherence, side effects, and treatment continuity are monitored (e.g., at 6 and 12 months). Fracture risk is reassessed, and therapy may be modified as needed. Primary and allied care communication ensures sustained management. Long-term follow-up and data tracking are reflected in BPF standards.[1]

Key Performance Indicators (KPI) for FLS

The CtF proposes an **11-item patient-level KPI set** to complement organisational standards.[5] [6] KPIs include:

- Percentage of fracture patients assessed for risk within 12 weeks
- Percentage receiving DXA within 12 weeks
- Percentage undergoing falls risk evaluation
- Percentage recommended anti-osteoporosis therapy
- Percentage starting strength & balance exercise within 16 weeks
- Percentage initiating therapy within 16 weeks
- Percentage remaining on therapy at 52 weeks

These indicators facilitate benchmarking and ongoing audit.[5] [6]

Evidence for Efficacy of FLS

Enhanced FLS models result in higher rates of anti-resorptive therapy initiation and systematic risk factor assessment compared to standard care.[7] Coordinator-led approaches significantly narrow the treatment gap.

Educational Resources & Support (BHOF)

The Bone Health & Osteoporosis Foundation (BHOF) offers educational materials (leaflets, manuals, guides), which can be integrated into FLS programmes to support patient and clinician education. Dissemination of materials in low-resource areas may improve outreach.

Falls Prevention Programmes & NICE NG249 (2025) Recommendations

Falls account for many fragility fractures, making fall risk reduction essential. The NICE NG249 (2025) guideline provides evidence-based recommendations for older people and those 50+ at higher risk.[8]

Key Recommendations (NG249)

- Screen all individuals aged 65+ and those 50–64 at increased risk for falls history and factors.[8]
- Multifactorial assessments examine gait, balance, strength, medications, vision, cardiovascular status, neuropathy, and home hazards.[8]
- Fall-prediction tools are not recommended for individual risk estimation.[8]
- Individualized, multicomponent interventions are suggested, including exercise programmes, environmental modifications, medication reviews, vision correction, and footwear adjustments.[8]
- Adherence is supported through motivational strategies and tailored follow-up.[8]

Embedding Falls Prevention in the FLS Pathway

Falls risk assessment should be integrated at the Investigation stage of the 4-I model, with timely referral or delivery of prevention programmes at Initiation. Existing KPIs track falls risk assessment coverage; further KPIs may monitor participation and outcomes.

Indian Context: Epidemiology, Opportunities & Challenges

Epidemiology in India

Approximately **50 million Indians** have osteoporosis or osteopenia. Rural populations and postmenopausal women face greater risk due to nutritional deficits, low sun exposure, and healthcare limitations. Calcium intake often ranges from 200–500 mg/day, below the recommended 1,000–1,200 mg. Vitamin D deficiency affects **70–90% of adults and adolescents.** Awareness and screening rates remain low, and many fracture patients are untreated for osteoporosis.

Opportunities and Implementation Strategies

Existing public health infrastructures (National Health Mission, Ayushman Bharat) could incorporate osteoporosis awareness, screening, and supplementation. Food fortification, school-based education, demonstration FLS units, mHealth tools, community outreach, registries, and adaptation of educational resources are potential strategies.

Implementation Challenges, Enablers & Recommendations

Challenges

Resource constraints (staff, funding, infrastructure) limit establishment of FLS and fall prevention initiatives. Fragmented care, lack of data systems, poor adherence, competing health priorities, and low visibility of osteoporosis are barriers.

Enablers & Strategies

Structured frameworks (CtF BPF, KPI sets) support FLS planning and audit. Educational materials should be adapted locally. Phased programme rollouts, collaboration with professional societies, development of registries, policy engagement, and iterative audit-feedback cycles are recommended. Enhancing patient engagement and simplifying regimens may improve adherence.

Conclusion

Osteoporosis prevention requires a continuous approach, addressing bone and muscle health from early life through fracture prevention and post-fracture care. The Fracture Liaison Services pathway, informed by international frameworks and guidelines, offers an organized method to improve care quality. In India, applying targeted strategies and leveraging existing platforms may help overcome challenges and reduce the burden of osteoporosis-related fractures.

References (Vancouver Style)

1.Åkesson K, Marsh D, Mitchell PJ, McLellan AR, Stenmark J, Pierroz DD, Kyer C, Cooper C. Capture the Fracture: a Best Practice Framework and global campaign to break the fragility fracture cycle. Osteoporos Int. 2013;24(8):2135–52.

2.International Osteoporosis Foundation. Best Practice Framework | Capture the Fracture [Internet]. [cited 2025 Aug 30]. Available from: https://www.capturethefracture.org/best-practice-framework

3.International Osteoporosis Foundation. New online platform facilitates recognition for Fracture Liaison Services [Internet]. [cited 2025 Aug 30]. Available from: https://www.osteoporosis.foundation/news/new-online-platform-facilitates-recognition-fracture-liaison-services-20210818-0156

4.Javaid MK, Kyer C, Mitchell PJ, Chana J, Moss C, Edwards MH, McLellan AR, Stenmark J, Pierroz DD, Schneider MC, Kanis JA, Åkesson K, Cooper C; IOF Capture the Fracture Working Group. Effective secondary fracture prevention: implementation of a global benchmarking of clinical quality using the IOF Capture the Fracture® Best Practice Framework tool. Osteoporos Int. 2015;26(6):1647–55.

5.International Osteoporosis Foundation. New guidance for the assessment of Fracture Liaison Services at a patient outcome level [Internet]. [cited 2025 Aug 30]. Available from: https://www.osteoporosis.foundation/news/new-guidance-assessment-fracture-liaison-services-patient-outcome-level-20200417-0900

6.Javaid MK, Sami A, Lems W, et al. A patient-level key performance indicator set to measure the effectiveness of fracture liaison services and guide quality improvement: a position paper of the IOF Capture the Fracture Working Group, National Osteoporosis Foundation and Fragility Fracture Network. Osteoporos Int. 2020;31(3):281–95.

7.McLellan A, Reid D, Forbes K, Campbell C, Gregori A, et al. An evaluation of an enhanced fracture liaison service as the optimal model for secondary prevention of osteoporosis. Osteoporos Int. 2011;22(11):2823–31.

8.National Institute for Health and Care Excellence. Falls: assessment and prevention in older people and people 50 and over at higher risk. NICE guideline NG249. London: NICE; 2025.

9.Ministry of Health and Family Welfare, Government of India. National Health Profile 2024.

10.Harinarayan CV, Ramalakshmi T, Prasad UV, Sudhakar D, Srinivasarao PV, Sarma KVS. High prevalence of low dietary calcium, vitamin D deficiency, and secondary hyperparathyroidism in healthy South Indians. Indian J Med Res. 2011;133(4):528–36.

“Space for Advertisement
Grow Your Business”

Contact

9425202550

dr.ashajain@smsaraipur.co.in