IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Evaluation Study of Hormones in Post Menopausal Women in India

Chauhan Karina Sheshbahadur, Asst. Prof. Shubham L. Hange, Dr. Surwase K.P
Kishori College of Pharmacy, Beed.

Abstract: *Introduction: Menopausal symptoms experienced by women are known to affect their quality-of-life. The symptoms experienced at menopause are quite variable and their etiology is found to be multifactorial. This study was hence done to assess the pattern and severity of menopausal symptoms and to find out the factors associated with these symptoms.*

Materials and Methods: This cross-sectional study was conducted in various outreach clinics of Kasturba Medical College, Mangalore. Women in the age group of 40-65 years were included in the study by convenient sampling method. Data regarding menopausal symptom was obtained by interviewing each participant using the menopause rating scale questionnaire.

The high proportion and severity of menopausal symptoms observed in this study group proves that menopausal symptoms are common and cannot be ignored. More of menopausal clinics are needed for awareness generation, early recognition and treatment of related morbidities.

Menopausal symptoms result from depletion of oestrogen level as women approaches menopausal stage and some of these women begin to experiences these menopausal..

Keywords: *Menopausal symptoms*

I. INTRODUCTION

Hormones are chemical messengers produced by endocrine glands that regulate various physiological activities in the human body. In females, hormones play an important role in growth, metabolism, reproduction, emotional balance, and maintenance of overall health. The female reproductive system is mainly regulated by hormones such as estrogen, progesterone, follicle stimulating hormone (FSH), luteinizing hormone (LH), and thyroid hormones. These hormones work together to maintain the menstrual cycle, fertility, bone health, cardiovascular function, and psychological well-being. The endocrine system consists of various glands including the pituitary gland, thyroid gland, adrenal glands, pancreas, and ovaries. These glands secrete hormones directly into the bloodstream, which then act on target organs.

Among all endocrine glands, ovaries are the primary reproductive glands in females responsible for the secretion of estrogen and progesterone.

Structure of Endocrine System

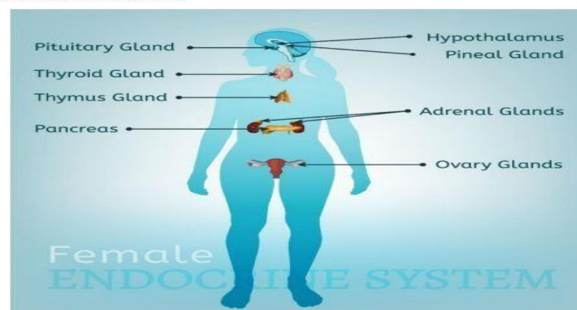


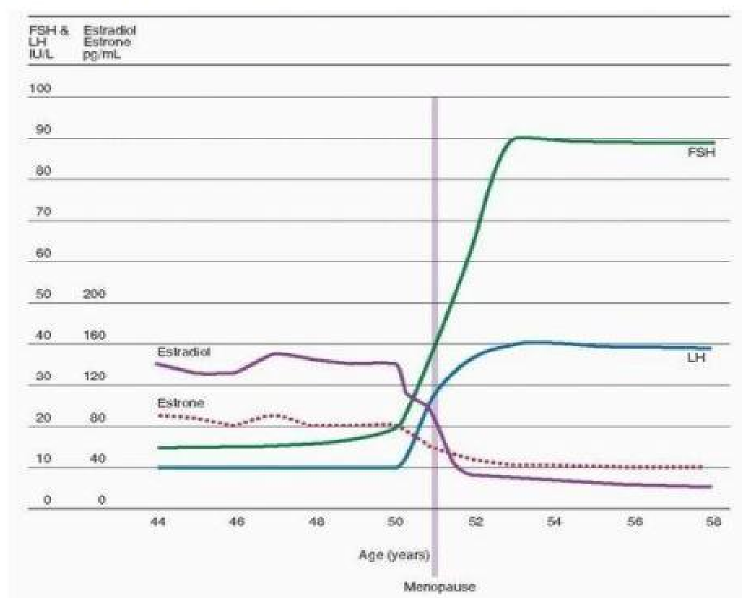
Fig 1: Structure of Female Endocrine System

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Estrogen is one of the most important female hormones responsible for development of secondary sexual characteristics, regulation of menstrual cycle, maintenance of bone density, skin elasticity, and cardiovascular protection. Progesterone mainly helps in preparation of the uterus for pregnancy and regulation of menstrual function. FSH due to loss of ovarian follicular activity. It usually occurs between 45–55 years of age. A woman is considered menopausal when menstruation stops continuously for twelve consecutive months. After menopause, women enter the postmenopausal phase in which several hormonal changes occur in the body. During menopause, ovarian function gradually declines, resulting in decreased production of estrogen and progesterone. Reduction in these hormones leads to multiple physiological and psychological changes. At the same time, FSH and LH levels increase due to reduced negative feedback from ovarian hormones.

Hormonal Changes During Menopause

Hormonal Changes During Menopause



Decline in estrogen levels may lead to symptoms such as hot flashes, night sweats, vaginal dryness, mood swings, anxiety, depression, sleep disturbances, and osteoporosis.

Progesterone deficiency may also disturb hormonal balance and reproductive function. Hormonal imbalance during postmenopause may additionally affect thyroid activity, lipid metabolism, glucose metabolism, and cardiovascular health. India has a rapidly increasing population of postmenopausal women due to increased life expectancy and improved healthcare facilities. Indian women often experience menopause earlier compared to women in Western countries. Various factors such as nutritional deficiency stress, lifestyle changes, lack of physical activity, and socioeconomic conditions influence menopausal health problems among Indian women. Postmenopausal women are more susceptible to several chronic disorders including osteoporosis, cardiovascular diseases, obesity, diabetes mellitus, hypertension, and cognitive disorders. Estrogen deficiency significantly affects bone metabolism and increases the risk of fractures by reducing bone mineral density.Cardiovascular diseases are also common after menopause because estrogen normally provides protective effects on blood vessels and lipid metabolism. Reduction in estrogen levels may increase cholesterol levels and blood pressure, thereby increasing cardiovascular risk. Hormonal evaluation in postmenopausal women is important for understanding endocrine changes and preventing associated complications. Measurement of serum estrogen, progesterone, FSH, LH, and thyroid hormones helps assess hormonal status and diagnose hormonal imbalance

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Fig 4: Hormone Evaluation Procedure Using ELISA Method
Citation: Practical Clinical Biochemistry by Harold Varley.

Hormonal analysis may help in early diagnosis and management of menopausal complications. Various laboratory techniques such as enzyme-linked immunosorbent assay (ELISA), radioimmunoassay, and chemiluminescent immunoassay are commonly used for hormonal estimation in blood samples. Lifestyle modification, balanced diet, regular exercise, calcium supplementation, vitamin D intake, and hormone replacement therapy (HRT) are commonly used approaches for management of menopausal symptoms. Early hormonal evaluation and awareness regarding postmenopausal healthcare may improve quality of life in women. The present study focuses on evaluation of hormones in postmenopausal women in India. This study aims to analyze hormonal changes occurring after menopause and assess their relationship with common menopausal symptoms and complications. Functions of Hormones in Female Body

- Regulation of menstrual cycle
- Maintenance of reproductive health
- Regulation of bone metabolism
- Maintenance of cardiovascular function
- Regulation of emotional balance
- Maintenance of skin and hair health
- Regulation of metabolism and body weigh

2. Introduction of Female Reproductive System

The female reproductive system

- sexual activity
- fertility
- pregnancy and childbirth

The female reproductive system is made up of female body parts including:

- ovaries — there are 2 ovaries, 1 on each side of the uterus, in which

female hormones (oestrogen and progesterone) are produced and eggs (follicles) are stored to mature. Every month an egg is released. This is called ovulation.

- fallopian tubes — these are 2 thin tubes that connect the ovaries to the uterus, allowing the egg to travel to the uterus

DOI: 10.48175/IJARSCT-36143

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

• uterus (the womb) — the lining of the uterus thickens with blood and other substances every month. If pregnancy happens, the fertilised egg will attach to the uterus and grow into a fetus and then a baby. If it does not, this lining flows out of the body. This is known as menstruation or your period.
• cervix — this is the lower part of the uterus that connects the uterus to the vagina.
• vagina — this is a muscular tube connecting the cervix to the outside of the body.

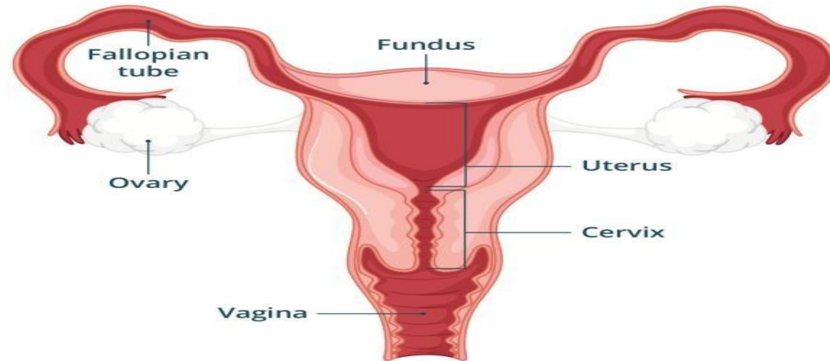


Diagram of the female reproductive system.

What is menstruation and the menstrual cycle?

Menstruation is bleeding from your vagina that happens about once a month. It is a normal part of the menstrual cycle. It is also known as having a period.

On average, females start to get their period around 12 to 13 years of age. You can have your first period as early as 9 years of age and as late as 16 years. The menstrual cycle usually lasts around 28 days. However, everyone is different, and it can range from 21 to 35 days. Your cycle may be irregular for the first 1 – 2 years after you start menstruating.

Each cycle prepares you for the possibility of pregnancy. The lining of your uterus thickens and during ovulation, one of your ovaries releases an egg to the endometrium (internal lining of the uterus).

The egg can be fertilised when sperm travels to the uterus during sex. If a sperm fertilises an egg, the endometrium will thicken and grow to support the pregnancy.

If the egg is not fertilised, the lining which is mostly blood, breaks down from the uterus and leaves the body from the vagina as a period (also known as menstruation, menses or the menstrual flow).

Menopause is when you stop having your period. This usually happens between the ages of 45 and 55 years. The average age of menopause in Australia is 51 years of age.

Perimenopause is the time before menopause where you may have symptoms caused by changing hormone levels.

What are the common conditions of the female reproductive system?

Conditions that involve the female reproductive system include:

• abnormal vaginal bleeding
• premenstrual syndrome (PMS)
• endometriosis
• polycystic ovary syndrome (PCOS)
• fibroids (non-cancerous growths of the uterus)
• cancer

When should I see my doctor?

Symptoms related to your periods change depending on the condition and may include:

• mood swings, irritability or depression
• headaches
• bloating

DOI: 10.48175/IJARSCT-36143

- breast tenderness
- acne

Symptoms differ between people and may not always appear during each period.
See your doctor if you have the following symptoms and they are making it difficult to get through daily life:

- pain in your lower abdomen, upper thighs or back
- painful, heavy or irregular periods or no periods at all
- periods that last more than 8 days or are more than 2 – 3 months apart
- pain or bleeding during or after sex
- bowel problems (such as constipation or diarrhoea)
- bleeding between periods

If you have trouble trying to get pregnant or with infertility, speak to your doctor.
Everyone experiences their menstrual cycle differently, most without any difficulties. If there is any change in your cycle that worries you, see your doctor.

Resources and support

- Jean Hailes is Australia's leader in women's health, with a range of fact sheets on female reproductive health.
- PlanetPuberty has information on the female reproductive system for children.
- Women with Disabilities Australia has resources about the female body, with an Easy Read function.
- Use the Period ImPact and Pain Assessment (PIPPA) to find out if your period pain symptoms are normal or cause for concern.
- You can also call the healthdirect helpline on 1800 022 222 (known as NURSE-ON- CALL in Victoria). A registered nurse is available 24 hours a day, 7 days a week.

Languages other than English

- Jean Hailes for Women's Health has translated fact sheets in community languages.
- Multicultural Centre for Women's Health has facts sheets on menstruation in community languages.

Information for Aboriginal and/or Torres Strait Islander peoples

- Jean Hailes for Women's Health has information on periods for Aboriginal and/or Torres Strait Islander peoples.

Information for sexually and gender-diverse families

- TransHub has resources and information about menstruation in gender-neutral language.

3. Introduction of Menopause

Menopause is the time in a woman's life when her periods stop as a result of the reduction and loss of 'ovarian reproductive function'. Ovaries produce the hormones estrogen, progesterone and testosterone. When a woman approaches the menopause, less estrogen is produced causing her body to behave differently. This process is usually a gradual one that progresses over several years. Estrogen also plays an important role in maintaining bone and heart health as well as brain function during the reproductive years. The menopause usually occurs between 45 and 55 years of age but it may be earlier. There are ethnic differences in age of onset. The average age in the UK is 51. It is defined as when a woman has had no
periods for one year or more. Before then a woman will experience 'early perimenopause' and 'late perimenopause' and prior to that, the 'late reproductive' phase. During early perimenopause, women experience a change in menstrual cycle pattern. They may start experiencing menopausal symptoms alongside cycle changes, most commonly by about 7 days from their norm. Subsequently, in late perimenopause, many women experience worsening of their menopausal symptoms. Menstrual cycles become less frequent, with periods sometimes a few months apart, leading to amenorrhea.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Prior to perimenopause, the late reproductive phase may see subtle changes in cycle and variable follicle-stimulating hormone (FSH). It is not described as part of the menopause transition, but some individuals may be aware of subtle hormonal fluctuations

Stages	−5	−4	−3b	−3a	−2	−1	+1a	+1b	+1c	+2
	Menarche						FMP (0)			
Terminology	REPRODUCTIVE				MENOPAUSAL TRANSITION		POSTMENOPAUSE			
	Early	Peak	Late		Early	Late	Early			Late
					Perimenopause					
Duration	Variable				Variable	1–3 years	2 years (1+1)		3-6 years	Remaining lifespan
PRINCIPAL CRITERION										
Menstrual cycle	Variable to regular	Regular		Subtle changes in flow/ length	Variable length (persistent ≥ 7-day difference in length of consecutive cycles)	Interval of amenorrhoea of ≥ 60 days	None			
SUPPORTIVE CRITERIA										
Endocrine: FSH AMH Inhibin B			Low Low	Variable Low Low	↑ Variable[a] Low Low	↑ >25 iu/l[b] Low Low	↑ Variable Low Low		Stabilises Very low Very low	
Antral follicle count			Low	Low	Low	Low	Very low		Very low	
DESCRIPTIVE CHARACTERISTSICS										
Symptoms						Vasomotor symptoms				Increasing symptoms of urogenital atrophy
						Likely	Most likely			

What do women experience when they go through the menopause?

All women experience the menopause at some stage in their life. It is estimated that more than 80% of women will be menopausal by the age of 54. Whilst not all women will experience menopausal symptoms when they go through the menopause, up to 80-90% will have some symptoms, with 25% describing them as severe and debilitating. Symptoms The most common symptoms are hot flushes and night sweats (vasomotor symptoms), experienced by 70-80% of women. Other symptoms include disturbed sleep and insomnia, low energy levels, low mood, anxiety, low libido and low sexual drive, impaired memory and concentration, a sensation of ‘brain fog’, joint aches, headaches, palpitations and vaginal dryness and urinary symptoms. Menopausal symptoms last on average for more than 7 years and it is estimated that more than a third of women experience long-term menopausal symptoms which may continue for a number of years beyond that.

Long-term health

When the ovaries have stopped producing estrogen, the fall in hormone levels may have an effect on long-term health. Most commonly these changes affect the strength and density of bones, increasing the risk of the bone-thinning disease osteoporosis. The bones of the female skeleton depend on estrogen to maintain their strength and resistance to fracture. However, whilst a hot flush or vaginal dryness is obvious, there are no obvious symptoms of osteoporosis – the first sign may be a fracture of a bone. In addition, estrogen deficiency after the menopause has been shown to result in an increase in the risk of heart disease in women. How do you diagnose the menopause? Diagnosis of the menopause should be made following careful history taking: assessing the clinical presentation and basing it on a combination of menopausal symptoms and change in menstrual cycle pattern in women beyond the age of 45. Hormonal testing (FSH) is not helpful in diagnosing the menopause for women over the age of 45, as the level of FSH can fluctuate from one month to another and may not give an accurate assessment. In those under 40 years of age suspected of Premature Ovarian Insufficiency (POI), FSH should be measured and the test repeated if results are ambiguous. For those between 40 and 45 years when early menopause is suspected, FSH may be useful to diagnose perimenopause, also taking into account other factors such as symptoms and cycle change. A single test may not be diagnostic.

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-36143

What interventions are available to women going through the menopause

The menopause transition can have a considerable impact on many women. The majority of women will experience menopausal symptoms and, for a significant proportion, troublesome symptoms may continue long-term. All women should be able to access advice on how to optimise their menopause transition. There should be a holistic and individualised approach in advising women, with particular reference to lifestyle advice and diet modification. This should be an opportunity to discuss the benefits and risks of their management options including Hormone Replacement Therapy (HRT) and alternative therapies.

Hormone Replacement Therapy (HRT)

HRT is the most commonly used treatment for managing menopausal symptoms and it has been shown to be the most effective intervention. Estrogen The hormone estrogen is the main component of HRT and it is effective in controlling menopausal symptoms. Estrogen can be given in the form of oral tablets or delivered through the skin (transdermally) in the form of a patch, gel or spray. Transdermal estrogen has a very neutral effect on the way the body breaks down the hormones and it does not increase the risk of blood clots compared to that in women who are not taking HRT. Transdermal estrogen should therefore be the preferred way of giving estrogen to women

What is the risk of breast cancer with HRT

Combined HRT containing estrogen and progestogen is associated with a small increase in the risk of breast cancer. This risk is low in both medical and statistical terms, particularly compared to other lifestyle risk factors such as obesity and alcohol intake. Estrogen only HRT (for women who have had a hysterectomy) has been shown to result in little or no increase in the risk of breast cancer. Women are often concerned that if they have a member of their family who has had breast cancer that they should not take HRT. Having a family member who has had breast cancer may increase a woman's background risk for developing breast cancer but this would not be a contraindication to taking HRT. The risk of breast cancer with HRT should also be considered in relation to the risk of breast cancer with other lifestyle factors. For example, the risk of breast cancer with drinking two units of alcohol a night is higher than that associated with taking HRT. Further, the risk of breast cancer with being overweight is significantly higher than the risk of breast cancer with taking HRT. The decision whether to take HRT and the duration of its use should be made on an individualised basis after discussing the benefits and risks with each woman. It should be considered in the context of the overall benefits obtained from using HRT, including symptom control and improving quality of life, as well as considering the bone and cardiovascular benefits associated with HRT use. For most women, the benefits in quality of life improvement, reduction in osteoporosis risk and reduction in risk of heart disease would outweigh the small increase in the risk of breast cancer. Women who take HRT have a reduced mortality compared to women who do not

Conclusion

Women experience the menopause in different ways. Some women experience minimal or no symptoms going through the menopause. However, many women experience menopausal symptoms that can significantly impact their quality of life. There should be an individualised approach in assessing women going through the menopause, with particular reference to lifestyle advice and diet modification, together with discussion about the role of HRT. All women should be aware that help and support is available. They should consult their healthcare professional to access advice on how they can optimise their menopause transition and to understand what options they have to manage their symptoms.

4. Hormones in Post Menopausal Women

We don't fully appreciate the natural hormone estrogen until it's gone. This humble hormone is essential for maintaining health throughout a woman's body – not just the reproductive
system. With a decrease in estrogen, your body's major systems can be affected too. Here's how estrogen relates to the rest of your body once you're postmenopause.

Heart/Cardiovascular System

Estrogen may have a positive effect on the inner layer of artery wall, helping to regulate blood flow. That's why researchers believe a decline in estrogen after menopause may be a factor in the increase in heart disease among post-menopausal women, according to the American Heart Association. Even though heart disease risk goes up after menopause, taking estrogen has an associated cardiovascular benefit if you start it early or within 10 years of natural menopause.

Bone/Skeletal System

There is a direct relationship between the lack of estrogen after menopause and bone loss. Women who've gone through menopause are more likely to develop osteoporosis, a condition that causes bone to become brittle and weak.

Urinary System

Lower levels of estrogen may cause the urethra lining to thin. Also, the pelvic muscles around the urethra may get weaker due to aging or vaginal childbirth. This can increase the risk of bladder leakage (incontinence), urinary tract infections, and other urogynecology problems.

Sexuality

Estrogen helps maintain the natural lubrication in the walls of the vagina. Lowered estrogen during menopause causes the vaginal tissues to become thinner and more easily irritated during sex—or dry out. This can lead to an increase in urinary tract infections and genitourinary syndrome of menopause, also known as atrophic vaginitis or vaginal atrophy.

Metabolism

Reduced estrogen may lower your metabolic rate, which prompts your body to store fat instead of burning it. But menopause alone isn't to blame. Age-related weight gain often occurs with a natural decrease in physical activity.

PCP vs. Menopause Specialist: Who Should You See First?

Postmenopause changes your body in many ways. You may have trouble identifying what changes are normal or not—but you don't need to live with disruptive, uncomfortable symptoms.

Schedule a visit with your primary care provider or your gynecologist first for help navigating this new phase of your life. Seek out a menopause specialist if you feel like your provider didn't effectively address your symptoms or questions.

Your provider may refer you to one of our menopause specialists if you have a history of the following conditions:

- Estrogen-sensitive cancer
- Heart disease
- Stroke
- Heart attack
- Blood clots

Menopause specialists will ask questions to better understand how your symptoms affect your quality of life. Our specialists are also trained to know if additional testing or treatment may help you.

Talk to your provider if you're still experiencing vaginal bleeding after you've
reached menopause (12 months after your last period), which could be a sign of a more serious condition

What You Can Do to Stay Healthy Postmenopause

It's never been more important to take a proactive role in your health care. Many women suffer unnecessarily from symptoms that can be managed with home remedies and prescribed treatments:

- Hormone therapy helps reduce hot flashes and vaginal dryness, and may prevent bone loss.
- Vaginal estrogen relieves vaginal dryness, discomfort during sex, and some urinary symptoms.

• Calcium and vitamin D supplements or other osteoporosis treatments aid in strengthening your bones.
• Vaginal lubricants increase comfort during sex.
• Incontinence treatments for gaining bladder control.
• Exercise to stimulate your heart and bone health and maintain a healthy weight.
• Well-balance diet to help you manage a healthy weight.

Talk to your doctor before you begin taking any new supplement or treatment, including over-the-counter and herbal remedies.

Postmenopausal health is about a lot more than your ovaries and uterus. Keep up with annual physical exams and schedule those regular preventive screenings, such as mammogram, bone density screening, Pap smear, mole checks, and colonoscopy. Remember your teeth and gums and your eyes, too. There's never been a better time to focus on your own well-being.

Overview

Menopausal hormone therapy (HT) involves the administration of estrogen, with or without a progestogen, to alleviate the symptoms of menopause. In the past, the term "hormone replacement therapy" was used, but it has largely been replaced by HT or menopausal HT. [1] When a person reaches menopause, circulating levels of estrogen and progesterone decrease because of reduced synthesis in the ovary. Hypoestrogenism during menopause can lead to a number of symptoms, the severity of which can vary widely. In approximately 25% of patients, menopausal symptoms are debilitating. [2]

The US Food and Drug Administration (FDA) has approved HT for the following indications:
• Vasomotor symptoms in menopause - HT is considered first-line therapy for these symptoms unless contraindications exist
• Prevention of bone loss and reduction of fractures in postmenopausal women
• Prevention of bone loss and provision of health benefits for treatment of menopausal symptoms, cognition and mood, and heart disease in women with premature ovarian failure, hypogonadism, or early surgical menopause who have no other contraindications to HT
• Treatment of genitourinary symptoms and vulvovaginal atrophy

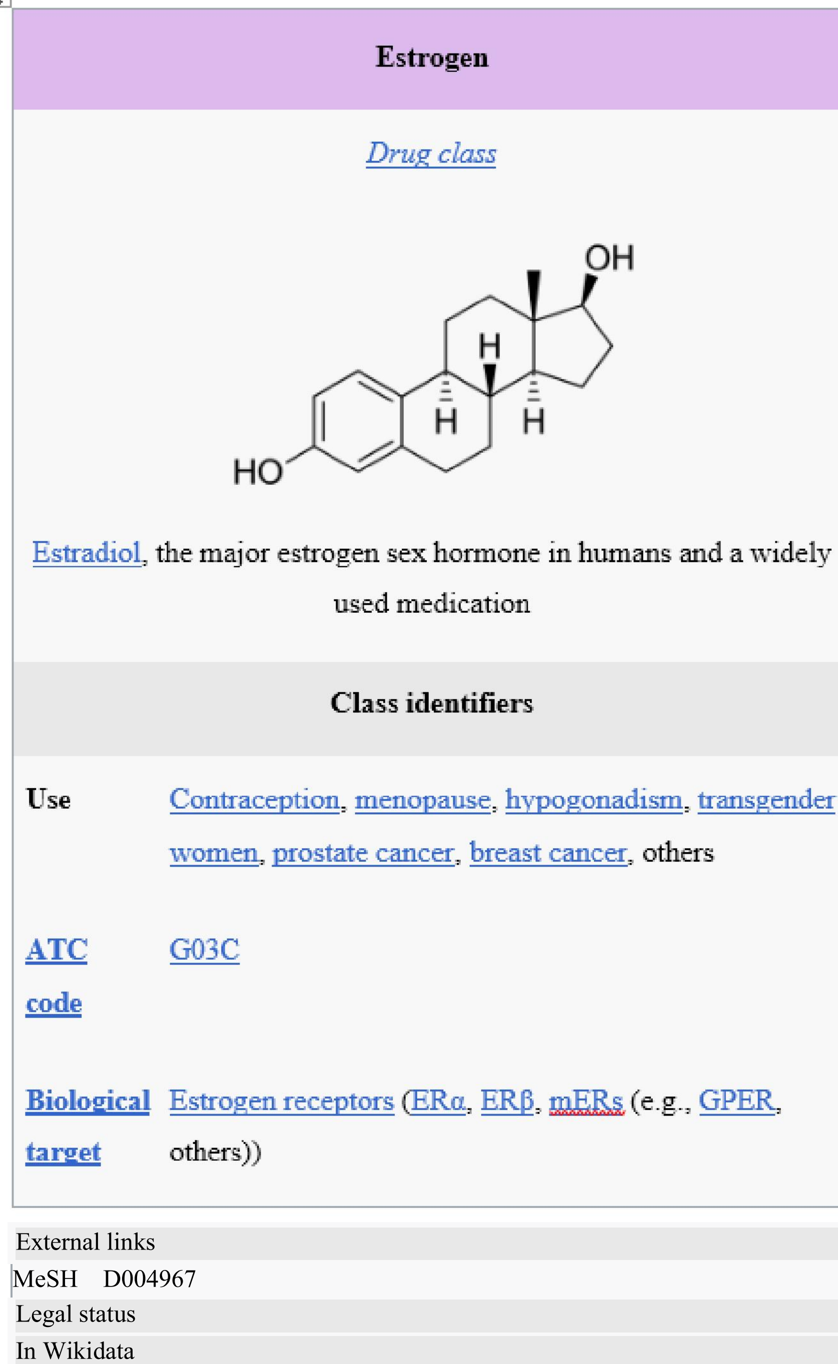
Although HT is considered the most effective therapy for vasomotor symptoms, [1] it has been linked to various risks, and debate regarding its risk-benefit ratio continues.

The FDA has removed “black box” warnings about the risk of cardiovascular disease, stroke,
breast cancer, and probable dementia from products containing estrogen and progestogen. However, a boxed warning will remain on systemic estrogen labels for the risk of endometrial cancer with unopposed estrogen use in patients with a uterus. For topical vaginal estrogen-only products, the label will focus on the safety findings most relevant to topical vaginal use rather than the broader warnings associated with systemic exposure. [3]

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

5. Effects of Estrogen Hormone

This article is about estrogens as hormones. For their use as medications, see Estrogen (medication).



Estrogen	
Drug class	
Estradiol, the major estrogen sex hormone in humans and a widely used medication	
Class identifiers	
Use	Contraception, menopause, hypogonadism, transgender women, prostate cancer, breast cancer, others
ATC code	G03C
Biological target	Estrogen receptors (ERα, ERβ, mERs (e.g., GPER, others))

External links	
MeSH	D004967
Legal status	
In Wikidata	

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-36143

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Estrogen (US English[a]) or oestrogen (Commonwealth English) is a category of sex hormone responsible for the development and regulation of the female reproductive system and secondary sex characteristics.[1][2] There are three major endogenous estrogens that have estrogenic hormonal activity: estrone (E1), estradiol (E2),
and estriol (E3).[1][3] Estradiol, an estrane, is the most potent and prevalent.[1] Another estrogen called estetrol (E4) is produced only during pregnancy.

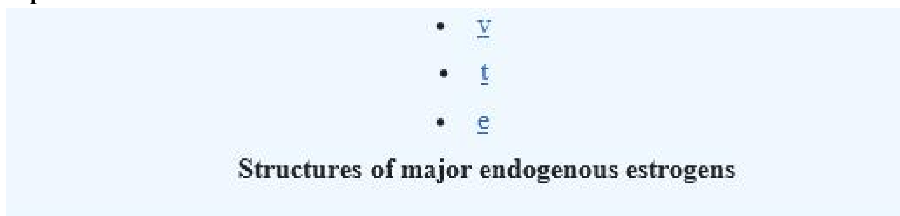
Estrogens are synthesized in all vertebrates[4] and some insects.[5] Quantitatively, estrogens circulate at lower levels than androgens in both men and women.[6] While estrogen levels are significantly lower in males than in females, estrogens nevertheless have important physiological roles in males.[7]

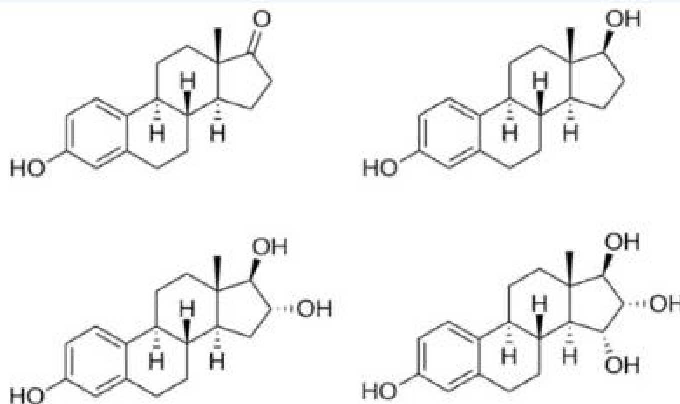
Like all steroid hormones, estrogens readily diffuse across the cell membrane. Once inside the cell, they bind to and activate estrogen receptors (ERs) which in
turn modulate the expression of many genes.[8] Additionally, estrogens bind to and activate rapid-signaling membrane estrogen receptors (mERs),[9][10] such as GPER (GPR30).[11]

In addition to their role as natural hormones, estrogens are used as medications, for instance in menopausal hormone therapy, hormonal birth control and feminizing hormone
therapy for transgender women, intersex people, and nonbinary people.

Synthetic and natural estrogens have been found in the environment and are referred to
as xenoestrogens. Estrogens are among the wide range of endocrine-disrupting compounds and can cause health issues and reproductive dysfunction in both wildlife and humans.[12][13]

Types and examples





Estrone (E1)
Estradiol (E2)
Estriol (E3)
Estetrol (E4)

Note the hydroxyl (–OH) groups: estrone (E1) has one, estradiol (E2) has two, estriol (E3) has three, and estetrol (E4) has four.

Copyright to IJARSCT
www.ijarsct.co.in

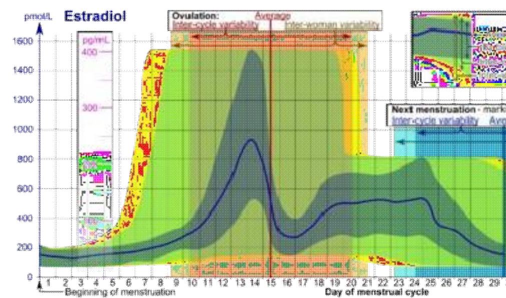
DOI: 10.48175/IJARSCT-36143

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

The four major naturally occurring estrogens in women are estrone (E1), estradiol (E2), estriol (E3), and estetrol (E4). Estradiol (E2) is the predominant estrogen during reproductive years both in terms of absolute serum levels as well as in terms of estrogenic activity. During menopause, estrone is the predominant circulating estrogen and during pregnancy estriol is the predominant circulating estrogen in terms of serum levels. Given by subcutaneous injection in mice, estradiol is about 10-fold more potent than estrone and about 100-fold more potent than estriol.[14] Thus, estradiol is the most important estrogen in non-pregnant females who are between the menarche and menopause stages of life. However, during pregnancy this role shifts to estriol, and in postmenopausal women estrone becomes the primary form of estrogen in the body. Another type of estrogen called estetrol (E4) is produced only during pregnancy. All of the different forms of estrogen are synthesized from androgens, specifically testosterone and androstenedione, by the enzyme aromatase.[citation needed]

Minor endogenous estrogens, the biosyntheses of which do not involve aromatase, include 27-hydroxycholesterol, dehydroepiandrosterone (DHEA), 7-oxo-DHEA, 7α-hydroxy- DHEA, 16α-hydroxy-DHEA, 7β-hydroxyepiandrosterone, androstenedione (A4), androstenediol (A5), 3α-androstanediol, and 3β-androstanediol.[15][16] Some estrogen metabolites, such as the catechol estrogens 2- hydroxyestradiol, 2-hydroxyestrone, 4-hydroxyestradiol, and 4-hydroxyestrone, as well as 16α-hydroxyestrone, are also estrogens with varying degrees of activity.[17] The biological importance of these minor estrogens is not entirely clear.

Biological function



Reference ranges for the blood content of estradiol, the primary type of estrogen, during the menstrual cycle[18] The actions of estrogen are mediated by the estrogen receptor (ER), a dimeric nuclear protein that binds to DNA and controls gene expression. Like other steroid hormones, estrogen enters passively into the cell where it binds to and activates the estrogen receptor. The estrogen:ER complex binds to specific DNA sequences called a hormone response element to activate the transcription of target genes (in a study using an estrogen-dependent breast cancer cell line as model, 89 such genes were identified).[19] Since estrogen enters all cells, its actions are dependent on the presence of the ER in the cell. The ER is expressed in specific tissues including the ovary, uterus and breast. The metabolic effects of estrogen in postmenopausal women have been linked to the genetic polymorphism of the ER.[20]

• Musculoskeletal
• Anabolic: Increases muscle mass and strength, speed of muscle regeneration,
and bone density, increased sensitivity to exercise, protection against muscle damage, stronger collagen synthesis, increases the collagen content of connective
tissues, tendons, and ligaments, but also decreases stiffness
of tendons and ligaments (especially during menstruation). Decreased stiffness of tendons gives women much lower predisposition to muscle strains but soft ligaments are much more prone to injuries (ACL tears are 2-8x more common among women than men).[35][36][37][38]
• Reduce bone resorption, increase bone formation[39][40]

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 14, May 2026 Impact Factor: 8.2

• In mice, estrogen has been shown to restore the proportion of type IIX muscle fibers to over 40% following an ovariectomy.[41]
• Metabolic
• Anti-inflammatory properties
• Accelerate metabolism
• Gynoid fat distribution: increased fat storage or estrogenic fat in some body parts such as breasts, buttocks, and legs but decreased abdominal and visceral
fat (androgenic obesity).[42][43][44]
• Estradiol also regulates energy expenditure, body weight homeostasis, and seems to have much stronger anti-obesity effects than testosterone in general.[45]
• Inhibition of ferroptosis by hydroxyoestradiol derivatives.[46]
• Other structural
• Maintenance of vessels and skin
• Protein synthesis
• Increase hepatic production of binding proteins
• Increase production of the hepatokine adropin.[47]
• Suppress the transcription of ether-lipid pathway proteins.[46]
• Coagulation
• Increase circulating level of factors 2, 7, 9, 10, plasminogen
• Decrease antithrombin III
• Increase platelet adhesiveness
• Increase vWF (estrogen -> Angiotensin II -> Vasopressin)
• Increase PAI-1 and PAI-2 also through Angiotensin II
• Lipid
• Increase HDL, triglyceride
• Decrease LDL, fat deposition
• Fluid balance
• Salt (sodium) and water retention, including facial swelling and edema[48][49]
• Estrogen is associated with edema, including facial and abdominal swelling.
• Melanin
• Estrogen is known to cause darkening of skin, especially in the face
and areolae.[50] Pale skinned women will develop browner and yellower skin during pregnancy, as a result of the increase of estrogen, known as the "mask of pregnancy".[51] Estrogen may explain why women have darker eyes than men, and also a lower risk of skin cancer than men; a European study found that women generally have darker skin than men.[52][53]
• Lung function
• Promotes lung function by supporting alveoli (in rodents but probably in humans).[54]
• Kidney function
• Protects from acute kidney injury in females.[46]
• Sexual
• Mediate formation of female secondary sex characteristics
• Stimulate endometrial growth
• Increase uterine growth
• Increase vaginal lubrication
• Thicken the vaginal wall
• Uterus lining

• Estrogen together with progesterone promotes and maintains the uterus lining in preparation for implantation of fertilized egg and maintenance of uterus function during gestation period, also upregulates oxytocin receptor in myometrium
• Ovulation
• Surge in estrogen level induces the release of luteinizing hormone, which then triggers ovulation by releasing the egg from the Graafian follicle in the ovary.
• Sexual behavior
• Estrogen is required for female mammals to engage in lordosis behavior during estrus (when animals are "in heat").[55][56] This behavior is required for sexual receptivity in these mammals and is regulated by the ventromedial nucleus of the hypothalamus.[57]
• Sex drive is dependent on androgen levels[58] only in the presence of estrogen. Without estrogen, free testosterone level actually decreases sexual desire (instead of increasing sex drive), as demonstrated for those women who have hypoactive sexual desire disorder, and the sexual desire in these women can be restored by administration of estrogen (using oral contraceptive).[59]
Female pubertal development
Estrogens are responsible for the development of female secondary sexual characteristics during puberty, including breast development, widening of the hips, and female fat distribution. Conversely, androgens are responsible for pubic and body hair growth, as well as acne and axillary odor.

Breast development
See also: Breast development § Biochemistry
Estrogen, in conjunction with growth hormone (GH) and its secretory product insulin-like growth factor 1 (IGF-1), is critical in mediating breast development during puberty, as well as breast maturation during pregnancy in preparation of lactation and breastfeeding.[60][61] Estrogen is primarily and directly responsible for inducing the ductal component of breast development,[62][63][64] as well as for causing fat deposition and connective tissue growth.[62][63] It is also indirectly involved in the lobuloalveolar component, by increasing progesterone receptor expression in the breasts[62][64][65] and by inducing the secretion of prolactin.[66][67] Allowed for by
estrogen, progesterone and prolactin work together to complete lobuloalveolar development during pregnancy.[63][68]
Androgens such as testosterone powerfully oppose estrogen action in the breasts, such as by reducing estrogen receptor expression in them.[69][70]

Female reproductive system
Estrogens are responsible for maturation and maintenance of the vagina and uterus, and are also involved in ovarian function, such as maturation of ovarian follicles. In addition, estrogens play an important role in regulation of gonadotropin secretion. For these reasons, estrogens are required for female fertility.[citation needed][71]
Neuroprotection and DNA repair
Estrogen regulated DNA repair mechanisms in the brain have neuroprotective
effects.[72] Estrogen regulates the transcription of DNA base excision repair genes as well as the translocation of the base excision repair enzymes between different subcellular compartments.
Brain and behavior
Sex drive
See also: Sexual motivation and hormones
Estrogens are involved in libido (sex drive) in both women and men.
Cognition
Verbal memory scores are frequently used as one measure of higher level cognition. These scores vary in direct proportion to estrogen levels throughout the menstrual cycle, pregnancy, and menopause. Furthermore, estrogens when

ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

administered shortly after natural or surgical menopause prevents decreases in verbal memory. In contrast, estrogens have little effect on verbal memory if first administered years after menopause.[73] Estrogens also have positive influences on other measures of cognitive function.[74] However the effect of estrogens on cognition is not uniformly favorable and is dependent on the timing of the dose and the type of cognitive skill being measured.[75]

The protective effects of estrogens on cognition may be mediated by estrogen's anti- inflammatory effects in the brain.[76] Studies have also shown that the Met allele gene and level of estrogen mediates the efficiency of prefrontal cortex dependent working memory tasks.[77][78] Researchers have urged for further research to illuminate the role of estrogen and its potential for improvement on cognitive function.[79]

Biochemistry

Biosynthesis

Steroidogenesis, showing estrogens at bottom right as in pink triangle[109]

Estrogens, in females, are produced primarily by the ovaries, and during pregnancy,
the placenta.[110] Follicle-stimulating hormone (FSH) stimulates the ovarian production of estrogens by the granulosa cells of the ovarian follicles and corpora lutea. Some estrogens are also produced in smaller amounts by other tissues such as the liver, pancreas, bone, adrenal glands, skin, brain, adipose tissue,[111] and the breasts.[112] These secondary sources of estrogens are especially important in postmenopausal women.[113] The pathway of estrogen biosynthesis in extragonadal tissues is different. These tissues are not able to synthesize C19 steroids, and therefore depend on C19 supplies from other tissues[113] and the level of aromatase.[114]

In females, synthesis of estrogens starts i

DOI: 10.48175/IJARSCT-36143

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Medical use
Main article: Estrogen (medication)
Estrogens are used as medications, mainly in hormonal contraception, hormone replacement therapy,[118] and to treat gender dysphoria in transgender women and other transfeminine individuals as part of feminizing hormone therapy.[119]
Chemistry
See also: List of estrogens
The estrogen steroid hormones are estrane steroids.[citation needed]
History
See also: Estradiol § History, Estrone § History, and Estrogen (medication) § History
In 1929, Adolf Butenandt and Edward Adelbert Doisy independently isolated and purified estrone, the first estrogen to be discovered.[120] Then, estriol and estradiol were discovered in 1930 and 1933, respectively. Shortly following their discovery, estrogens, both natural and synthetic, were introduced for medical use. Examples include estriol
glucuronide (Emmenin, Progynon), estradiol benzoate, conjugated estrogens (Premarin), diethylstilbestrol, and ethinylestradiol.
The word estrogen derives from Ancient Greek. It is derived from "oestros"[121] (a periodic state of sexual activity in female mammals), and genos (generating).[121] It was first published in the early 1920s and referenced as "oestrin".[122] With the years, American English adapted the spelling of estrogen to fit with its phonetic pronunciation.
Society and culture Etymology
The name estrogen is derived from the Greek οἶστρος (oîstros), literally meaning "verve" or "inspiration" but figuratively sexual passion or desire,[123] and the suffix -gen, meaning "producer of".
Environment
A range of synthetic and natural substances that possess estrogenic activity have been identified in the environment and are referred to xenoestrogens.[124]
• Synthetic substances such as bisphenol A as well as metalloestrogens (e.g., cadmium).
• Plant products with estrogenic activity are
called phytoestrogens (e.g., coumestrol, daidzein, genistein, miroestrol).
• Those produced by fungi are known as mycoestrogens (e.g., zearalenone).
Estrogens are among the wide range of endocrine-disrupting compounds because they have high estrogenic potency. When an endocrine-disrupting compound makes its way into the environment, it may cause male reproductive dysfunction to wildlife and humans.[12][13] The estrogen excreted from farm animals makes its way into fresh water systems.[125][126] During the germination period of reproduction the fish are exposed to low levels of estrogen which may cause reproductive dysfunction to male fish.[127][128]

Cosmetics
Some hair shampoos on the market include estrogens and placental extracts; others contain phytoestrogens. In 1998, there were case reports of four prepubescent African-
American girls developing breasts after exposure to these shampoos.[129] In 1993, the FDA determined that not all over-the-counter topically applied hormone-containing drug products for human use are generally recognized as safe and effective and are misbranded. An accompanying proposed rule deals with cosmetics, concluding that any use of natural estrogens in a cosmetic product makes the product an unapproved new drug and that any cosmetic using the term "hormone" in the text of its labeling or in its ingredient statement makes an implied drug claim, subjecting such a product to regulatory action.[130]

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

6. Effects of Progesterone Hormone

Description

Progesterone is used to help prevent changes in the uterus (womb) in women who are taking conjugated estrogens after menopause. It is also used to properly regulate the menstrual cycle and treat unusual stopping of menstrual periods (amenorrhea) in women who are still menstruating.

This medicine is available only with your doctor's prescription. This product is available in the following dosage forms:

• Capsule, Liquid Filled
• Capsule

Before Using

In deciding to use a medicine, the risks of taking the medicine must be weighed against the good it will do. This is a decision you and your doctor will make. For this medicine, the following should be considered:

Allergies

Tell your doctor if you have ever had any unusual or allergic reaction to this medicine or any other medicines. Also tell your health care professional if you have any other types of allergies, such as to foods, dyes, preservatives, or animals. For non-prescription products, read the label or package ingredients carefully.

Pediatric

Use of progesterone is not indicated in children. Safety and efficacy have not been established.

Geriatric

Appropriate studies performed to date have not demonstrated geriatric-specific problems that would limit the usefulness of progesterone in the geriatric population. However, elderly patients are more likely to have breast cancer, stroke, or dementia, which may require caution in patients receiving progesterone.

Breastfeeding

There are no adequate studies in women for determining infant risk when using this medication during breastfeeding. Weigh the potential benefits against the potential risks before taking this medication while breastfeeding.

Drug Interactions

Although certain medicines should not be used together at all, in other cases two different medicines may be used together even if an interaction might occur. In these cases, your doctor may want to change the dose, or other precautions may be necessary. When you are taking this medicine, it is especially important that your healthcare professional know if you are taking any of the medicines listed below. The following interactions have been selected on the basis of their potential significance and are not necessarily all-inclusive.

Using this medicine with any of the following medicines is usually not recommended, but may be required in some cases. If both medicines are prescribed together, your doctor may change the dose or how often you use one or both of the medicines.

• Abametapir
• Apalutamide
• Avacopan
• Cannabidiol
• Carbamazepine
• Clarithromycin
• Conivaptan

DOI: 10.48175/IJARSCT-36143

• Erythromycin
• Eslicarbazepine Acetate
• Fedratinib
• Fexinidazole
• Fosnetupitant
• Insulin Aspart, Recombinant
• Itraconazole
• Letermovir
• Lonafarnib
• Melatonin
• Mifepristone
• Netupitant
• Omaveloxolone
• Phenobarbital
• Primidone
• Relacorilant
• Tazemetostat
• Voriconazole

Using this medicine with any of the following medicines may cause an increased risk of certain side effects, but using both drugs may be the best treatment for you. If both medicines are prescribed together, your doctor may change the dose or how often you use one or both of the medicines.

• Kratom

Other Interactions

Certain medicines should not be used at or around the time of eating food or eating certain types of food since interactions may occur. Using alcohol or tobacco with certain medicines may also cause interactions to occur. Discuss with your healthcare professional the use of your medicine with food, alcohol, or tobacco.

Other Medical Problems

The presence of other medical problems may affect the use of this medicine. Make sure you tell your doctor if you have any other medical problems, especially:

• Abnormal or unusual vaginal bleeding or
• Allergy to peanuts or peanut oil or
• Blood clots (eg, deep vein thrombosis, pulmonary embolism), active or history of or
• Breast cancer, known, suspected, or a history of or
• Heart attack, active or history of or
• Liver disease or
• Stroke, active or history of—Should not be used in patients with these conditions.
• Asthma or
• Diabetes or
• Edema (fluid retention or body swelling) or
• Endometriosis or
• Epilepsy (seizures) or
• Heart disease or
• Hypercalcemia (high calcium in the blood) or

• Hypercholesterolemia (high cholesterol in the blood) or
• Hypertension (high blood pressure) or
• Kidney disease or
• Migraine headache or
• Obesity or
• Smoke tobacco or
• Systemic lupus erythematosus (SLE) or
• Thyroid problems—Use with caution. May make these conditions worse.

Proper Use

Take this medicine only as directed by your doctor. Do not use more of it, do not use it more often, and do not use it for a longer time than your doctor ordered. To do so may cause unwanted side effects.

This medicine comes with a patient information leaflet. Read and follow the instructions in the leaflet carefully. Ask your doctor if you have any questions.

For women who use this medicine after menopause, it will be given together with an estrogen medicine. Carefully follow the schedule your doctor gives you for both medicines.

If you have trouble swallowing this medicine, take it with a glass of water while standing up.

Dosing

The dose of this medicine will be different for different patients. Follow your doctor's orders or the directions on the label. The following information includes only the average doses of this medicine. If your dose is different, do not change it unless your doctor tells you to do so.

The amount of medicine that you take depends on the strength of the medicine. Also, the number of doses you take each day, the time allowed between doses, and the length of time you take the medicine depend on the medical problem for which you are using the medicine.

• For oral dosage form (capsules):
o For prevention of thickening of the lining of the uterus (endometrial hyperplasia):
 Adults—200 milligrams (mg) taken as a single dose at bedtime, for 12 continuous days per 28-day menstrual cycle.
 Children—Use is not recommended.
o For treatment of unusual stopping of menstrual period (amenorrhea):
 Adults—400 milligrams (mg) taken as a single dose at bedtime, for 10 days.
 Children—Use is not recommended.

Missed Dose

If you miss a dose of this medicine, take it as soon as possible. However, if it is almost time for your next dose, skip the missed dose and go back to your regular dosing schedule. Do not double doses.

Storage

Store the medicine in a closed container at room temperature, away from heat, moisture, and direct light. Keep from freezing.

Keep out of the reach of children.

Do not keep outdated medicine or medicine no longer needed.

Ask your healthcare professional how you should dispose of any medicine you do not use.

Precautions

It is very important that your doctor check your progress at regular visits to make sure this medicine is working properly and does not cause unwanted effects. Pelvic exam, breast exam, and mammogram (breast x-ray) may be needed to check for unwanted effects, unless your doctor tells you otherwise. Be sure to keep all appointments.

Using this medicine while you are pregnant can harm your unborn baby. Use an effective form of birth control to keep from getting pregnant. If you think you have become pregnant while using the medicine, tell your doctor right away.
Using this medicine may increase your risk for having blood clots, stroke, or heart attack. This risk may continue even after you stop using the medicine. Your risk for these serious problems is even greater if you have high blood pressure, high cholesterol, diabetes, overweight, or you smoke cigarettes. Contact your doctor immediately if you experience chest pain, confusion, difficulty speaking, double vision, headaches, an inability to move arms, legs or facial muscles, or an inability to speak.
Using this medicine over a long period of time and using it together with estrogen may increase your risk of breast or ovarian cancer. Talk with your doctor about these risks.
Tell the medical doctor or dentist in charge that you are using this medicine before any kind of surgery (including dental surgery) or emergency treatment. Your doctor will decide whether you should continue using this medicine. This medicine may also affect the results of certain medical tests.
Check with your doctor immediately if severe headache or sudden loss of vision or any other change in vision occurs while you are using this medicine. Your doctor may want you to have your eyes checked by an ophthalmologist (eye doctor).
This medicine may cause some people to become dizzy or drowsy. Make sure you know how you react to this medicine before you drive, use machines, or do anything else that could be dangerous if you are not alert.
Do not take other medicines unless they have been discussed with your doctor. This includes prescription or nonprescription (over-the-counter [OTC]) medicines and herbal or vitamin supplements.

Side Effects

Along with its needed effects, a medicine may cause some unwanted effects. Although not all of these side effects may occur, if they do occur they may need medical attention.
Check with your doctor immediately if any of the following side effects occur:
More common
• Chest pain
• chills
• cold or flu-like symptoms
• cough or hoarseness
• fever
• problems with urination
Less common
• Clear or bloody discharge from the nipple
• dimpling of the breast skin
• inverted nipple
• lump in the breast or under the arm
• persistent crusting or scaling of the nipple
• redness or swelling of the breast
• sore on the skin of the breast that does not heal
Incidence not known
• Bloating
• blurred vision
• change in vaginal discharge
• chest tightness
• clay-colored stools
• cleft lip or palate

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

- confusion
- constipation
- darkened urine
- diarrhea
- difficult or labored breathing
- difficulty with swallowing
- difficulty with walking
- dizziness
- dizziness, faintness, or lightheadedness when getting up suddenly from a lying or sitting position
- fainting
- fast, pounding, or irregular heartbeat or pulse
- headache
- hives
- indigestion
- irregular heartbeat
- irritation
- itching
- joint pain, stiffness, or swelling
- lightheadedness
- loss of appetite
- nausea
- nervousness
- noisy breathing
- numbness or tingling in the face, arms, or legs
- pain or feeling of pressure in the pelvis
- pains in the stomach, side, or abdomen, possibly radiating to the back
- pounding in the ears
- puffiness or swelling of the eyelids or around the eyes, face, lips, or tongue
- rash
- redness of the skin
- slow heartbeat
- spontaneous abortion
- stomach or pelvic discomfort, aching, or heaviness
- sweating
- swelling of the eyelids, face, lips, hands, or feet
- trouble breathing
- trouble speaking, thinking, or walking
- unpleasant breath odor
- unusual tiredness or weakness
- vaginal bleeding
- vomiting
- vomiting of blood
- yellow eyes or skin

Some side effects may occur that usually do not need medical attention. These side effects may go away during treatment as your body adjusts to the medicine. Also, your health care professional may be able to tell you about ways

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

to prevent or reduce some of these side effects. Check with your health care professional if any of the following side effects continue or are bothersome or if you have any questions about them:

More common
• Breast pain or tenderness
• depression
• muscle or joint pain
• white or brownish vaginal discharge
• worry
Incidence not known
• Attack, assault, or force
• blurred or loss of vision
• change in walking and balance
• changes in behavior
• changes in patterns and rhythms of speech
• choking
• clumsiness or unsteadiness
• confusion about identity, place, and time
• continuing ringing or buzzing or other unexplained noise in the ears
• decreased awareness or responsiveness
• difficulty with moving
• disturbed color perception
• double vision
• drowsiness
• extreme dizziness or drowsiness
• feeling drunk
• feeling of constant movement of self or surroundings
• feeling of unreality
• hair loss or thinning of the hair
• halos around lights
• hearing loss
• longer or heavier menstrual periods
• loss of consciousness
• muscle cramps or stiffness
• night blindness
• normal menstrual bleeding occurring earlier, possibly lasting longer than expected
• overbright appearance of lights
• redness of the skin
• relaxed and calm
• sensation of spinning
• sense of detachment from self or body
• severe sleepiness
• sleepiness
• slurred speech
• swollen tongue
• thoughts of killing oneself

- tunnel vision
- weight changes

Other side effects not listed may also occur in some patients. If you notice any other effects, check with your healthcare professional.

Call your doctor for medical advice about side effects. You may report side effects to the FDA at 1-800-FDA-1088.

7. Effects of FSH and LH Hormones

What is a follicle-stimulating hormone (FSH) levels test?

This test measures the level of follicle-stimulating hormone (FSH) in a sample of your blood. A hormone is a chemical messenger in your bloodstream that controls the actions of certain cells or organs. FSH plays an important role in sexual development in children and fertility in adults.

- In women who menstruate (have periods), FSH helps control the menstrual cycle. It triggers the growth of eggs in the ovaries and gets the eggs ready for ovulation. Ovulation is when an ovary releases an egg so it can travel down a fallopian tube where it can be fertilized by sperm.
- In men, FSH helps control the amount of sperm that the testicles (testes) make. It also affects how healthy the sperm are.
- In children, FSH levels are normally low until puberty starts. Then FSH levels begin to rise along with the levels of other hormones. The increase in all these hormones triggers the physical changes of puberty:
- In girls, FSH tells the ovaries to start making the hormone estrogen. Estrogen is involved in the growth of breasts, body hair, and menstruation.
- In boys, FSH tells the testicles to start making the hormone testosterone. Testosterone is involved in the growth of facial and body hair, changes in a boy's voice, and sperm production.

FSH levels are controlled by a complex system of hormones made in different parts of your body. Abnormal levels of FSH may be a sign of a problem with any of these parts. They include your:

- Pituitary gland, a small gland at the base of your brain. It makes FSH.
- Hypothalamus, a part of your brain. It makes hormones that tell your pituitary gland how much FSH to make.
- Reproductive glands, your ovaries or testicles. The amount of sex hormones they make let your hypothalamus and pituitary gland know when to start and stop making FSH.

Other names: follitropin, FSH, follicle-stimulating hormone: serum, pituitary gonadotropins

What is it used for?

FSH testing is used to help diagnose conditions that cause too much or too little FSH. The specific way the test is used depends on your sex and age.

In women, an FSH test may be used to:

- Help find the cause of infertility
- Check for medical conditions that affect how the ovaries work
- Find the reason for irregular or stopped menstrual periods in women of childbearing age
- Find out when a woman is most likely to get pregnant
- Find out if menopause or perimenopause may have begun:
- Menopause happens when the ovaries stop making certain hormones, and menstrual periods have stopped for 12 months in a row. This usually happens around age 50.
- Perimenopause is the time leading up to menopause when hormones and periods begin to change. It usually starts around age 45.

In men, an FSH test may be used to:

- Help find the cause of infertility
- Find the reason for a low sperm count

DOI: 10.48175/IJARSCT-36143

• Check for medical conditions that affect the testicles
In women and men, FSH testing may be used to help diagnose disorders of the:
• Pituitary gland
• Hypothalamus
In children and teens, FSH testing is most often used to find out if a medical disorder is causing early or delayed (late) puberty.
An FSH test is often used with a blood test for another hormone made in the pituitary gland called luteinizing hormone (LH). These two hormones work together to control sexual development and reproduction. Blood tests to check estrogen, testosterone,
and progesterone levels are also commonly used with FSH testing.
Why do I need an FSH levels test?
For women:
You may need this test if:
• You've been unable to get pregnant after 12 months of trying.
• Your menstrual periods aren't regular or have stopped.
If you're age 45 or older, testing usually isn't needed. That's because high levels of FSH are a normal sign of perimenopause and menopause. As your ovaries release fewer eggs, your body makes more hormones to try to trigger ovulation. But you may need an FSH test along with other hormone tests if there is a medical reason, including:
• Premature menopause (age 40 or younger)
• Early menopause (before age 45)
• Having symptoms that may be related to menopause, but the cause isn't clear
• You have a less interest in sex than usual.
For men:
You may need this test if:
• You've been unable to get your partner pregnant after 12 months of trying.
• You have less interest in sex than usual.
• You have a low sperm count.
• You have a loss of muscle and/or body hair.
For women and men:
You may need an FSH test if your health care provider thinks you could have a pituitary disorder. Pituitary problems can affect fertility and decrease your interest in sex. They may also cause symptoms, such as:
• Fatigue
• Weakness
• Decreased appetite and/or weight loss
Children and teens may need FSH testing if puberty seems to be starting too early or too late:
• Early puberty means showing signs of sexual development before age 8 in girls and age 9 in boys.
• Delayed puberty means not showing signs of sexual development by age 13 in girls and age 14 in boys.
What happens during an FSH levels test?
A health care professional will take a blood sample from a vein in your arm, using a small needle. After the needle is inserted, a small amount of blood will be collected into a test tube or vial. You may feel a little sting when the needle goes in or out. This usually takes less than five minutes.
Will I need to do anything to prepare for the test?
Women who have menstrual periods may need to be tested at a specific time during their menstrual cycle. That's because FSH levels change throughout the month.

Are there any risks to the test?

There is very little risk to having a blood test. You may have slight pain or bruising at the spot where the needle was put in, but most symptoms go away quickly.

What do the results mean?

To understand the results of your FSH test, your provider will consider your sex, age, symptoms, medical history, and the results of other hormone tests, especially your level of luteinizing hormone (LH). Your provider can explain what the results of your FSH test mean.

Generally, in women and men:

- Higher levels of FSH are often a sign of a condition in the reproductive glands (ovaries or testicles) that prevents them from making normal levels of sex hormones. The pituitary responds by making more FSH to try to get them to work properly. High FSH may also be a sign of a condition outside of the reproductive glands that affects how the glands work.
- Lower than normal levels of FSH in women and men are often a sign of a problem with the pituitary gland or hypothalamus. These problems may make it hard for your body to make FSH and LH.

In women, low FSH levels may also be linked to rapid weight loss, being very underweight, or extreme exercise.

Generally, in children with signs of early sexual development (before age 8 in girls or age 9 in boys):

- High levels of FSH and LH mean the child has early puberty, also called precocious puberty. In most cases, the cause is unknown. But in certain cases, the cause is a problem in the brain, such as:
- A brain tumor
- A past brain injury
- A past brain infection, such as meningitis or encephalitis
- Normal levels of FSH and LH mean the child has a type of early puberty called peripheral precocious puberty. This often means that a disorder in the testicles, ovaries, or adrenal glands is causing higher than normal levels of estrogen or testosterone.

Severe hypothyroidism and exposure to medicines that contain sex hormones may also cause this type of early puberty.

Generally, in teens with no signs of sexual development by age 13 for girls or age 14 for boys, low or normal levels of FSH and LH usually mean delayed puberty. Many teens with delayed puberty are healthy and go through normal puberty at a later age. But delayed puberty may be caused by certain medical conditions, such as:

- Poor nutrition from a long-term illness or eating disorder
- Hypogonadism, which is when the ovaries or testicles make little or no hormone. It may be caused by:
- Certain genetic disorders, including Kallmann syndrome
- Tumors in the brain or pituitary gland
- Turner syndrome in girls
- Klinefelter syndrome in boys
- Certain autoimmune disorders
- Radiation therapy or chemotherapy

If you have questions about test results, talk with your or your child's provider.

Learn more about laboratory tests, reference ranges, and understanding results.

Is there anything else I need to know about an FSH levels test?

At-home test kits that measure FSH levels in urine (pee) may help women find out if menopause or perimenopause is causing symptoms, such as irregular periods, vaginal dryness, or hot flashes.

Home tests can only find higher than normal FSH levels. They shouldn't be used to check whether you can become pregnant because they can't accurately tell whether your ovaries are making eggs. If you use a home FSH test, discuss your symptoms and test results with your provider.

8. Symptoms and Complications of Menopause

Menopause Symptoms and Side Effects

Some of these effects may improve over time with medication or other medical interventions. For some people, hormone therapy may be an option for addressing medical or quality-of-life issues that are not resolved in any other way. For people who are unable, or choose not to take hormone replacement, other options may be available to help ease the effects of menopause. Everyone experiences menopause differently. Some of the more common symptoms and side effects of menopause include:

Hot flashes Vaginal symptoms
Decreased libido or other sexual side effects
Sleep disturbance Memory or mood changes Weight gain
Heart disease Bone weakening
Urinary incontinence
Vaginal symptoms

Menopause can also cause the walls of the vagina to become thin and dry, a medical condition known as genitourinary syndrome of menopause, or GSM. GSM symptoms include vaginal dryness, shrinking of tissues, and itching and burning, which can make intercourse painful. GSM can cause bladder and urinary tract infections as well as incontinence. Experts may use one or a combination of several approaches to treat GSM.

- lubricants
- vaginal creams
- systemic hormones
- vaginal hormones
- vaginal treatment with laser or radio frequency

Normally, doctors recommend lubricants and vaginal creams as the first treatment for people who have medical reasons to avoid hormones. Vaginal lubricants (e.g., K-Y, Astroglide, and others) can help make sex more comfortable while vaginal moisturizers (e.g., Liquibeads, Replens, Hyalo GYN) are designed to be used on a regular basis (not related to sexual activity). Both lubricants and moisturizers are widely available and do not require a prescription.

Systemic hormone replacement therapy (e.g., tablets or skin patches) can also improve vaginal dryness. Some doctors prescribe low-dose local vaginal hormonal treatments.

Research suggests that vaginal estrogen may be safe for breast cancer survivors who cannot take systemic hormones.

Ospemifene (Osphena) is a type of drug known as a Selective Estrogen Receptor Modulator (SERM). It has been FDA approved to treat painful intercourse due to
menopause. Researchers are studying how well Carbon Dioxide (CO2) laser treatment such as MonaLisa Touch and radiofrequency treatment such as ThermiVa may help. These vaginal treatments do not have have FDA approval, and most insurance companies do not cover their costs.

Libido

“Libido” refers to a person's level of sexual desire. Many people experience decreased libido as a side effect of menopause. Hormones can improve libido after surgical menopause. Some doctors recommend the addition of testosterone replacement for women who have loss of libido with menopause that isn't alleviated by estrogen and progesterone
alone. Studies looking at the effects of the antidepressant bupropion (Wellbutrin)
on libido suggest that the drug may improve sexual arousal, overall sexual satisfaction, and satisfaction with intensity of orgasm. Larger studies are needed to validate these findings.

ISSN: 2581-9429
Volume 6, Issue 14, May 2026
Impact Factor: 8.2

Sleep disturbance

Some people report disruption in sleep patterns associated with menopause. Sleep disturbances may also cause fatigue and problems thinking. Sleep experts can help develop plans for treating sleep disorders, which may include behavioral therapy, strategies for improving sleep habits and medication.

Memory and mood

Menopause can affect memory. People in menopause often report memory loss or difficulty focusing on tasks. A number of studies have shown that having bilateral oophorectomy before menopause can lead to an increased risk of memory decline and dementia. Hormone replacement may help protect against memory loss from young-onset menopause. More research is needed to better understand the effects of estrogen and progesterone replacement on memory and the best timing for hormone replacement. Some research has shown a benefit from yoga, exercise, mindfulness, meditation and cognitive training. Experts also recommend a healthy diet, avoiding alcohol, and getting adequate sleep. Research has shown some benefit from the medication Modafinil, a drug used to treat sleep disorders.

b

Heart disease is the leading cause of death in American women. Risk increases after menopause, especially young-onset, surgical menopause. In addition to surgical menopause, risk factors for heart disease include:

• sedentary lifestyle
• waistline of more than 35 inches
• high blood pressure or cholesterol
• certain cancer treatments
• family history of heart disease and genetic factors

Research suggests that estrogen replacement therapy may protect against heart disease caused by early menopause. More research is needed to confirm these findings. Maintaining an ideal body weight, exercising, and avoiding smoking can also help protect from heart disease.

For most people, heart disease is treated with medications. When heart disease is caught early, it is more treatable. It's important for post-menopausal people to have an annual physical exam and to report to their doctor any shortness of breath, abnormal heart rhythm, chest pains or other symptoms.

Bone weakening

Experts use the terms “normal,” “osteopenia,” or “osteoporosis” to describe bone health and weakening. Osteopenia refers to low bone mass or density. Osteoporosis is a more serious loss of bone density, which weakens the bones. Some degree of bone thinning occurs as a natural part of the aging process. Loss of estrogen through natural or surgical menopause can lead to weakening of the bones, increasing the risk for broken bones.

A bone density test can tell whether a person’s bones are weakened or normal. Doctors often recommend a baseline bone density test around the time of menopause or surgery, and followup bone density tests yearly, or every two years after that.

Hormonal and nonhormonal medications can lower the risk for broken bones caused by loss of bone density. Proper nutrition, including adequate calcium intake is important for bone health. Weightbearing or resistance exercises may strengthen bones in postmenopausal women.

Urinary incontinence

Urinary incontinence refers to abnormalities of the bladder. The two most common types of urinary incontinence are leakage of urine and a persistent urge to urinate. Both are common side effects of menopause. There are hormonal and non-hormonal treatments for incontinence. Special exercises (called Kegel exercises) that strengthen your pelvic muscles can help. When medication and exercises don't help, surgery may also be used to treat incontinence.

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-36143

What is osteoporosis?

Osteoporosis is a disease in which your bones become weak and are likely to fracture (break). The disease can develop when your bone mineral density and bone mass decrease. It can also happen if the structure and strength of your bones change.

Osteoporosis is called a "silent" disease because it doesn't usually cause symptoms. You may not even know you have the disease until you break a bone. This could happen with any bone, but it's most common in the bones of your hip, vertebrae in the spine, and wrist.

What causes osteoporosis?

Your bones are made of living tissue. To keep them strong, your body breaks down old bone and replaces it with new bone. Osteoporosis develops when more bone is broken down than replaced. You lose bone mass and changes happen in the structure of your bone tissue. This can happen as you get older. Other risk factors can also lead to the development of osteoporosis or increase your chance of developing the disease.

Who is more likely to develop osteoporosis?

Anyone can develop osteoporosis, but you are more likely to develop it if you have one or more risk factors:

- Your sex. Osteoporosis is more common in women, especially after menopause (postmenopausal).
- Your age. Your risk increases as you get older. It is most common in people over age 50.
- Your body size. It is more common in people who are slim and thin boned.
- Your race:
- White and Asian women are at highest risk.
- African American and Mexican American women have a lower risk.
- White men are at higher risk than African American and Mexican American men.
- Family history. Your risk of osteoporosis may be higher if one of your parents has osteoporosis or broke their hip.
- Changes to hormones. Low levels of certain hormones can increase your chance of developing osteoporosis.
- Diet. A diet that is low in calcium and/or vitamin D or does not include enough protein can raise your risk.
- Long-term use of certain medicines, such as:
- Corticosteroids
- Proton pump inhibitors (which treat GERD)
- Medicines to treat epilepsy
- Having other medical conditions, such as:
- Endocrine diseases
- Certain digestive diseases
- Rheumatoid arthritis
- Certain types of cancer
- HIV
- Anorexia nervosa, a type of eating disorder
- Your lifestyle. Certain lifestyle factors can contribute to bone loss, such as:
- Smoking tobacco
- Long-term heavy alcohol use
- Physical inactivity or prolonged periods of bedrest

What are the symptoms of osteoporosis?

Osteoporosis usually doesn't cause symptoms. You may not know that you have it until you break a bone.

How is osteoporosis diagnosed?

Health care providers often diagnose osteoporosis during routine screening for the disease. The U.S. Preventive Services Task Force recommends screening for:

• Women age 65 and older
• Postmenopausal women under age 65 who have factors that increase the chance of developing osteoporosis

For men, it isn't clear yet whether regular screening is helpful. More research is needed to know for sure.

To find out if you have osteoporosis, your provider:

• Will ask about your medical history and whether you have ever broken a bone
• May do a physical exam, which could include checking for:
• A loss of height and/or weight
• Changes in your posture
• Balance and gait (the way you walk)
• Your muscle strength
• Will likely order a bone density scan
• May do a fracture risk assessment, which is a short questionnaire that helps estimate your risk of breaking a bone in the next 10 years
• Will likely order a bone density scan
• May do a fracture risk assessment, which is a short questionnaire that helps estimate your risk of breaking a bone in the next 10 years

What are the treatments for osteoporosis?

The goals for treating osteoporosis are to slow or stop bone loss and to prevent fractures. Your provider may recommend:

• A healthy, balanced diet that includes enough calcium, vitamin D, and protein
• Lifestyle changes such as quitting smoking and limiting alcohol
• Regular physical activity including weight-bearing exercise (like walking), strength training, and balance exercises
• Fall prevention to help prevent fractures
• Medicines, such as:
• Medicines that slow down bone loss
• Medicines that help rebuild bone

In addition to managing your osteoporosis, it's important to avoid activities that may cause a fracture. These can include movements that involve:

• Twisting your spine, like swinging a golf club
• Bending forward from the waist, like sit ups and toe touches

You can also help reduce the risk of breaking a bone by preventing falls.

Can osteoporosis be prevented?

To help keep bones strong and help prevent osteoporosis, the best thing to do is to eat a healthy diet rich in calcium and vitamin D. Getting regular physical activity, limiting alcohol, and not smoking can also help.

NIH: National Institute of Arthritis and Musculoskeletal and Skin Diseases

Start Here

• Osteoporosis (National Institute of Arthritis and Musculoskeletal and Skin Diseases)Also in Spanish

Diagnosis and Tests

• Bone Density Scan (National Library of Medicine)Also in Spanish
• Bone Mineral Density Tests: What the Numbers Mean (National Institute of Arthritis and Musculoskeletal and Skin Diseases)Also in Spanish

Prevention and Risk Factors

• Calcium and Vitamin D: Important for Bone Health (National Institute of Arthritis and Musculoskeletal and Skin Diseases)Also in Spanish
• Exercise for Your Bone Health (National Institute of Arthritis and Musculoskeletal and Skin Diseases)Also in Spanish
• Healthy Bones at Every Age (American Academy of Orthopaedic Surgeons)
• Preventing Another Broken Bone (National Institute of Arthritis and Musculoskeletal and Skin Diseases)Also in Spanish

Treatments and Therapies

• Osteoporosis Treatment (Endocrine Society)
• Osteoporosis Treatment: Medications Can Help (Mayo Foundation for Medical Education and Research)Also in Spanish
• Red Clover (National Center for Complementary and Integrative Health)
• Vertebroplasty and Kyphoplasty (American College of Radiology; Radiological Society of North America)Also in Spanish

Related Issues

• Bone Density: MedinePlus Health Topic (National Library of Medicine)Also in Spanish
• Osteoporosis and Your Spine (Bone Health and Osteoporosis Foundation)
• Pelvic Fractures (Merck & Co., Inc.)Also in Spanish
• Recovering from Fractures (Bone Health and Osteoporosis Foundation)

Specifics

• Glucocorticoid-Induced Osteoporosis (American College of Rheumatology)Also in Spanish

Genetics

• Hajdu-Cheney syndrome: MedlinePlus Genetics (National Library of Medicine)
• Juvenile primary osteoporosis: MedlinePlus Genetics (National Library of Medicine)
• Osteoporosis-pseudoglioma syndrome: MedlinePlus Genetics (National Library of Medicine)

Videos and Tutorials

• Osteoporosis (Medical Encyclopedia)Also in Spanish

REFERENCES

1. Shirvani M, Heidari M. Quality of life in postmenopausal female members and non-members of the elderly support association. J Menopausal Med. 2016;22:154–160. doi: 10.6118/jmm.2016.22.3.154. [DOI] [PMC free article] [PubMed] [Google Scholar]
2. Tandon VR, Mahajan A, Sharma S, Sharma A. Prevalence of cardiovascular risk factors in postmenopausal women: a rural study. J Midlife Health. 2010;1:26–29. doi: 10.4103/0976- 7800.66993. [DOI] [PMC free article] [PubMed] [Google Scholar]
3. Puri S, Bhatia V, Mangat C. Perceptions of menopause and post menopausal bleeding in women of Chandigarh. Internet J Fam Pract. 2008;6:601–608. [Google Scholar]
4. Im EO, Liu Y, Dormire S, Chee W. Menopausal symptom experience: an online forum study. J Adv Nurs. 2008;62:541–550. doi: 10.1111/j.1365-2648.2008.04624.x. [DOI] [PMC free article] [PubMed] [Google Scholar]
5. Tamilmani Menopause and hormone replacement therapy. Nightingale Nurs Times. 2006;2:24– [Google Scholar]
6. Parsa P, Tabesh RA, Soltani F, Karami M. Effect of group counseling on quality of life among postmenopausal women in Hamadan, Iran. J Menopausal Med. 2017;23:49–55. doi: 10.6118/jmm.2017.23.1.49. [DOI] [PMC free article] [PubMed] [Google Scholar]

7. Kwak EK, Park HS, Kang NM. Menopause knowledge, attitude, symptom and management among midlife employed women. J Menopausal Med. 2014;20:118–125. doi: 10.6118/jmm.2014.20.3.118. [DOI] [PMC free article] [PubMed] [Google Scholar]
8. Yanikkerem E, Koltan SO, Tamay AG, Dikayak S. Relationship between women's attitude towards menopause and quality of life. Climacteric. 2012;15:552–562. doi: 10.3109/13697137.2011.637651. [DOI] [PubMed] [Google Scholar]
9. Waidyasekera H, Wijewardena K, Lindmark G, Naessen T. Menopausal symptoms and quality of life during the menopausal transition in Sri Lankan women. Menopause. 2009;16:164–170. doi: 10.1097/gme.0b013e31817a8abd. [DOI] [PubMed] [Google Scholar]
10. Nayak G, Kamath A, Kumar P, Rao A. A study of quality of life among perimenopausal women in selected coastal areas of Karnataka, India. J Midlife Health. 2012;3:71–75. doi: 10.4103/0976- 7800.104456. [DOI] [PMC free article] [PubMed] [Google Scholar]
11. Özkan S, Alataş ES, Zencir M. Women's quality of life in the premenopausal and postmenopausal periods. Qual Life Res. 2005;14:1795–1801. doi: 10.1007/s11136-005-5692- 4. [DOI] [PubMed] [Google Scholar]
12 .Membrive JM, Granero-Molina J, Salmerón MJS, Fernández-Sola C, López CMR, Carreño TP. Quality of life in perimenopausal women working in the health and educational system. Rev Latino-Am Enfermagem. 2011;19:1314–1321. doi: 10.1590/s0104-11692011000600006. [DOI] [PubMed] [Google Scholar]
13. Hakimi S, Haggi HB, Shojai SK, Farahbakhsh M, Farhan F. Comparing the pattern of menopausal symptoms, concern and attitudes in urban and rural postmenopausal Iranian women. J Menopausal Med. 2018;24:50–55. doi: 10.6118/jmm.2018.24.1.50. [DOI] [PMC free article] [PubMed] [Google Scholar]
14. Shobeiri F, Jenabi E, Khatiban M, Hazavehei SMM, Roshanaei G. The effect of educational program on quality of life in menopausal women: a clinical trial. J Menopausal Med. 2017;23:91–95. doi: 10.6118/jmm.2017.23.2.91. [DOI] [PMC free article] [PubMed] [Google Scholar]
15. Zivdir P, Sohbet R. Effect of feelings of guilt and shame on life quality of women in menopause. J Menopausal Med. 2017;23:5–14. doi: 10.6118/jmm.2017.23.1.5. [DOI] [PMC free article] [PubMed] [Google Scholar]
16. Bahri N, Yoshany N, Morowatisharifabad MA, Noghabi AD, Sajjadi M. The effects of menopausal health training for spouses on women's quality of life during menopause transitional period. Menopause. 2016;23:183–188. doi: 10.1097/GME.0000000000000588. [DOI] [PubMed] [Google Scholar]
17. Reed SD, Guthrie KA, Newton KM, Anderson GL, Booth-LaForce C, Caan B, et al. Menopausal quality of life: RCT of yoga, exercise, and omega-3 supplements. Am J Obstet Gynecol. 2014;210:244.e1–244.e11. doi: 10.1016/j.ajog.2013.11.016. [DOI] [PMC free article] [PubMed] [Google Scholar]
18. Satoh T, Ohashi K. Quality-of-life assessment in community-dwelling, middle-aged, healthy women in Japan. Climacteric. 2005;8:146–153. doi: 10.1080/13697130500117961. [DOI] [PubMed] [Google Scholar]