

Awareness of the Benefits of Phytoestrogens-make a Safe Journey to Rocky Road of Menopause

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Introduction

Menopause is a physiological stage in a woman's life that marks the end of the reproductive stage and is characterized by the permanent cessation of menstruation. Menopause is determined by the reduction of the ovarian function and decreased production of estradiol, leading to depletion of the ovarian follicles (Kopper et al 2008, Blake 2006, Al- Eassa 2012) The late problems associated with menopause are osteoporosis and coronary artery disease. Approximately 75 - 80% of women experience menopausal symptom, almost half of them considers the symptoms painful, while 20-30% has severe symptoms (Palacios, 2003, Burger 1996).¹As a result, their quality of life is affected physically and psychologically, as well associably.

The History of Soy

- There is a lot of material on soy and its discovery and use since atleast 2000 to 3000 years ago. Soy and its phytoestrogenic property is well known in the veterinary field. However, no studies on human subjects exist before 1982.
- Allen Doisy first reported to exhibit estrogenic activity in plant extract in 1926. It is in 1940, in Australia, clover disease was recognized. The biological activity of phytoestrogens first identified in female sheep grazing on Australian pastures. And it was then thought that such activity might exist inhuman.

- Phytoestrogens were identified in the urine of non human primates in 1979 and in human in 1982.
- In India, in April 2001, charak pharma made capsules from soy- evanova which contained isoflavones + lignane + calcium and vitamin C
- Soy bean is a plant cultivated foodstuff whose health properties have recently been discovered. Thorough studies have revealed that the consumption of the soybeans have favorable effects on people's health.
- Soy bean have been known to mankind in its original area, Asia for 5000 years, as the main food ingredient, it plays a major role as it contains up to 35% of vegetable proteins, as well as 20% vegetable fat and around 30% of carbohydrates.²

How the idea came about to look into diet?

The traditional diet of Chinese and Japanese women were studied. Their food contained mainly of soy and soy products, which have phytoestrogens.³

Studies linking health and soy bean consumption had striking results:

- **Mayo (1999)** did a study on health benefits of soy and the results shows, lower number of hormonal depending tumors such as breast cancer, prostate cancer, bone stability, lower risk of developing osteoporosis and an extremely low rate of menopause symptoms for Chinese and Japanese women. However those beneficial effects for the health disappeared when the food consumed

not include a high number of foodstuff rich in soybean.

- **Classical example** is of Japanese women, they have very little fracture risk when having typical soy rich diet in Japan. But when they migrated to West and had change in diet; they started showing increased fracture risk.
- **Hot flashes across the globe:** Incidence of hot flashes is seen in more than 60% women in USA and Europe. While only approximately 20% incidence is seen in Chinese and Japanese women.⁴

Soy provides isoflavones as BIOCHANIN A and FORMONETIN. The healthy intestinal bacterial flora converts them into active isoflavones, GESTEIN and DAIDZEIN respectively. Thus it is absolutely essential to have healthy intestinal flora.

Phytoestrogens

Phytoestrogens are plant compounds that are structurally or functionally similar to steroidal estrogens. These compounds are weaker than natural estrogens and reside in herbs and seasonings, vegetables, fruits and drinks. Phytoestrogens are selective estrogen enzyme modulators functioning as pro estrogens when estrogen deficiency is present and as anti estrogens when excess estrogen is present. Thus these flavonoids effectively balance the estrogen metabolism in the body.

The three most important types of phytoestrogens are **isoflavones, lignans and coumestains**. Isoflavones are the most potent and the most common phytoestrogens in supplements.⁵

Types of phytoestrogens

Sl.no	Types	Common source
1	Isoflavones	Legumes, particularly the soy bean, clover, peas
2	Lignans	Most cereal, fruits and vegetables
3	Flavones	Most red, yellow colored fruits and vegetables
4	Flavanones	Citrus fruit
5	Flavonols	Most red, yellow colored fruits and vegetables
6	Coumestains	Bean shoots, alfalfa sprouts, sunflower seeds and oils, spinach, red beans, split peas, soy beans and some special species of clover
7	Chalcones	Liquorice and apple seeds

Benefits of phytoestrogens

Antioxidants

Isoflavones and other phytoestrogens also act as superb antioxidants, helping the body to remove impurities such as free radicals, the damaging substances ingested by the body in the form of pollutants, and produced by the body as a by-product of normal metabolism.

Bone protectors

The bone conserving action of phytoestrogens is considered to result from

the direct estrogen receptor mediated action of genistein on bone building cells called osteoblasts and their precursor cells.

Cancer prevention

It is proposed that isoflavones inhibit angiogenesis, thus depriving tumor of the blood vessels that enable their growth. Asian diets that typically include phytoestrogens rich foods have been correlated with reduced risk of prostate cancer.

Anti atherogenic

- ❖ Atherosclerosis is initiated by monocytes binding to the endothelium and migrating into intimal layer to develop into foamcells.
- ❖ The adhesiveness of endothelial cell is due to lipid induced, oxidant sensitive transcription of adhesion molecules and chemokines, which promote monocytes binding.
- ❖ This binding is reliant upon intercellular signaling and oxidant sensitive transcription of adhesionmolecules.
- ❖ Phytoestrogens protect against atherosclerosis by interfering with these initial process, like alter the activity of growth factors and inhibit the cell adhesion and proliferation thus preventing the atherosclerosis.⁶

Cardio Protective effects

The WHO cardiac study supported that consumption of high soybean diet is associated with lower mortalities fromcoronary artery disease.

Delay the ageing process

- ❖ It helps to inhibit the production of free radicals, which are associated with ageing. FreeRadicalsareanimportantfactorinthe

ageing process and are constantly formed in most cells and tissues. Free radicals can be created and cause damage to the cell, including proteins, lipids, and DNA.

- ❖ Some population based studies indicate a lower incidence of menopausal discomforts such as hot flashes in Asian women who heavily consume soyfoods.
- ❖ Studies indicate that the phytoestrogens, iso flavones may help control cholesterol levels, and could potentially protect against osteoporosis.
- ❖ Researchers noted that the reduced LDL cholesterol seen in the carotid arteries with soy was due to decreased delivery of LDL to the arteries, which could partly explain the soy's cardio protectiveeffects.⁷

Sources of phytoestrogens

Food items	Lignan content (µg/100g)	Total phytoestrogen (µg/100g)
Vegetables		
Soy bean sprouts	2.2	789.6
Garlic	583.2	603.6
Winter squash	113.3	113.7
Green beans	66.8	105.8
Collards	97.8	101.3
Broccoli	93.9	94.1
Cabbage	79.1	80
Fruits		
Dried prunes	177.5	183.5
Peaches	61.8	64.5
Strawberry	48.9	51.6
Raspberry	37.7	47.6
Watermelon	2.9	2.9
Nuts and other legume seeds		
Pistachios	198.9	382.5
Chestnuts	186.6	210.2

Walnuts	85.7	139.5
Cashews	99.4	121.9
Hazel nuts	77.1	107.5
Lentils	26.6	36.5
Beverages		
Wine, red	37.3	53.9
Tea, green	12	13
Wine, white	8	12.7
Tea, black	8.1	8.9
Coffee, decaf	4.8	5.5
Beer	1.1	2.7
Black bean sauce	10.5	5330.3

Absorption, metabolism and excretion of isoflavones:

Phytoestrogens, found in diet as glucosyl conjugates (daidzein, genistin), are hydrolyzed in the intestine, by the action of UDP-glucuronosyl transferase (UGT) secreted by intestinal bacteria, into the active forms aglycones (daidzein and genistein). Genistein and daidzein are also produced from the demethylation of their precursor biochanin A and formononetin, respectively. The aglycones are absorbed from the intestinal tract to the liver where they are mainly conjugated with glucuronic acid and sulfates. Some of the conjugated aglycones are excreted in the bile where they are hydrolyzed, and some of the unconjugated aglycones are excreted in the feces, while some are reabsorbed to the liver via enterohepatic circulation. In blood, isoflavones are metabolized mainly into equol and O-desmethylandolensin (O-DMA) which are excreted in urine.

When it can be detectable in the blood:

For isoflavones to be effective, genistein levels 25 mmol/L should be achieved. Even in high soy consumers it is unlikely that the blood isoflavone concentrations ever exceed 1-5 mmol/L. When total isoflavone intake is 50 mg/day, the blood plasma concentrations achieved are 50-800 ng/ml for genistein + daidzein + equol. After 6 weeks of isoflavone intake, detectable levels are achieved in blood. The plasma half-life of genistein, daidzein is 7 to 9 hours for adults.

Mechanism of action

- ❖ Binding of estrogen receptors
- ❖ Modulation of sex steroid binding protein

Pro estrogenic effects

- Reduce the severity and frequency of menopausal symptoms such as hot flashes, night sweats, vaginal dryness, depression etc..
- Preserves bones and prevents fractures
- Regulates blood lipid profile favorably

Anti estrogenic effects

- Reduce the risk of hormone-related cancer such as breast cancer. Study shows that 45 mg of soy isoflavones has been shown to lengthen the first half of the menstrual cycle that is before ovulation, in premenopausal women. It is perhaps the combined effect of lower estrogen exposure and a lengthened cycle that confers protective benefits against breast cancer in premenopausal women.⁹

Dosage

It should be taken in quantities measuring 1-2 mg per kg body weight as once or twice daily, preferably with a high carbohydrate meal.

Target tissues for phytoestrogens

- ❖ Reproductive tissues – uterus, breast, prostate
- ❖ Cardiovascular tissue – arteries, lipoproteins
- ❖ Skeletal tissue – lipoproteins, bone

Conclusion

Menopause is a normal stage of life experienced by women all over the world. It occurs typically between the ages of 40 and 60 years when the ovaries stop producing the hormones

estrogen and progesterone, which are responsible for the monthly menstrual cycles. When the ovaries stop making these hormones, the menstrual cycles stop as well.

Unfortunately, for many women, the drop in hormone production can cause uncomfortable side effects, such as hot flashes and vaginal dryness. The good news is that simple dietary changes may reduce some of these menopausal symptoms.

Bibliography

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Contra indications for using Phytoestrogens

- ❖ Pregnant and lactating mother
- ❖ Women on birth control pills
- ❖ Infants and children
- ❖ Any interactions with hormonal replacement therapy or cancer therapy

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