



## Post menopausal effect on calcium, bone mineralization and mood swing

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### Abstract

When cessation of menstruation occurs there are lots of change occurs in the body. The factors like calcium, bone mineralization and mood swings in post menopause are well known. This review article focuses on the effect of these factors on nutrients intake and mood status. The intake of calcium in the diet is directly proportional to bone resorption. Thus calcium supplementation is effective to prevent the bone loss in post menopausal women. There is a high association between mood swing and menopause. The decline of the estrogen hormone controls the cognitive functions in post menopausal women. Hormone replacement therapy is the treatment method to prevent post menopause symptoms but currently dietary supplements are more preferable.

**Keywords:** Menopause, estrogen, mood swing, black cohosh, ginseng, calcium supplementation.

### INTRODUCTION

The phenomenon of the menopause was known to the ancient Greeks; Aristotle (384-322 BC) described the cessation of menstruation at the age of 40. In the nineteenth century, the menopause was believed to be directly responsible for madness and even in more modern times it had still been believed to cause certain psychiatric illness [1]. The term menopause was defined by International Menopause Society as a permanent cessation

of menstruation resulting from the loss of ovarian follicular activity. Natural menopause was recognized to have occurred after 12 consecutive months of amenorrhea for which there was no other obvious pathological or physiological cause. Whereas the post menopause was the period of date from the first menstrual period (FMP), regardless of whether the menopause was induced or natural/ spontaneous [2]. The word menopause was taken from word, meno means month or menses and pause means 'to stop' and it was considered to be a direct description of physiological changes in women where menses stop.

When menopause is attained, lot of changes occurs in the body due to the deficiency of estrogen hormone. The main symptoms after the menopause are hot flushes, night sweats, insomnia and vaginal dryness [3]. Apart from these symptoms, irregular menstrual bleeding, osteoporosis, arteriosclerosis, dyslipidaemia, depressed mood, irritability, headache, forgetfulness, dizziness, deterioration in postural balance, palpitations, dry eyes, dry mouth, reduced skin elasticity, muscle and joint pain have also been implicated with menopause [4,5,6].

### **CALCIUM & BONE MINERALIZATION**

Bone, the supporting frame work of the body is a highly specialized connective tissue. It is very rigid, hard and has the power of regeneration and repair [7]. It is a dynamic tissue that undergoes continuous bone resorption and formation. Resorption is high in growing children whereas it is balanced in healthy adults. The resorption lags with menopause and aging in both men and women. Remodelling of the portion of the skeleton occurs every year and it can be as high as 50% in young children to 5% per year in adults. Bone also serves as a reservoir of calcium [8].

Calcium can be supplemented only through diet. Calcium absorption occurs more during the growing stage than in adult stage. Excretion of calcium through urine is much reduced to create a reserve for bone mineralization. Age related bone loss occurs after the attainment of Peak Bone Mass (PBM) and minerals including calcium are lost from the bone. Factors which influence the rate of age-related loss of bone includes the following [9]

- Immobility
- Deficiencies of sex hormones (particularly female)
- Thinness (being underweight)
- Cigarette smoking
- Alcohol consumption
- Corticosteroids
- Thyrotoxicosis
- Chronic liver disease
- Intestinal malabsorption
- Anorexia nervosa
- Factors decreasing risk of bone loss
- Physical activity (especially weight-bearing activity)

- Hormone replacement therapy (postmenopausal women)
- Diuretic use (thiazides)
- Obesity and being overweight.

Such a bone demineralization may lead to porosity of the bone and thus makes it fragile and easily breakable. Such low bone mineral density is also referred to as osteoporosis. The WHO defines osteoporosis as 'a disease characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk'[11] and it is considered as the second leading healthcare problem after cardiovascular disease in individual with normal mineral density [11]. Osteoporosis is clinically diagnosed using various techniques of which Two-dimensional dual-energy Xray absorptiometry (DEXA) is the commonly used method [9]. Indeed all women who attain menopause should undergo 'DEXA' periodically and accordingly they need to seek medical advice and dietary supplementation.

#### **Need for Calcium supplementation in early post menopausal women**

During menopause circulating estrogen level falls drastically. This results in rapid bone loss in the first 5 to 10 years of menopause which leads to bone resorption and an increase level of calcium ions in the plasma. Due to this the serum parathyroid hormone (PTH) and calcitriol level falls to maintain the normal level of calcium in the blood. Absorption of calcium through the gastrointestinal tract is also reduced [9]. Elders et al., (1991) and Aloia et al., (1994) suggested that calcium supplementation can prevent bone loss [12,13].

#### **Need for Calcium supplementation in late post menopausal women**

The low intake of calcium in the diet is one of the reasons for increased bone resorption in post menopausal women. Therefore increase intake of calcium is more compelling in this group. According to a study conducted by Storm et al., (1998), calcium intake up to 1g/day through diet or supplement had shown to inhibit bone loss over a period of two years in postmenopausal women over the age of 65 years [14]. The supplementation of calcium during first year showed greatest skeletal preservation than in the second year but the long term effects are not known [15] therefore it is recommended lifelong supplementation of calcium to obtain the reported skeletal benefits [9].

#### **MENOPAUSE AND MOOD SWING**

Mood swing occurs due to the decline of estrogen hormones in the body. Mood swings are highly associated with menopause and it can affect the marital status, hormonal variations, changes in the environmental and socio economic events, educational level and depressive stage [16,17]. According to a prospective study conducted by Melbourne women's midlife health project, the women who are with the peak of transition stage to menopause showed highest rate of depression [18]. The transition time to menopause may take a few months to years. During the perimenopause, mood problems like insomnia and hot flashes are

common but this can aggravate from minor to major mood swing known as depression [19]. In addition, vasomotor symptoms are common in menopause stage and it follows: sleep disturbance, mood swing, cognitive deficits and reduced quality of work [18]. Women who had already experienced mood swings during the period of menstrual cycle or post partum depression are likely to have more mood swing problems in the later stage of menopause [19]. According to Dennerstein et al., (1999) during the menopausal transition of 354 Australian mid – aged women shows a magnitude of negative mood which was significantly adversely affected by prior experience of negative mood [20].

### **EFFECT OF MOOD SWING AND HORMONE REPLACEMENT**

The causes of mood swings with post menopause are not well known but there are different theories stating that mood changes can occur due to the hormonal imbalance. The hormone called estrogen plays a role in brain functions that affect mood and memory. According to Ditkoff and team (1991), estrogen treatment for postmenopausal women has improved the mood state and psychological function where as there was no significant difference in the memory level. A study conducted by Inger Bjorn et al., (2002) concluded that there was a cyclic change of negative mood in women during the late progestrogen phase and positive mood during the estrogen only phase [21]. In the postmenopausal hormone replacement therapy in women, hormone names medroxyprogesterone acetate shows more positive mood state than with norethindrone. Whereas there is a study which shows that negative mood changes were seen in post menopausal women who has taken vaginal progesterone as hormone replacement therapy with other medications [22]. The estrogen replacement therapy for post menopause women has reported to have an improved cognitive functions and improved mood status. It has shown that estrogen can augment serotonergic activity as well as in norepinephrine in post menopausal women. This is due to the mood related neurotransmitter. The estrogen replacement therapy will reduce the affinity towards the depression state [23]. Substituting estrogen hormone as a hormone replacement therapy will increase the women's quality of life and well being.

### **EFFECT OF DIETARY SUPPLEMENTS**

After the release of the Women's Health Initiative (WHI) to reduce estrogen therapy, there is an increase in the consumption of dietary supplements mainly focusing on post menopause women. It highlights the need for critical evaluation of tolerability and effectiveness [24]. In postmenopausal women, phytosterols and phytostanols have a property for diminishing LDL and total cholesterol. The regular intake of fiber rich dietary supplements can reduce the serum total cholesterol in hypercholesterolemic postmenopausal women. It also suggests that effectiveness of a combination of calcium and Vitamin D reduces the bone mineral density loss and incidence of fractures [25]. A dietary supplement survey conducted in San Francisco concluded that during the period of menopause the frequency of dietary supplements are more.

### **BLACK COHOSH**

It is a medicinal root which is known as black snakeroot or bungbane. The botanical name of black cohosh is *Cimicifuga racemosa* L. It contains potent phytochemicals that have an effect on endocrine system. This root is mainly used for the treatment for post-menopausal symptoms like hot flushes, mood swings, night sweats [26]. This herb is used by Native Americans to treat the menopause and menstrual irregularity. The majority of the studies indicate that the extract of black cohosh improves the symptoms of menopause related problems. The evidence from experimental studies suggests that black cohosh can be an alternative treatment for menopause related problems. The early German studies found black cohosh improved physical and psychological menopausal symptoms. A study conducted in 120 women, after the administration of black cohosh was effective for the postmenopausal symptoms and it can be safe as an alternative treatment for women who will not or cannot take HRT.

### **GINSENG**

Ginseng is a medicinal plant which belongs to the genus *Panax* and the family (Araliaceae). It is found in North America and in eastern Asia. Ginseng is characterized by the presence of at least 28 ginsenosides a class of natural steroid glycosides and gintonin a glycolipoprotein. *Panax ginseng* is used to maintain the energy level, to increase the mental stability and physical abilities, and to improve mood [27]. According to Myung- Sunny kim et al., (2013) a randomized control trail study was conducted to assess the effectiveness of ginseng for a treatment for managing menopause symptoms and concluded that there was beneficial effects of ginseng on depression and well- being [28]. In addition to this, a study conducted on 384 post menopausal women who were on randomized control trail to receive placebo or ginseng for 16 weeks, showed an improvement in their three subsets of psychological general well being [29]. With the studies and the reviewers the ginsengs have the property to reduce the post menopause symptoms, but yet more studies are required to ascertain strongly.

### **SOY ISOFLAVAONES**

Soybean belongs to legumes family and it is rich in proteins and lipids. The soybean protein is similar to that of animal proteins in quality wise, and therefore it is considered as poor man's meat. The protein products of soy contain bioactive molecules like phytoestrogen or isoflavanones. The isoflavanones have potential role in increasing the bone mineral density among postmenopausal women there by reducing the risk of osteoporosis [30]. In many of the western countries the soy products are considered as natural remedy for postmenopausal symptoms. According to the study conducted by Rosanna Duffy et al., (2003), soya extract containing isoflavanones were given to post menopausal women for 12 weeks and concluded that there was improvement in the cognitive functions [31]. Soy

isoflavanones also help to reduce the fasting blood glucose level, and reduce the cardiovascular effects.

## CONCLUSION

Due to the decline of estrogen level in the body, poor bone mineralization and mood swings are common among post menopausal women. This review article concludes that dietary supplements may reduce the symptoms in post menopause women to replace the hormone therapy. However it requires future research.

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