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9. Management of Osteoporosis: Issues and Concerns

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9.1 Osteoporosis: An Introduction:

Osteoporosis is defined as a major public health problem in developing countries mainly in the Middle East, having high prevalence of low bone mineral density than Western Countries (**Handa *et al*., 2008)**. Osteoporosis is the most common skeletal disorder that affects both sexes, but most importantly affects female who feels more rapid loss of their bone mass during the early years following menopause **(National Osteoporotic Foundation, 2010)**.

It is a bone disease characterized by reduced bone density, deficiency of bone tissue relative to the volume of biological bone and decreased bone strength. Since osteoporosis is a "Silent Disorder", as generally people may not be aware of their diseased condition until they experience fragility fracture after a sudden strain on bones, bumps or falls due to their weaken bones. **(Scottish Intercollegiate Guidelines Network, 2003).**

The greatest loss of bone density occurs in women during perimenopause and is related with low level of estrogen in the blood, a condition of menopause. According to World Health Organization, Osteoporosis is defined as a Bone Mineral Density of 2.5 standard deviations or more below the mean peak bone mass as measured by Dual-Energy X-Ray Absorptiometry **(WHO, 1994)**. The disease may classify as Primary Type-1, Primary Type II or secondary. The form of osteoporosis most common in women after menopause referred to as Primary Type-I or Postmenopausal Osteoporosis.

9.1.1 A Prevalent Condition: Need a Global Focus:

This bone disorder is a prevalent global public health problem associated with compelling morbidity, mortality and socioeconomic burden. The prevalence of osteoporosis intensifies with age for all sites and according to World Health Organization (WHO) definition of osteoporosis up to 70% of women above the age 80 years have osteoporosis. Worldwide women over 45 years of age, more than 200 million have osteoporosis and this is responsible for over 1.5 million fractures annually **(Khatoon *et al.*, 2013)**.

The data concerned with India indicates that 1 out of 3 females suffered from osteoporosis, which making India one of the largest affected countries in world **(Jaipal and Gora, 2015)**. According to a study conducted among the Indian women aged between 30-60 years from

low income group, low BMD at all skeletal sites were observed in comparison with data reported from developed country and there was a high prevalence of osteopenia (52%) and osteoporosis (29%) among the selected women due to their inadequate dietary intake. **(Facts and Statistics, International Osteoporotic Foundation, 2015)**

Due to the problem with definition and diagnosis of osteoporosis, it is difficult to determine worldwide variation in its incidence and prevalence. To determine the rate of fracture in older people is the most appropriate way to compare prevalence of osteoporosis among the population. Usually osteoporosis is not a life threatening disorder, so the quantitative data from the developing country like India are still scarce. Despite this, the current consensus reported nearly 1.66 million hip fractures every year worldwide and due to increasing number of older people, the incidence is set to increase four-times by 2050 **(US Department of health and Human Service, 2004)**.

9.1.2 Menopausal Women and Osteoporosis:

With the onset of menopause very rapid loss of bone mineral density occurs which is believed to average approximately 2-3% every year, being greatest in the early postmenopausal years. Thus for the purpose of prevention and control of osteoporosis there is great interest in conducting epidemiologic survey on prevalence of osteoporosis and related risk factors in communities. Few studies examined Arab middle-aged and elderly women's knowledge and attitude about osteoporosis, all of them have poor knowledge, bad dietary behavior, low physical activity **(Mohamad and Tayel, 2012)**. Similarly, unawareness about risk factors of osteoporosis and unhealthy life style was also reported among young females **(Al-Zu'bi *et al.*, 2010)**

Until recently, it was believed that osteoporosis mainly affects postmenopausal women. However, recent researches indicate that osteoporosis may occur in women aged above 40 years and even in youth. The main contributing factors involve deficiency in dietary intake of calcium, vitamin D and protein. Prevention from osteoporosis should begin in early ages through the consumption of calcium rich foods like Milk and milk products, whole pulses and cereals, nuts and green leafy vegetables to reduce loss of bone mineral density (**Carol*i et al.*, 2011).**

9.1.2 Risk Factors of Osteoporosis:

Osteoporosis is a diseases which can be prevented by obtaining peak bone mass during skeletal growth, preserving bone mass during adulthood, and reducing loss of bone density with advancing age. Thus, adolescents and young adults should be encouraged to adopt healthy life style behaviors for ideal skeletal health by increasing the level of weight bearing exercise, optimal intake of dietary calcium and vitamin D, proper nutrition and maintaining ideal body mass index, cessation of smoking, and moderate intake of alcohol, caffeine and sodium **(NIH Consensus Development Panel, 2001).**

During the age of puberty the onset of anorexia nervosa frequently occurs, and this is the time of life when maximal bone mass accrual occurs, thereby adolescent girls and boys with anorexia nervosa are at high risk of having reduced peak bone mass **(Mishra *et al.*, 2008)**.

It is evident from the researches that adequate intake of calcium can improve the positive effect of physical activity on bone health during the growth period of the children **(Specker and Binkley, 2003)**.

Various risk factors are related with the occurrence of osteoporosis and contribute to the probability of an individual suffering from this bone disorder. There are some risk factors which are modifiable such as sex hormone, anorexia nervosa, dietary intake of calcium and vitamin D, long duration consumption of some medications like steroids and antacids, inactive life style, smoking and excessive intake of alcohol and caffeine. On the other side gender, age, body size, race and family history are non-modifiable risk factors for the development of osteoporosis **(Johnson *et al.,* 2008).**Considering that osteoporosis is a highly preventable disease and among these risk factors, most of them are controllable and dependent on a person's behavior, educational and nutritional awareness programs have the potential to improve knowledge and awareness about the disease and its harmful consequences **(Chan *et al.,* 2007)**

9.1.3 Preventive and Curative measures of Osteoporosis:

The life style changes can reduce the risk of osteoporosis and osteoporotic fractures. It involves healthy diet, active lifestyle, regular exercise and prevention from fall, sudden strain or bumps. Balanced diet and adequate nutrition plays an important role in prevention and treatment of osteoporosis. Among all the macro and micro nutrients, calcium and vitamin D have been major focus of nutritional prevention of osteoporosis but recent researchers have identified the role of several other nutrients like Magnesium, potassium, vitamin C, vitamin K, B vitamins and carotenoids in the prevention of osteoporosis (**Tucker *et al.,* 2009).**

9.2 Role of Vitamin D: A Sunshine Vitamin:

Indian subcontinent is situated between 8.4º and 37.6ºN latitude and most of the population residing here experience perennial sun light throughout the year and getting adequate vitamin D through this sunlight exposure. However the sun exposure is very limited in India due to darker skin pigmentation, recent modernization of India has resulted into working indoors and reduced physical activity. The Indian women are less exposed to the sun light due to their dressing pattern which covers most of their body parts and working indoors most of the time **(Mitra *et al.,* 2006).** So this metabolic bone disorder which progresses silently is widely prevalent in India and related fractures are the main cause of morbidity and mortality among peri and postmenopausal women. According to researchers approximately 1.6 million hip fractures occur worldwide each year, by 2050 this number could reach between 4.5 million **(Gullberg *et al*., 1997)** and 6.3 million **(Cooper *et al*., 1992)**.

9.2.1 Nutritional Management of Osteoporosis:

In the last decades, the consumption of milk and milk products has decreased by nearly 20%, whereas the proportion of highly processed foods and confectionary products in consumers' diets increased by nearly 25% (estimate of the department of Nutritional

Economics of the National Food and Nutrition Institute in Warsaw based on an unpublished survey of household budgets carried out by the **Central Statistical Office, 2008).** The increasing popularity of Dietary supplements, including calcium, results in unlimited consumption of vitamins and minerals, often without medical consultation. This imbalanced intake of nutrients results in acidification of bodily tissues and intensifies parathyroid activity which promotes calcium loss from bones which may lead to bone related disorders like osteoporosis **(Heaney *et al.*, 2001).**

A diet rich in calcium may not be fruitful due to the high consumption of salt, alcohol and caffeine which reduces calcium absorption and increases it's excretion from the body **(Park and Avioli, 1988)**. On the other hand researches shows that vast majority of people had no knowledge about role of vitamin D in maintaining a healthy calcium balance in the body as proper supply of multi-role of vitamin D in combination with calcium rich diet is important for the prevention of the osteoporosis **(Avanell *et al.*, 2009)**. Increasing consumption of calcium rich foods, many of which are also fortified with vitamin D, is a safe way to increase their calcium and vitamin D intake. Women, having high risk of osteoporosis should be referred to a dietician who well advises them about the type, amount and safety of dietary supplements.

In countries with a high incidence of osteoporotic fractures, a minimum of 400-500 mg calcium intake is required to prevent osteoporosis. When consumption of dairy product is limited, other sources of calcium include fish with edible bones, green vegetables high in calcium (Moringa, curry leaves, Amarathus, broccoli), legumes and their products of (Tofu, Black Gram, kidney beans), Nuts and oil seeds (Almond, Flax seed, Gingelly seed, Anjeer) **(Gopalan *et al.*, 2008)**.

The interaction between calcium intake and physical activity, sun exposure and intake of other dietary components (e.g.-vitamin D, vitamin K, sodium, protein) and protective phytonutrients (e.g.-soy compounds), needs to be considered before recommending increased calcium intake in countries with low incidence of fractures in order to be in line with recommendations for industrialized countries.

The researches show that there is a positive relationship between fruits and vegetable intake with bone density but the exact component of fruits and vegetable which confer a benefit to bone are still to be clarified **(New SA, 2004).** In a study on elderly men and women, higher intake of dietary protein is positively associated with lower rate of age related loss of bone mineral density **(Hannan *et al*., 2000)**

9.2.2 Physical Activity and Exercise:

According to some studies, therapeutic exercise is a suitable way to maintain and improve the bone mineral density in the post-menopausal women **(Kemmler *et al.*, 2004)**. The weight bearing exercises are the most suitable exercises to improve the bone health. The example of weight bearing exercise includes weight training, hiking, jigging, climbing stairs, tennis and dancing. Higher level of leisure time, sports activity and household chores and fewer hours of sitting daily were positively associated with reduced risk of hip fractures**. (Feskanich *et al*., 2003)**

Osteoporosis is a very common condition that can be prevented by good nutrition and healthy life style. Many medications are now available to help prevent or treat osteoporosis after a women reaches menopause. Calcium and vitamin D supplements are also available and inexpensive for people with osteoporosis, fracturing a bone are a major concern. Avoiding falls, tripping and bumping into objects can prevent fractures and allow people with osteoporosis to live very healthy and productive lives.

9.3 Drug Treatment for Osteoporosis:

There is availability of wide range of drug treatment for postmenopausal osteoporosis. Different studies have consistently shown that drug treatment reduce the risk of vertebral fractures by between 30-70%, non-vertebral fractures by between 15-20% and hip fractures up-to 40% **(Kanis *et al.*, 2008)**

The drug treatment of established osteoporosis is cost-effective irrespective of age **(Kanis *et al.*, 2005)** and therapies with proven rapid efficacy may offer important value to healthcare payers, providers and patients **(Lindsey *et al.*, 2005).**One of the most important problems with drug treatment is poor compliance as studies reported that only 40% of patients take treatment for more than one year while at two years only 20% patients are still taking their medications **(Rabenda *et al.*, 2008)**.

9.3.1 Awareness and Osteoporosis:

Various studies reviewed by **Werner (2005**) suggest that there is more to osteoporosis prevention than the improvement in knowledge level. However it has become evident that changes in belief are difficult to be achieved **(Mcleod and Johnson, 2011).** Awareness is an important component of medical nutrition therapy.

Although menopause is a natural stage of women's life, it brings many complications in which poor bone health is the major concern which can severely impair the women's ability to cope-up with day to day life. Apart from many solutions ranging from hormone replacement therapy to many medication, nutritional interventions through awareness programs is a natural approach to managing menopausal osteoporosis **(Bhorsuy and Jeewon *et al.*, 2013)**.

9.4 Conclusion:

So the other components of the diet like minerals and vitamins should be considered for healthy bone in association with calcium and vitamin D while consideration of other factors like Age, Menopausal Status, Behavioral and Genetic factors is also very important in the effective management of Osteoporosis. For optimizing healthy bone mass at all sites, there is some potentially important micronutrient like magnesium, potassium, vitamin C, vitamin K which should be consumed in the daily diet and these can be easily available by the consumption of a diet rich in fruits and vegetables (5 servings per day). Awareness of the significance of sufficient calcium and vitamin D consumption (easily observed by serum 25(OH) D) for optimal bone health, as well as the prevention from falls and fractures, should be the major concern for the management of osteoporosis.

Healthcare professionals and policymakers should also pay attention to create awareness regarding responsible factors for osteoporosis other than nutrients like physical activity, genetic factors and age-related factors like menopausal status.

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