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Prevalence and management of osteoporosis in menopausal women through dietary modifications

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Abstract

The aim of this study is to find the widespread prevalence of the disease worldwide, the main reasons and causes behind this fast spreading disease and find out the most affected groups of people and the affected parts of the world. It has been shown by many researches that it affects approximately 75 million people in USA, Japan and Europe. In the year 2000 new 9 million osteoporotic fractures were estimated and discovered. Europeans and Americans together accounted for 51% of all the osteoporotic fractures. It's necessary to gain knowledge about osteoporosis in post-menopausal women, and see what preventive measures can be taken through dietary management or controlling any other factors. The pain in the joints and reduction in the development of the disease is the motto of researcher. Common symptoms of this disease are fracture of bones even on a minute fall or impact. It is a silent disease, patients are unaware of it till the symptoms get aggravated or they are tested for the disease. Here actually bones become porous and fragile, so fracture is very easy and painful too. The spinal column can even break on even minute pressure in osteoporotic patients. Therefore this study enlightens the causes, prevalence and management of the disease.

Keywords: osteoporosis, menopausal women, osteoporotic fractures

1. Introduction

It is a disease in which the bones become weak and are more likely to break [Agarwal, 2011]^[1]. People who break bones in the hip, spine and wrist are mostly found to have osteoporosis. It can be manifested in both males and females at any age but mostly it is found to be prevalent mainly in aged women. It is a global public health issue and is increasing each day [Thulka, 2016]^[8] Estrogen deficiency at the onset of menopause in women mainly brings about bone mass loss in women [Agarwal, 2011]^[1]. Osteoporosis can be classified as a highly prevalent skeletal disorder in which bone strength is terribly decreased and hence individuals are more exposed to an increased risk of bone fractures [Holzer, 2015]^[3]. We can define the term "Osteoporosis" as a group of clinical problems with decreased bone mass without mineralization defect. When there is loss in skeletal bone mass accompanied with severe pain and noticeable deformities the disorder is termed as 'Osteoporosis'. Aged persons are more prone to develop this disease. Women are more likely to get affected by this disease than men and thin and lean persons are more prone towards this disease. It has been observed that offspring of parents having osteoporosis have a greater chance of developing the disease too. Prolonged intake of certain drugs can also lead to osteoporosis, bed rest for a longer time due to some illness or having no physical exercise at all can lead to weaken the bones and eventually to osteoporosis. Excessive intake of alcohol is also another cause which leads to weak bones and broken bones. Low consumption of calcium and vitamin D in daily diet can lead to weak bones and osteoporosis. Eating disorder syndrome is another factor that may lead to osteoporosis. Decreased levels of female reproduction hormone "Estrogen" and male reproductive hormone "Testosterone" can lead to osteoporosis in females and males respectively. Human bones consist of collagen, which is basically a protein, calcium salts and other minerals. Each bone consists of a thick outer shell known as "cortical shell" and a strong inner mesh of trabecular bones which gives a honeycomb look, with blood and bone marrow trapped between the struts of bone [Bhardwaj, 2013]^[2]. Osteoporosis occurs when this struts become thin causing bones to become fragile, weak and break easily.

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The osteoporotic patient has bigger holes in the honeycomb than normal persons [Bhardwaj, 2013] ^[2]. We can classify Osteoporosis as a disease which is having decreased bone mass and increased skeletal fragility [Sharma, 2006] ^[7]. Osteoporosis is a multifactorial skeletal disorder characterised by decreased bone mass and deteriorated microarchitecture which lead to increased risk of bone fracture [Sharma, 2006] ^[7]. Osteoporosis is a debilitating, bone thinning disorder, which causes the bones to get weakened until eventually susceptible even to the slightest trauma [Bhardwaj, 2013] ^[2]. It is known as a silent disease as it develops gradually and as such gives no major symptoms until it reaches to its peak and several tests are needed to diagnose the disease [Sharma, 2010] ^[6]. Osteoporosis affects millions of people and is gradually becoming a burden over the affected person, the society and the medical support system [Thulkar, 2016] ^[8]. Statistical results declared by the National Osteoporosis Foundation shows that 1 out of every 2 women over the age of 50 yrs are suffering from one or the other osteoporosis related fracture. Age and low body weight are the confirmed factors for the development of this disease. In the United States, millions of people are either affected by Osteoporosis or are at high susceptibility to low bone mass [Patni, 2010] ^[4]. Osteoporosis is commonly linked to post-menopausal women [Sharma, 2010] ^[6] However men, younger women, children and pregnant women can also be the victims of this disease. Two types of cells are constantly working in our bones: building new bones and breaking up of old bones. Above 40 years of age the damaged cells become more active and the bones eventually lose their density. Especially women lose their bone density at quicker rates in the years following menopause when there is a sudden drop of their Oestrogen level in their bodies after menopause. This primarily leads to osteoporosis and fractured bones. Osteoporosis causes bones to break even with a small impact or fall. Most common fractures are in the hip region, wrist, elbows and spine. Thin, fragile and weak bones are not at all painful but the fractured bones resulting from fragility can be painful and many other problems can arise related to it. Osteoporosis never says that the bones will always break but it says that people having osteoporosis are always at greater risk of fractures even at the slightest fall or impact. Compressed bones in the back can lead to decreased height and spinal curvature and deformity. Osteoporosis is very common in postmenopausal women, and it can be assumed that it is due to the fact that BMD decreases with increase of age [Agarwal, 2011] ^[1]. BMD is bone mineral density and is an important factor which determines the risk of fracture especially in women [Sharma, 2010] ^[6]. In today's modern world mainly lifestyle problems like poor nutrition, insufficient physical activity, cigarette smoking and heavy alcohol consumption are mostly responsible for low BMD [Sharma, 2010] ^[6]. All post-menopausal women should be annually assessed to check whether they are at risk for developing osteoporosis and related fracture. A past history, physical examination and necessary diagnostic tests are required for its assessment. It has also been found through different data that with advancing age calcium intake also decreases. An increase in urinary calcium excretion has also been induced by oestrogen deficiency. Calcium requirements in postmenopausal women or women having hysterectomy or premature ovarian failure get increased. Calcium retention can be provoked by caffeine intake. In preventing postmenopausal bone loss and fractures we cannot replace ovarian hormone therapy for oestrogen loss by calcium supplements. Since 60years ago reported the beneficial effects of oestrogen for

decreasing urinary calcium excretion and suggested that these hormones might be useful in preventing postmenopausal osteoporosis. Animal protein seems to induce an increased calcium losses in the urine, so it has been suggested as a risk factor for osteoporosis [Sell Meyer, 2001] ^[5]. Sufficient amounts of vitamin D is required for optimal absorption of calcium. Strict vegetarian diets which exclude even milk and milk products in their menu can be major victims of osteoporosis. Calcium supplementation cannot act as replacement for ovarian hormone therapy in the prevention of post-menopausal bone loss and fractures. Researches also show that magnesium is also essential for proper absorption of calcium into the bones. So without proper intake of magnesium, calcium supplementation will also be ineffective. Another direct link has been found between the body acidity and osteoporosis. The higher is the acidity of the body the greater is the risk of osteoporosis. Human body normally maintains a neutral pH at about 7. So when too much acidic foods and beverages are consumed, minerals released from human bones decrease the bone density. Again a diet low in proteins tend to prevent the risk of osteoporosis. Proteins more than 46gm/day for a women and 56g/day for men are said to be at risk factors for osteoporosis. Researches also show boron, silicon, folic acid, Vitamin K are also required for preventing the risk of osteoporosis. Vitamin K is adequately found in yoghurt and green leafy vegetables. The presence of oxalates and phytates Indian fibre rich diet also cause hindrance to calcium absorption. It has been observed that many Canadians obtain sufficient vitamin D through sunlight but those who use sunscreen lotions they need adequate dietary sources of vitamin D, mainly elderly persons [Agarwal, 2011] ^[1]. Exercise is another critical factor which can prevent osteoporosis. When a person is subjected to physical exercise, the body becomes more adaptive, the muscles get stimulated and stronger, and the bones become more dense [Agarwal, 2011] ^[1]. All these lead to an overall result of bearing the increased work load. When a person regularly exercises the chances of that person to fall decreases as that person's sense of balance also increases and become more stable. It is advised to exercise three times a week for one hour. Type of exercise is not important, rather maintaining regularity is more vital in this case. Various weight bearing exercises like walking, jogging, or aerobics is very important to maintain bone strength. 75 million people in the United States, Europe and Japan suffer from osteoporosis. Osteoporosis is the third leading cause of death in most women over the age of 70 years. Asian females are more prone for osteoporosis, though women from other races are also at high risk of developing this disease. Globally osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture in every 3 secs. It affects 200 million women worldwide, 1/10th of women aged 60yrs, 1/5th of women aged 70yrs, 2/5th of women aged 80yrs, and 2/3rd of women aged 90yrs. In Europe the fracture rate is expected to double itself from 500,000 to 1 million in the coming 50 years. Universally 1 in 3 women over age of 50yrs would experience osteoporotic fracture, in comparison to men that 1 in 5 men over the age of 50yrs. By 2050 the worldwide incidence of hip fracture in men has been calculated to be increased by 310% and 240% in women, in comparison to what was in the year 1990. In Europe handicapped persons due to osteoporosis is more than that caused due to cancer. Women above 50yrs of age spent more days in hospitals due to osteoporosis related problems than any other diseases like breast cancer, myocardial infarction or diabetes. Certain medications using for a longer period of time

can also contribute to the development of osteoporosis. Here are the names of certain drugs which may lead to osteoporosis on long term usage: corticosteroids, thyroid medications, blood thinners, diuretics, antibiotics, immune system suppressants, aluminium containing antacids. Over dosage of vitamin A intake, which is above the recommended dosage can also lead to osteoporosis. One must consume vitamin A within the daily recommended dosage of vitamin A. Women who experience early menopause before the age of 45 years, go a long time without having a menstrual period due to hormonal imbalance and problems, and have very irregular periods indicating that they are not ovulating regularly are at higher risks of developing osteoporosis. Researches made on Indian women and Iranian women show that duration of menopause greater than 5years, menarche (more than 14years), menopause age before 45years, are the major risk factors to the development of osteoporosis which were observed in both the population. In early years of menopause the risk of bone resorption is greater than in late years of menopause. The decreased bone resorption risk in late postmenopausal women might be due to increased FSH levels. In India a direct relation has been established between the nutritional status and the dietary intake of calcium with the bone mineral density. Indian women are also frequently found to be deficient in vitamin D, which is an essential factor for positive bone metabolism [Thulkar, 2016] [8]. Lower socio economic status, duration of breast feeding, and corticosteroid therapy were other important factors that are considered to be vital points for considering them as risk factors for osteoporosis...Osteoporosis is diagnosed by bone density test, bone density is inversely related with fractures of bones i.e. the less is the bone density the more is the chances of breaking of the bones. Bone density scans can only be done for those people who are considered to be at high risk of having a fragility fracture. Nowadays dying in hip fracture is so common that it has become almost same as that of breast cancer. One out of three women in age group of 50-60 years in India are suffering from osteoporosis. Statistical records tell us that Indian women have an early onset of osteoporosis as compared to women residing in western parts of the globe [Bhardwaj, 2013] [2]. In 2013 India had more than 36 million population who were victims of osteoporosis. In 2003 it was 26 million of population who were affected by osteoporosis in India. It is reported that 42.5% of women above the age of 50 years in India suffer from osteoporosis. In India value of peak bone mineral density (BMD) at hip, forearm and spine is significantly lower than those in western countries. There is also suggested risk of hip fractures among current smokers [Sharma, 2006] [7]. In current smokers the risk of hip fracture is similar in women upto the age of 50, but then increases with age with a risk ratio of 1.17 at the age of 60, increasing to 1.71 at the age of 80. Though current smoking can be linked with significantly increased risk of any fracture, any osteoporotic fracture and hip fracture in women. The exact reason behind this logic is yet unknown, it may be due to lower levels of activity, morbidity, or risk of falls. Some data and records also suggest an unbiased association between moderate alcohol intake and increased BMD in postmenopausal women [Sharma, 2006] [7]. Data from more than 11000 women predicts the increased risk of osteoporotic fracture after consumption of alcohol more than 2 units a day. It has also been found that In India osteoporotic fractures are more predominant in urban population. People are lethargic to sit in the sunlight and on contrary make extensive use of air conditioners in homes, schools, colleges, offices and hospitals which is another reason behind developing of osteoporosis.

Present living style in India result in less exposure to sun. Clothing like salwar kammmez, saris and burkhas prevalent in India also limit the sun exposure areas of the body for vitamin D synthesis [Agarwal, 2011] [1]. Hence high incidence of this disease is noted in India. In India there is an estimated report of 500,000 spinal fractures (300,000 hip fractures and 200,000 broken wrists) annually. May be in next ten years if preventive measures are not taken half of Indian population will be affected by this disease.

Meals should include from all the food groups like fruits and vegetables, carbohydrates like bread, potatoes, pasta and cereals, milk and dairy products and proteins like meat, fish, eggs, pulses, nuts and seeds. The diet should be rich in calcium and vitamin D. The following foods can be recommended for an osteoporosis patient: calcium and vitamin D fortified breakfast cereals, bakery products made from fortified flour, fortified orange juice, dairy products like milk, yoghurt, cream, cheese, green leafy vegetables such as cabbage, broccoli and ladyfingers, spinach, dried figs and apricots, tofu, calcium fortified, sesame seeds, soya beans and soya drinks with added calcium, nuts, fish like small edible bones like sardines and salmons and eggs for those who are non-vegetarians. Vegetarians who do not consume milk should take special care that they consume considerable amount of calcium in their diets. Some green vegetable like broccoli and spinach and some legumes like soya beans either contain much less calcium or the calcium is poorly absorbed by the body. Vitamin D is important as it helps to absorb calcium. Vitamin D supplements can be recommended. Otherwise short term exposure to sunlight without sunscreen lotion for about 10-15 minutes twice a day when the sun is shining enough. [Agarwal, 2011] [1]. Considering Indian geographic locations, Indians can get more vitamin D synthesised if they get themselves exposed to sun between 11am and 2pm. It is important to note that some foods can decrease bone density. Such foods should be consumed in limited quantities. Here is a list of foods which should be restricted or limited: salt, consuming too much salt can lead to calcium loss, which weakens bone over a period of time. So high salted items like processed foods, baked goods, canned soups and sauces should be avoided, carbonated drinks, many soft drinks contain phosphoric acid which may increase calcium excretion in the urine. So water or fruit juice should be taken in place of carbonated beverages, caffeine, it has also a detrimental effect on bone density [Sharma, 2006] [7]. Tea is less harmful than coffee. So it's better to drink tea than coffee. Plenty of water and milk can replace tea or coffee intake. Calcium requirements are increased in post-menopausal women or women who have premature ovarian failure. Caffeine has been shown to affect calcium retention, but 2 cups per day is permissible as long as one glass of milk is consumed per day. Calcium absorption is decreased by intake of high fibre diets, so with very high intake of fibres in the diet calcium intake may be have to increase over the recommended allowance. Calcium supplements are better absorbed when taken along with foods and may be better absorbed when taken in divided doses instead of taking all at once. The Indian Menopausal Society has developed guidelines for the management of postmenopausal osteoporosis. It has divided women according to years (less than 5 years and more) since menopause. Menopause with less than 5 years and no risk factors require only primary preventive measures like improved nutrition, lifestyle modification, adequate vitamin D and calcium, and proper exercise. But menopause since more than 5years and with diagnosed osteoporosis requires active medical treatment.

Suggested Menu can be as follows: almonds and pista nuts at early morning, chappati made of ragi with rajma curry and chenna made out of milk in breakfast, curd/lassi can be taken in midmorning, rice, bathua leaves bhaji, cauliflower roast, Bengal gram dal, any fish or prawn in lunch, dried dates with jaggery at tea time and rice, soya bean curry and salad made up of lettuce leaves, tomato, carrot, cabbage, broccoli, sprouts and coriander leaves in dinner.

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