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Risk Factors, Management and Prevention of Osteoporosis; A review

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Abstract: One of the most interesting applied areas of bone biology for physical therapists is that of osteoporosis. Osteoporosis is a relatively common clinical disorder in which the process of bone resorption is increased. It disproportionately affects women more than men and is estimated to affect 1 in 3 women beyond the age of 50 years. Osteoporosis is a condition of micro-architectural loss of bone tissue leading to decreased density and bone fragility. The primary reasons for developing this condition include poor bone acquisition during youth and accelerated bone loss during aging. Both of these processes are regulated by environmental and genetic controls. Loss of bone mass can be due to a combination of hormone deficiency, poor nutrition, decreased physical activity, and various pharmacological agents. Risk factors for developing osteoporosis include genetic, nutritional, and behavioural. The goal of osteoporosis therapies is to inhibit bone resorption in management include lifestyle, change, medicine, and healthy eating. This paper is aiming to review the risk factors, diagnosis, management and living with osteoporosis.
Keywords: Osteoporosis, Risk factor, Management, Prevention

INTRODUCTION

Osteoporosis is a skeletal disorder characterized by compromised bone strength, which predisposes elderly persons to increased risk for fracture which is a common disease in this age group. Osteoporosis is defined as a diffuse reduction in bone density that results when the rate of bone resorption exceeds the rate of bone formation; which makes them vulnerable towards physical stress as a result of progressive microscopic destruction [1-4].

Osteoporosis can be categorized as being either primary or secondary. Primary osteoporosis is the deterioration of bone mass associated with either a decrease in sex hormone, aging, or both. In women, early menopause or premenopausal estrogen deficiencies can accelerate the development of primary osteoporosis. Secondary osteoporosis can occur due to chronic conditions that contribute to the acceleration of bone loss, including excess endogenous and exogenous thyroxin, malignancies, gastrointestinal diseases, hyperparathyroidism, connective tissue diseases, renal failure, and medications. The most common medication-related inducement of osteoporosis is long-term use of glucocorticoids, which is associated with suppression of osteoblastic activity. Other contributing factors include prolonged periods of inactivity or immobilization, inadequate calcium intake, and alcohol and tobacco abuse [4, 5].

The number of hip fractures worldwide due to osteoporosis is expected to rise three-folds, from 1.7 million in 1990 to 6.3 million by 2050. At the present time, the majority of hip fractures occur in Europe and North America. Demographic changes over the next 50 years will lead to unprecedented increases in the number of the elderly in Asia, Africa and South America. As a result, up to 75% of all hip fractures will be occurring in the developing countries 50 years from now [6].

Worldwide, osteoporosis affects about 1 in every 3 women and 1 in every 8 men. White and Asian women are at an increased risk when compared to others. It is responsible for millions of fractures annually, mostly involving the lumbar vertebrae, hip, and wrist. Fragility fractures of ribs are also common in men. Osteoporosis is commonly noted in individuals between the age group 50 and 70 years [4].

As a result of this condition 40% of women and 14% of men over the age 50 will suffer from a fracture. With the increasing number of elderly people, it is anticipated that this disease process will become an epidemic in the years to come. Indeed, it has been predicted that by the year 2050 there will be 6.5 million hip fractures worldwide [2].

In Arabic countries osteoporosis also has a significant prevalence. In Egypt, research data show that 53.9% of postmenopausal women have osteopenia

while 28.4% have osteoporosis and 21.9% of males aged 20-89 have osteoporosis. In Jordan, it has been estimated that there are 1008 hip fractures per year, however, based on the First Jordanian Hip Fracture Survey it is predicted that this number will quadruple by 2050 [7,8].

In Lebanon, hip fractures occur at a younger age compared to western populations, and 60% of patients with hip fractures have osteopenia rather than osteoporosis [9]. While in Saudi Arabia, with a population of 1,461,401 persons aged 50 years or more, 8768 would suffer femoral fractures yearly at a cost of $1.14 billion. (10) In Syria, it is estimated that there are about 15,000 vertebral fractures each year of which only 20% are treated by doctors [8].

In The United States osteoporosis affects 55% of Americans aged 50 and above. Of these, approximately 80% are women. On the other hand, 26% of women aged ≥ 65 years and >50% of women aged ≥ 85 years have osteoporosis. Over 1.5 million fractures per years are attributable to osteoporosis; these fractures result in 500.000 hospitalizations, 800.000 emergency room visits, 2.6 million physician visits, 180.000 nursing home placement, and 12 to 18 billon dollar in direct healthcare costs each year. Fractures also result in loss of function and have a negative impact on psychological status. For this reason, in recognition of the importance of bone health, the general surgeons in United States in 2010 have, for the first time, issued comprehensive report on bone health and treatment [1].

More specifically, hip fractures are responsible for the most serious consequences of osteoporosis. In the United States, more than 250,000 hip fractures annually are attributable to osteoporosis. A 50 years old white woman is estimated to have a 17.5% life time risk of fracture of the proximal femur. The incidence of hip fractures increases each decade from the six to nine for both sexes for all populations. About Vertebral fractures between 35% and 50% of all women over 50 years had at least one vertebral fracture. In the United States, 700,000 vertebral fractures occur annually, but only about a third is recognized [1].

Furthermore, in the United States, 250,000 wrist fractures annually are attributable to osteoporosis. Wrist fractures are the third most common type of osteoporotic fractures. The life time risk of sustaining a Colles' fracture is about 16% for white women. In term of rib fractures, fragility fractures of the ribs are common in men as young as age 35. These are often overlooked as signs of osteoporosis, as these men are often physically active and suffer the fracture in the course of physical activity. An example would be as a result of falling while water skiing or jet skiing. However, a quick test of the individual's testosterone level following the diagnosis of the fracture will readily reveal whether that individual might be at risk [6]. The number of hip fractures worldwide due to osteoporosis is expected to rise three-fold by the middle of the current century, from 1.7 million in 1990 to 6.3 million by 2050. Worldwide Osteoporosis include men and women and affects about 1 in every 3 women and 1 in every 8 men. Studies have shown that health care for osteoporosis is at an exorbitant yearly cost. In the United States 12 to 18 billion dollars in direct healthcare costs each year. While in Saudi Arabia, with a population of 1,461,401 persons aged 50 years or more, 8768 would suffer femoral fractures yearly at a cost of $1.14 billion, which impacts on the workforce and reduces the private country output. All these reasons have made osteoporosis an important issue to review and worthwhile topic to study. This paper is aiming to review the risk factors, diagnosis, management and living with osteoporosis.

MATERIAL AND METHOD

Searching on the internet using the Google search engine was the main source of data as well as books. The keywords include risk factors, and management of osteoporosis. The search has generated about 65 sources, of which 25 sources have actually been used. These 25 articles were considered relevant because they answered the aim and objectives of the review. The library database was also used during the study. All included articles and books were written in English. The inclusive criteria included studies of epidemiology, risk factors, pathogenesis, diagnosis, prevention, and management. The study period has extended from March to end of January 2017.

DISCUSSION

Risk factors

Risk factors for osteoporotic can be split between non modifiable and (potentially) modifiable risk factors. In addition, osteoporosis is a recognized complication in specific diseases and disorders. Medication use is theoretically modifiable, although in many cases, the use of medication that increases osteoporosis risk is unavoidable. Most modifiable risk factors, which arise primarily because of unhealthy diet or lifestyle choices, directly impact bone biology and result in a decrease in bone mineral density (BMD). Some modifiable risk factors also increase the risk of fracture independently of their effect on bone itself [11].

Modifiable Risk Factors

Alcohol

People with excessive alcohol consumption (>2 units daily) have a 40% increased risk of sustaining any osteoporotic fractures, compared to people with moderate or no alcohol intake. High intakes of alcohol cause secondary osteoporosis due to direct adverse effects on bone-forming cells and on the hormone that regulates calcium metabolism, and poor nutritional status (calcium, protein and vitamin D deficiency) [2,12-16].

Smoking

People with a past history of cigarette smoking and people who smoke are at an increased risk of any fracture, compared to non-smokers. Many studies have associated smoking with decreased bone health, but the mechanisms are unclear. Tobacco smoking has been proposed to inhibit the activity of Osteoblasts, and is an independent risk factor for osteoporosis. Smoking also results in increased breakdown of exogenous estrogen, lower body weight and earlier menopause, all of which contribute to lower bone mineral density [6,11].

Low Body Mass Index

Leanness (body mass index (BMI) <20 kg/m2) regardless of age, sex and weight loss, is associated with greater bone loss and increased risk of fracture. People with a BMI of 20kg/m2 have a two-fold increased risk of fracture compared to people with a BMI of 25 kg/m2. This is affected by a number of factors. Patients who are overweight have a lower risk of fracture [6,11].

Poor Nutrition

Vitamin D is also essential, since it helps calcium absorption from the intestines into the blood. When insufficient calcium is absorbed from dietary sources, the body produces more parathyroid hormone, which boosts bone remodelling, mobilizing Osteoblasts in the bone to break down and sacrifice bone calcium to supply the nerves and muscles with the mineral they need. Vitamin D is made in our skin with exposure to the sun's ultraviolet rays. In most people casual exposure to the sun for as little as 10-to-15 minutes a day is usually sufficient. However, in elderly people, people who do not go outdoors, and during the winter, food or supplemental sources of vitamin D is of importance. There are indications that protein is also important in that it may act synergistically with vitamin D and calcium. Nutrition has an important and complex role in maintenance of good bone. Identified risk factors include low dietary calcium and/or phosphorus, magnesium, zinc, boron, iron, fluoride, copper, vitamins A, K, E, C and D. Excess sodium is a risk factor. High blood acidity may be diet-related, and is a known antagonist of bone [6,12-14]. Some have identified low protein intake as associated with lower peak bone mass during adolescence and lower bone mineral density in elderly populations. Conversely, some have identified low protein intake as a positive factor, protein is among the causes of dietary acidity. Imbalance of omega-6 to omega-3 polyunsaturated fats is yet another identified risk factor [6,11]. Malnutrition cause osteoporosis because insufficient protein is available. At all times there exists balance of protein anabolism and catabolism in body. Osseous anabolism cannot be carried on unless protein material is readily available. In presence of adequate nutrition the cause of osteoporosis must be sought in a disturbance of protein metabolism. This can affect all tissues everywhere, it may be limited to the skeletal system as osteogenesis imperfect, or it may be confined to one or few bones within a limited area .Certain bones become porotic more rapidly than other body [3].

Eating disorders

Osteoporosis can also be compounded by eating disorders such as anorexia nervosa and bulimia. Eating disorders that last even just one year bring with them an increased risk of osteoporosis, or the reduction of bone mineral density. This risk is not simply far in the future either - some teenagers who suffer from eating disorders will even be diagnosed with osteoporosis in their twenties. This loss of bone mineral density is the result of both nutritional deficiencies and the loss of menstrual periods in young women with eating disorders. When menstrual periods cease, oestrogen production subsides and thus presents a further risk to bone health. Unfortunately, younger individuals run the risk of more than just a reduction of bone mineral density but a failure to reach peak levels as well. This is a double negative for bone health, weakened bones which are more easily susceptible to breaks is the result. Fortunately, much of the damage caused to bones by eating disorders can be reversed, but not all of it can be overcome [11,17].

Estrogen Deficiency

Estrogen deficiency in women speeds up bone loss in a similar way to that which occurs in post-menopausal women, but to make matters worse, these diseases reduce the robust build up of bone mineral density that usually occurs in adolescence and early adulthood. This may be related to both hormone imbalance and nutritional factors [6,11]. Postmenopausal women commonly suffer from this condition owing to the decrease in the levels of a hormone known as estrogen during menopause. Estrogen deficiency makes the bone more sensitive to the resorting effect of another hormone; that eventually result in bones becoming brittle and fracture when exposed to minimal stress. While in men osteoporosis may result from the decreased production of testosterone in the body [2].

Insufficient Exercise

People with a more sedentary lifestyle are more likely to have a hip fracture than those who are more active especially weight-bearing exercise. For example, women who sit for more than nine hours a day are 50% more likely to have a hip fracture than those who sit for less than six hours a day [11].

Frequent falls

Visual impairments, loss of balance, neuromuscular dysfunction, dementia, immobilization, and use of sleeping pills which are quite common conditions in elderly persons, significantly increase the risk of falling and accordingly increase the risk of fracture. Ninety percent of hip fractures result from falls.

Also, if there is a certain risk of fracture each time a person falls on the floor, then the chance of a person sustaining a fracture depends on the frequency of falls and ,the nature of the two objects colliding, i.e. the body and the floor. Approximately one-third of the elderly population fall annually, the rate is higher in institutionalised individuals and increases with age. It is essential to assess a patient who has had a fragility fracture for their falls risk [2,11].

Non modifiable Risk Factors

Gender and Age

The most important risk factors for osteoporosis are advanced age (in both men and women). About 10 million adults in the United States have osteoporosis and another 34 million have low bone mass that places them at risk for developing osteoporosis. According to a report from the Surgeon General's office, by 2020 half of all Americans over age 50 could be at risk for this condition. Seventy percent of people with osteoporosis are women. Men start with higher bone density and lose calcium at a slower rate than women, which is why their risk is lower. Nevertheless, older men are also at risk for osteoporosis. Women are at much greater risk; losing bone more rapidly than men due to menopause. However, men constitute 20% of the patient population with osteoporosis [6,18].

Ethnicity

Although adults from all ethnic groups are susceptible to developing osteoporosis, European Caucasian and Asian women and men face a comparatively greater risk [6, 18-20].

Body Type

Osteoporosis is more common in people who have a small, thin body frame and bone structure. A decrease in bone density is a major risk factor for a fragility fracture. In addition; a previous fragility fracture is also an independent factor for a future fragility fracture. At greater risk are small-boned women who weigh less than 127 pounds [2,18].

Family and personal history

This includes family history of osteoporosis, history of fracture on the mother's side of the family, and a personal history of any kind of bone fracture as an adult after age 45. The heritability of the fracture, as well as low bone mineral density, is relatively high, ranging from 25% to 80%. At least 30 genes are associated with the development of osteoporosis. Those who have already had a fracture are at least twice as likely to have another fracture compared to someone of the same age and sex [6,18, 20-23].

Hormonal Deficiencies

Events associated with estrogen deficiencies are the primary risk factors for osteoporosis in women. Within women, these events include menopause, surgical removal of ovaries, missing periods for 3 months or longer and never having given birth. Within 5 years after menopause, the risk for fracture increases dramatically. Fractures occurring during this period are more likely to occur in the wrist or spine than the hip, but their occurrence is a strong predictor of later severe osteoporosis and hip fracture [6,18].

Within men, low levels of testosterone increase osteoporosis risk. Certain types of medical conditions such as hypogonadism and treatments such as prostate cancer and androgen deprivation can cause testosterone deficiency [6].

Risk Factors in Children and Adolescents

The maximum density that bones achieve during the growing years is a major factor in whether a person goes on to develop osteoporosis. Persons, usually women, who never develop peak bone mass in early life are at high risk for osteoporosis later on. Children at risk for low peak bone mass include children who are born prematurely, have anorexia nervosa; have delayed puberty or abnormal absence of menstrual periods [18].

Pathogenesis

Bone consists of an organic component (primarily cells, blood vessels and proteins such as collagen), and an inorganic mineral component, primarily a crystalline calcium phosphate compound (hydroxyapatite). Osteoporosis is a disease in which both organic and inorganic components are deficient resulting in a decrease in the total bone mass. As a result of this the microarchitecture is disrupted with loss of trabeculae and an increase in the size of the pores spaces within the bone [1]. Under abnormal conditions the reduction in bone density may represent the failure of formation of the protein matrix in which the calcium is laid down.

Histologically, this is apparent by either diminished osteoblastic activity or excessive osteoclastic activity. Osteoblasts are rare and little or no new bone apposition can be seen. The cortices are reduced in thickness and cancelloustrabeculae become thinned as marrow spaces are widened [1,2]. Cancellous bone becomes porotic more rapidly than compact bone. When osteoporosis is generalized, it tends to be most pronounced in the spine and the pelvis, as for example in postmenopausal osteoporosis [3].

Signs and Symptoms of Osteoporosis

No symptoms or sings are noticed during the initial stages of osteoporosis. The destruction of the bones is a chronic process that remains asymptomatic until a fracture occurs in the weakened bones. In case of women, bone loss may be initiated either with the commencement of menopause or just before.

Fracture of the hip, vertebral bone and the wrist are the most common fractures associated with

osteoporosis. There may also be tenderness or pain felt in the bone. The fractures may at times result in permanent disability depending on its severity. The time required for bone healing is also prolonged. Fracture of the vertebral bones may result in sudden pain or chronic dull pain in the back that limits the day to day tasks of the affected individual [4].

Progressive demineralization of the bone also results in gradual reduction in height and bending or stooping of the back. Patients with osteoporosis complain of pain in the bones particularly in the back. A compression fracture may result from a trivial trauma such as opening a window. Frequent acute attacks of backache suggest minimal fractures that cannot be identified in roentgenograms. The acute onset, the point of tenderness, and relief with recumbence are the chief diagnostic signs [2]. Another causes of osteoporosis include hereditary, osteogenesis imperfect, rheumatologic, rheumatoid arthritis, ankylosing, spondylitis, disuse, paralysis , paraplegia ,tetraplegia, chronic obstructive lung disease, hypogonadism, cushing disease (hypercortisolism), lifestyle, alcoholism, smoking, drugs and steroids [4].

OSTEOPOROSIS DIAGNOSIS

Risk Factor Assessment

Currently, the only ways to detect osteoporosis early are bone mineral density tests (BMD). A BMD will measure the mass or density of the bones. These tests provide a T-score which compares the bone mineral density (BMD) to an optimal BMD of a 30-year-old healthy adult. There are several different types of BMD tests, such as the single energy x-ray absorptiometry, which examines the heel or wrist, and the quantitative computed tomography, which is usually used to look at the density of the spine [4]. In addition to the detection of abnormal BMD, the diagnosis of osteoporosis requires investigations into potentially modifiable underlying causes; this may be done with blood tests. Patients who are between ages 60 and 64, weigh less than 154 pounds, and do not take estrogen, should undergo a bone density test. Assessment of risk factors and/ or underlying causes associated with osteoporosis includs history, and physical examination. Biochemical markers are another approach; yet, not generally recommended. However, interpretation and clinical application of T-scores and evaluation for secondary causes of osteoporosis are common methods during the assessment process [25].

Management of Osteoporosis

There is no standard treatment for osteoporosis. Treatment is tailored according to patient's specific needs. Generally, overall risk of fracture helps to determine the best course of treatment [25,26]. Osteoporosis is in many aspects the inverse of the potentially modifiable risk factors. As tobacco smoking and high alcohol intake have been linked with osteoporosis, smoking cessation and moderation of alcohol intake are commonly recommended as vital prevention tool of osteoporosis incidence. Aerobics and weight-bearing endurance exercise and resistance exercises plus or minus exercises to strengthen muscles improve bone strength in those with osteoporosis, as well as they maintain or increase BMD in postmenopausal women. Fall prevention can help prevent osteoporosis complications.

There is some evidence for hip protectors specifically among those who are in care homes. As well as, exposuring some skin to the sun on most days of the week to allow enough vitamin D production. furthermore, excessive caffeine can affect the amount of calcium the body absorbs; for this reason, limiting caffeinated drinks is highly recommended [25,26]. In relation to nutrition, there is insufficient evidence to determine if supplementation with calcium and vitamin D results in greater harm or benefit in men and premenopausal women. Low dose supplementation (less than 1 gm of calcium and 400 IU of vitamin D) is not recommended in postmenopausal women as there does not appear to be a difference in fracture risk. It is unknown what effects higher doses have. There however may be some benefit for the frail elderly living in care homes. While vitamin D supplementation alone does not prevent fractures, combined with calcium it might [25]. There is however, an increased risk of myocardial infarctions and kidney stones. Vitamin K supplemental may reduce the risk of fractures in post-menopausal women however there is no evidence for men [25]. In younger people, osteoporosis can be treated both by helping them regain weight and ingest recommended daily amounts of vitamins and minerals, and by re-introducing oestrogen in women, possibly by the administration of oral contraceptives (birth control pills) that will help to even out hormones after a period of several months. Unfortunately, once bone mineral density has decreased it may never recover to appropriate levels and may always lag behind what would be expected in healthy individuals for their ages [22]. Similar to diet and lifestyle changes, medication plays vital role in osteoporosis management. Bisphosphonates are useful in decreasing the risk of future fractures in those who have already sustained a fracture due to osteoporosis. This benefit is present when taken for three to four years. They have not been compared directly to each other, though, thus it is not known if one is better [19]. Fracture risk reduction is between 25 and 70% depending on the bone involved. There are concerns of atypical femoral fractures and osteonecrosis of the jaw with long term use, but these risks are low. With evidence of little benefit when used for more than three to five years and in light of the potential adverse events, it may be appropriate to stop treatment after this time in some. Alendronate may decrease fractures of the spine but does not have any effect on other types of fractures. Teriparatide (a recombinant parathyroid hormone) has been shown to be effective in the treatment of women with

postmenopausal osteoporosis. Some evidence also indicates that strontium ranelate is effective in decreasing the risk of vertebral and none-vertebral fractures in postmenopausal women with osteoporosis [16]. Hormone replacement therapy,while effective for osteoporosis, is only recommended in women who also have menopausal symptoms. Raloxifene, while effective in decreasing vertebral fractures, does not affect the risk of no vertebral fracture and while it reduces the risk of breast cancer, it increases the risk of blood clots and strokes. Denosumab is also effective for preventing osteoporotic fractures. In hypogonadal men, testosterone has been shown to improve bone quantity and quality, but, as of 2008, no studies evaluated its effect on fracture risk or in men with normal testosterone levels [21]. Calcitonin while once recommended is no longer due to the associated risk of cancer with its use and questionable effect on fracture risk [6,13,19]. Selective oestrogen receptor modulators (SERMs) – sites in the female body called 'oestrogen receptors' respond to the hormone oestrogen. SERMs mimic the action of oestrogen and therefore reduce bone loss. SERMs have been shown to reduce the risk of spinal fractures, but they may increase the risk of clots and stroke [1]. Strontium ranelate – similar to bisphosphonates, strontium ranelate slows down the 'breakdown' process of bones and increases the 'build-up' process. Parathyroid hormone – the parathyroid glands make the parathyroid hormone (PTH). This chemical regulates the amounts of calcium, phosphorus and magnesium in the bones and blood. Parathyroid hormone therapy stimulates new bone formation and can increase bone density and strength. This medication is used for people with severe osteoporosis when other types of medication are considered either unsuitable or ineffective [17].

Prevention of Osteoporosis

Osteoporosis is a common problem that causes bones to become abnormally thin, weakened, and easily fractured. However, fortunately, preventive treatments are available that can help to maintain or increase bone density. Prevention approaches include sun light, regular physical activity, weight management, and balanced diet. Sunlight (from May to September) triggers the production of vitamin D, which helps the body absorb calcium. This process helps strengthen teeth and bones, which in turn helps to prevent conditions such as osteoporosis. Although genes determine the potential height and the strength of human skeleton, lifestyle factors such as diet and exercise can influence how healthy the bones are [1-4,9]. Regular exercise is essential. Adults should do at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity (i.e. cycling or fast walking) every week. Weight-bearing exercise and resistance exercise are particularly important in improving bone density and helping prevent osteoporosis [11]. Weight-bearing exercises are exercises where the feet and legs support the weight. High-impact weight-bearing exercises, such as running, skipping, dancing, aerobics and even jumping up and down on the spot, are all useful ways to strengthen the muscles, ligaments and joints. People over the age of 60 can also benefit from regular weight-bearing exercise. This can include brisk walking, keep-fit classes or a game of tennis. Swimming and cycling are not weight-bearing exercises. On the other hand, resistance exercises use muscle strength, where the action of the tendons pulling on the bones boosts bone strength. Examples include press-ups, weightlifting or using weight equipment at a gym. Eating a healthy, balanced diet is recommended for everyone, it can help prevent many conditions, including heart disease, diabetes and many forms of cancer, as well as osteoporosis. Calcium is important for maintaining strong bones. The recommended intake of calcium is at least 700 mg a day [16]. This is almost equivalent to one pint of milk. Calcium can also be found in a number of different foods, including green leafy vegetables, dried fruit, tofu and yoghurt.

Vitamin D is also important for bones and teeth as it helps your body to absorb calcium. Vitamin D can be found in eggs, milk and oily fish. However, most vitamin D is made in the skin in response to sunlight. A short exposure to sunlight, without sunscreen (10 minutes twice a day) throughout the summer should provide you with enough vitamin D for the whole year.

Certain groups of people may be at risk of not getting enough vitamin D. These include people who may be housebound or particularly frail, people with a poor diet or who keep covered up in sunlight because they wear total sun block or adhere to a certain dress code, and women who are pregnant or breastfeeding. These groups should take a vitamin D supplement. For adults, 10 micrograms a day of vitamin D is recommended. The recommended amount for children is 7 micrograms for babies under six months, and 8.5 micrograms for children aged six months to three years [25].

Living with Osteoporosis

Most individuals suffering from osteoporosis are able to lead a normal life, when appropriate care is taken. Strict adherence to the therapeutic protocols and maintenance of a healthy lifestyle can prevent severe bone loss and prevent complications. Some individuals may however become disabled owing to the weakened bones and the ability to perform regular tasks may also be reduced [4].

CONCLUSION

Osteoporosis is a skeletal disorder characterized by compromised bone strength and diffuse reduction in bone density when the rate of bone resorption exceeds the rate of bone formation. Osteoporosis can be categorized as being either primary

or secondary. Primary osteoporosis is associated with either a decrease in sex hormone, aging, or both. Secondary osteoporosis can occur due to chronic conditions that contribute to the acceleration of bone loss, such as excess endogenous and exogenous thyroxin, malignancies, gastrointestinal and connective tissue diseases, renal failure, and medications. Worldwide, osteoporosis affects about 1in every 3 women and one in every 8 men. White and Asian women are at an increased risk when compared to others. Osteoporosis is commonly noted in individuals between the age group 50 and 70 years. Risk factors for osteoporotic can be either non modifiable and or modifiable. Most modifiable risk factors include alcohol, smoking, low body mass index, poor nutrition, eating disorder, oestrogen deficiency, insufficient exercise and frequent falls. Non modifiable risk factors include gender and age, ethnicity, body type, family and personal history, hormonal deficiencies. The most common cause of osteoporosis is the decrease in the female sex hormone, estrogen. Patients with osteoporosis complain of pain in the bones particularly in the back; which is relief with recumbence; the chief diagnostic signs. Currently, the only ways to detect osteoporosis early is bone mineral density tests (BMD). Diet, lifestyle changes, and medication play vital role in osteoporosis management. While, the prevention of osteoporosis includes exposure to sun light, regular physical activity, weight reduction, and balanced diet. Most individuals suffering from osteoporosis are able to live a normal life when they strictly adhere to the therapeutic protocols and maintain a healthy lifestyle which could prevent severe bone loss and prevent complications. People whose age 65 and older, should undergo bone density test. Painless bone mineral density tests, called DEXA tests, can help determine the bone mass and determine if people have normal bone mineral density, osteopenia or osteoporosis. It is recommended that increasing the awareness about the disease have to be conduct for all members of family. Future studies are needed to help uncover the mechanobiological rules that help to govern bone response to mechanical loading.

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