A Review on Prevalence of Osteoporosis

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***Abstract*—Osteoporosis is skeletal disease characterized by low bone mass with micro architectural deterioration of bone tissue leading to enhanced bone fragility. This increase the susceptibility to fracture. Osteoporosis is a silent disorder similar to Hypertension and Dyslipideamia. It affects both male and female, above the age of 40 years. Osteoporosis is a rising health difficulty in both developed and developing countries. Osteoporosis is a disabling and costly disease with a high mortality rate; one in five patients with an osteoporotic fracture die within one year of sustaining the fracture. It is linked with considerable Morbidity and Socio-economic burden worldwide.**

***Index Terms*—Osteoporosis, fragility, costly, fracture, mortality and morbidity.**

I. INTRODUCTION

Osteoporosis defined as: "osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fracture. Osteoporosis is a disease generally affecting the entire skeleton in which the overall mass of bone is decreased and the structure of the bone is damaged (Hijazi, 2007). Defined as a chronic, asymptomatic skeletal disease, osteoporosis is characterized by decreased bone mass with a consequent increase in bone fragility and risk of fracture, particularly of the wrist, spine, hip and ribs. It can be manifested in both males and females at any age but mostly it is found to be prevalent mainly in aged women (Das *et al*., 2017).

After the age of 40, slow resorption of bone occurs in both sexes but after menopause women loss of additional bone mass for a decade leading to decreased bone mineral density (BMD). The process of BMD actually starts prior to menopause due to estrogen deficiency and become more marked often menopause due to rapid decline in estrogen level. With the onset of menopause, rapid bone loss occurs which is believed to average approximately two to three percent over the following five to ten years, being greatest in the early postmenopausal years. Life time losses may reach 30% to 40% of the peak bone mass in women and 20% to 30% in men (Indumati *et al*., 2007).

II. OSTEOPOROSIS

Osteoporosis is the most common bone disease, literally meaning "porous bones". Osteoporotic fractures may occur not only from a fall from standing height, but also from simple movements such as normal lifting and bending. The impact of osteoporotic fractures, particularly of the vertebra, hip and spine, is significant as they are often associated with considerable morbidity and mortality. These fractures can result in pain, disability, reduced mobility and other serious injuries. Osteoporosis can cause multiple vertebral fractures in spine which result in loss of at least 15 – 20% of its height. These fractures often result in patient's height loss, chronic pain and kyphosis which ultimately damage respiratory function. The complication can lead to death if they are left untreated (McLeod *et al*., 2013).

Bone Mineral Density (BMD) is the most commonly expressed measure of overall bone strength, estimated to account for approximately 70% of bone strength. Therefore, BMD is measured for diagnosis of osteoporosis and to provide information on fracture risk. The bone formations are far less elevated suggesting the imbalance of bone resorption and formation that occurs with osteoporosis. Osteoporosis has BMD at least 2.5 standard deviations below peak bone mass, T-score of -2.5 standard deviations below peak bone mass (Mohankumar *et al*., 2013).

Osteoporosis is generally accepted as a "women's health issue" and is particularly prevalent among postmenopausal women. The consequence of osteoporosis is fracture. As estrogen levels fall, the risk of osteoporosis increases. Lower bone mineral density and an increased fracture risk were found in more women than men and in more postmenopausal women than premenopausal women. Because of their lower bone density and higher rate of fractures, postmenopausal women suffered from complications of osteoporosis (Xu *et al*., 2013). The risk factors in common including smoking, older age, low level of calcium and vitamin D, long-term treatment with corticosteroids, excessive weight loss and low body mass index (Abbasi *et al*., 2016).

III. GLOBAL PREVALENCE OF OSTEOPOROSIS

Osteoporosis is a global public health issue and is increasing each day. Osteoporosis and osteoporotic fractures are an enormous and growing public health concern. Worldwide, an estimated 200 million adults suffer from osteoporosis (Qureshi *et al*., 2017). International osteoporosis foundation reported that 1.7 million people globally suffered from osteoporosis hip fractures. Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every three seconds (International Osteoporosis Foundation, 2017).

According to The World Health Organization Health Report (2003) 70 million people worldwide are diagnosed to have osteoporosis. According to International Osteoporosis Foundation (2000) the ratio of osteoporosis between female and male is 4:1. About 30-50% female and 15-30% male are at risk of osteoporotic fracture during their lifetime. Highest risk of osteoporotic hip fracture is in Norway, Sweden, Iceland, Denmark and USA (Haris *et al*., 2014).

Osteoporosis is an International problem. According to the International Osteoporosis Foundation (IOF), osteoporosis affects approximately one in three women. The approximate number of women diseased with osteoporosis around the world is 200 million women. In USA about ten million people have osteoporosis. About 68% of the osteoporosis cases in the USA are women. The prevalence rate of osteoporosis is approximately one in nine or 10.29%. Osteoporosis affects about 30% of postmenopausal white women in USA and the proportion rises to 70% in women over age of 80 years. In 2006, about 1.5 million fractures per year are related to osteoporosis and more than 37000 people die from subsequent fracture-related complications in USA (Hijazi, 2007).

Osteoporosis is an important public health issue in postmenopausal women and when the condition is left untreated, 60% of these women will experience fragility fractures during their lifetime. Fractures, especially of the spine, hip, and wrist are a frequent clinical complication of osteoporosis. Initially, spinal fractures can be asymptomatic, but they are associated with substantial morbidity and mortality. Study shown the prevalence of osteoporosis at any anatomic site in postmenopausal women to be about 40% to 50% (Paul *et al*., 2008).

An osteoporosis-related fracture (i.e., fragility and fracture), particularly those of the hip and spine, is an independent predictor of subsequent fracture and associated with increased morbidity and mortality. It is estimated that osteoporosis affects over two million Canadians of which one in four are women and one in eight are men over 50 years of age (McLeod *et al*., 2013).

IV. PREVALENCE OF OSTEOPOROSIS IN ASIA

According to Nagi (2013), the prevalence of osteoporosis is estimated at over 200 million worldwide, of whom 44 million patients are from the US and 9.9 million patients are from Pakistan. From those 9.9 million, 2.7 million are men and 7.2 million are women and from those women, postmenopausal women are more prone to develop osteoporosis. These numbers will rise to 11.3 million in 2020 and 12.91 million in 2050. Iran contributes for 0.08% of the global burden of hip fracture and 12.4% of the burden of hip fracture in the Middle East. The risk of osteoporotic hip fracture is steadily increasing in Asia, currently every one out of four hip fractures occur in Asia and this ratio will increase to one in two by 2050 (Hirani *et al*., 2014).

WHO has predicted Asians to be largely affected by the year 2050 (Godara, 2017). People's Republic of China has the largest number of people affected by osteoporosis in the world, where the disease currently affects more than 6.9 million people over the age of 50 years and causes about 6,87,000 hip fractures each year (Xu *et al*., 2013).

The osteoporotic fractures estimation given by WHO in South East Asia was found to be 17.4% (Bala *et al*., 2016). Vitamin D deficiency reported in postmenopausal women from South-East Asian countries, i.e., around 47% in Thailand, 49% in Malaysia, 90% in Japan and 92% in South Korea (Kadam *et al*., 2010).

V. PREVALENCE OF OSTEOPOROSIS IN INDIA

Osteoporosis is estimated to affect 200 million women worldwide-approximately one-tenth of women aged 60, one-fifth of women aged 70, two-fifths of women aged 80 and two-thirds of women aged 90. one out of eight males and one out of three females in India suffers from osteoporosis, making India one of the largest affected countries in the world (Nikose *et al*.,2015).

According to the Osteoporosis Society of India (2003) the estimated number of osteoporosis patients was 26 million approximately in 2003 and this numbers will increase to 36 million by 2013. In 2013, estimates suggested that ~50 million people in India had *T* –scores of < - 1 (Haris *et al*., 2014). Prevalence of osteoporosis increases with age in women and not in men. It is reported that that currently India has 42.5% women and 24.6 % men above the age of 50 years suffer from osteoporosis in India (Thulkar *et al*., 2015).

Even conservative estimates suggest that of the total Indian population above 50 years of age, 20% of women and about 10-15% of men would be osteoporotic. In North India, the prevalence of osteoporosis in postmenopausal women was more at the lumbar spine (25.8%) than at the femoral neck (8.7%) or total hip (2.3%). Similar findings have been reported in postmenopausal women in South India where the prevalence of osteoporosis was 48% at the lumbar spine and 16.7% at the femoral neck region (Kadam *et al*., 2010).

In South India, approximately 30% women had post-menopause as a risk factor for developing osteoporosis. The number might increase to 6.3 million by 2050. However, physicians routinely seen the patients suffering from bone fractures and other complications due to the postmenopausal osteoporosis. In South India, Vitamin D deficiency was found 70% in postmenopausal women (Singh *et al*., 2015). Around 75% of postmenopausal women in South Indian city having dietary deficiency of calcium (Raj *et al*., 2015).

In Indian women, increasing longevity and risk factors, such as low calcium intakes, vitamin D deficiency, sex inequality, early menopause, genetic predisposition, lack of diagnostic facilities and poor knowledge of bone health, have contributed toward the high prevalence of osteoporosis and fractures (Khadilkar *et al*., 2015).

Osteoporosis-related fractures are associated with substantial pain, suffering, disability and possibly even death for the affected patients. Further, increasing longevity has resulted in an increasing number of senior citizens globally ; life expectancy at present is ~67 years in India and is expected to increase to 71 years by 2025 and to 77 years by 2050. Further,~10% of the Indian population is older than 50 years at present; however, these figures are likely to go up to 34% by 2050. Thus, increasing longevity and a greater proportion over the age of 50 years are likely to result in an increased number of people affected by osteoporosis. A study estimated that more than 61 million Indians have osteoporosis and 80% patients are female. A high incidence of osteoporosis between 41 – 65 years of age in Indian women (Godara, 2017).

V. CONCLUSION

In modern era non-communicable diseases are rapidly increasing in developing countries including India. Osteoporosis is a silent disease, reflected only in a low bone density, till a fracture occurs. With increase longevity of the Indian population, it is now being realized that, as in the West, osteoporotic fractures are a major cause of morbidity and mortality in the elderly. Even conservative estimates suggest that of these, 20 per cent of women and about 10 – 15 per cent of men would be osteoporotic.

The prevalence of osteoporosis in India and neighbouring countries is 41%, but in India alone, it is 53%, which is higher. It is expected that more than about 50% of all osteoporotic hip fractures will occur in Asia by the year 2050. Most of the

osteoporosis cases are underdiagnosed and undertreated, even in the most high risk patients in Asia. The problem is particularly acute in rural areas. In the most populous countries like China and India, the majority of the population lives in rural areas, where hip fractures are often treated conservatively at home.

Due to the drastic increase in its incidences among women, International Osteoporosis Foundation selected the theme of the world osteoporosis day (20th October 2013) as "Post-menopausal women and their bone health". World Bank reported that India will be second highest in the world after China in terms of postmenopausal osteoporosis.

Abbreviations and Acronyms

BMD - Bone Mineral Density

WHO - World Health Organization

IOF - International Osteoporosis Foundation

USA - United States of America

US - United States

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