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Osteoporosis a "Silent disease" in Females – Mini Review

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ABSTRACT:

Osteoporosis is more common in females. This article presents an overall basic and specialist knowledge of osteoporosis in females with a brief of factors acting as risks and different diagnosis techniques. This paper help in focusing the role of healthcare team in evaluation and treatment ofosteoporosis.

Keywords: Osteoporosis, DEXA, Bone mineral density, fracture

Introduction

Osteoporosis (OP) is usually come across in aged women and generally with no underlying risk factors but that does not essentially mean that it is accredited only to old age. The bone density and quality get affected due to it. Post-menopausal women suffer from osteoporosis mostly and it impact their allover health as well as emotional stress. The frequency of OP is one in every three women[1]. Due to loss of bone density a female suffering from OP is more vulnerable towards bone fractures. OP related fractures are more common in wrist, spine and hip. The bone is constantly breaking and replaced by new bone but in OP the loss of bone is not keep up with new bone formation. The OP affects both men and women. But women with Caucasian and Asian ethnicity are more susceptible to OP[2]. The WHO (World Health Organization) has defined T score for evaluating bone density, the T score is number of SD (Standard Deviation) which falls below the young adult mean value. A T score of less than -2.5 is defines as OP. Symptoms associated with OP may include- back pain, deformed posture, brittle bones prone to fractures. But mostly OP does not become clinically deceptive until a fracture is noticed so also termed as "silent disease". On physical examination the following signs are may observed:- Dowager's hump (Thoracic kyphosis with cervical lordosis), Loss of lumbar lordosis, Acute pain followed by minor trauma, Pain in localized, identifiable vertebral level in case of vertebral fractures, with progressive kyphosis loss of 1-3 cm in height, Pain that exacerbated by any physical activity[3]. The trabecular bone thinning is the main histopathological abnormality detected[4].

Risk Factors

Imbalance in bone resorption and formation leads to OP. Studies in past stated that risk factors for OP are modifiable as well as non-modifiable[5]. Number of risk factors associated with OP are race, age, medical history, treatments and lifestyle. Population with smaller body frames are also supposed to have higher risk of OP as they have less bone mass[6]. Patients suffering from diseases like hyperthyroidism, chronic kidney disease, rheumatoid arthritis, celiac disease, ankylosing spondylosis, multiple myeloma are more prone to OP[7]. Smoking also exaggerate the OP [8]. level of hormones also acts as risk factor. lower level of estrogen and testosterone develop the OP [9]. Overactive adrenal and parathyroid glands also lead to OP. lower intake of calcium causes early bone loss and lower bone density[10]. Sedentary lifestyle, no exercise and alcohol consumption are the habits contributing in OP which can be modifiable.

Evaluation of Osteoporosis

To diagnose OP in women can be complicated before menopause as young women are generally have low bone density structure and it can be due to genetics. Initially basic lab test is conducted to access level of CBC (Complete Bool Count), RFT (Renal Function Test), LFT (Liver Function Test), serum electrolytes, total protein, calcium, phosphorus, albumin, thyroid function test and hydroxyvitamin D test. Additional test for celiac disease, Cushing syndrome, malignancy and multiple myeloma are also conducted based on the abnormalities detected in lab tests[11]. Bone turnover markers was also introduced but not used in solitude as some results are nonspecific. Serum osteocalcin (a specific marker for osteoblastic function), serum type 1 procollagen, or serum carboxy-terminal collagen crosslinks (CTX) (a marker for bone resorption) are used as treatment response markers[12]. Also,

there are other bone resorption markers like urinary hydroxyproline, urinary pyridinoline, bone sialoprotein. Another important and specific test in identifying microarchitecture of the bone is Biopsy but it is rarely used for diagnosis OP. Fracture Risk Assessment Tool (FRAX) is an online tool to access future breaking of bone it calculates the ten-year probability of fracture with BMD (Bone Mineral Density) [13].

Radio Imaging Techniques - A plane radiograph depicting low bone density can expect osteopenia and OP. wedging of vertebras can demonstrate the fracture risk. The cause of fractures can be concluded by CT scans, MRI and bone scans (Scintigraphy). Now a days DEXA (Dual-energy x-ray Absorptiometry) is used to measure BMD[14]. This scan is classified as T score and Z scores. T scores estimate the risk of fractures by measuring bone density in comparison to younger population whereas a Z score measure bone density of the same age group. T score above -1 is taken as normal, score between -1 to -2.5 is categorized as Osteopenia and less than -2.5 as OP. Z score is useful in diagnosing secondary osteoporosis and is used in children, young male and females and in pre-menopausal women.

Discussion

Loss of bone mass and microarchitectural deterioration causes OP. Due to loss in estrogen hormone bone density starts reducing in first 5 to 10 years after menopause. All the risks factors associated to OP are briefed above in the article. Further dementia, diabetes mellitus, osteomalacia, hypogonadism act as secondary factor in causing OP. Bloodcalcium levels are usually normal in osteoporosis is discussed in a study published in 2002 [15]. Alkaline phosphatase(ALP), an enzyme from liver and bone, B-ALP (bone specific ALP) is more specific for bone and therefore, more sensitive in detecting the small changes in bone formation seen in osteoporosis specified in an article published in 2008[16]. One of the first studies to examine the effectiveness of an osteoporosis screening programme recruited a total of 4800 women aged 45–54 years in Aberdeen, Scotland. Post-screening, those in the lowest quartile of BMD were advised to consider hormone replacement therapy. Nine years later, the effect of screening (on the uptake of treatment and fracture incidence) was evaluated by postal questionnaire. They found a 25.9% decrease in risk of fracture in the screened group[17]. Thus, a definite test is required to diagnose OP and future fracture risk estimation. Several imaging techniques are available which help in deciding treatment strategy. Our study updates the risk factors and diagnosing techniques available for OP. As per US Preventive Task Force the women above the age of 65 should get a DEXA scan test. OP is asymptomatic so an early diagnosis is required to treat and preventing further disease progress. According to the current guidelines on osteoporosis management, BTMs (Bone turnover biomarkers) cannot diagnose osteoporosis, but changes in BTMs may be useful in monitoring osteoporosis treatment to confirm the efficacy of treatment and treatment adherence and can improve the specificity of assessment of fracture risk. In an article written by Tsung-Rong Kuo and Chih-Hwa Chen published in 2017 they stated that P1NP (Procollagen type 1 N-terminal propeptide) has shown the great potential as a sensitive and stable bone biomarker for the early detection of osteoporosis[18].

For treatment of OP increase in bone mass is required and that can be done by anabolic therapy or by decreasing bone resorption by antiresorptive therapy. Number of studies recommended to increase physical activity in females in all age groups to maintain bone strength[19], [20]. The recommended value of calcium in postmenopausal women is 1200mg per day and 800-1000 international units per day of Vitamin D. Diagnose of OP in early phase can help in reducing bone loss by treating with bisphosphonates. The estrogen replacement therapy is used in women where non-estrogen medication are not suitable, but estrogen has never approved as a treatment of OP. There is evidence that hormone replacement therapy may lower the risk of osteoporosis in women by increasing bone density, reducing the number of fractures, and improving balance. However, there are risks associated with this therapy, including an increased risk for uterine and breast cancers and blood clots. The mortality rate increased by 10% if OP is detected after an age of 80 years and have history of hip or vertebra fractures. The OP management requires patient education and awareness through health and wellness centres. Social services can help in reaching the targeted population and vulnerable patients. Health staff should promote programs related to smoking cessation, healthy lifestyle, exercise routines especially for postmenopausal females.

Conclusion

Osteoporosis can be diagnosed and can be treated effectively before the onset of fractures in female. In past years the risk factors for loss of bone mass are identified and effective pharmacological treatments are introduced but the treatment is limited to minority of individuals. DEXA scan should be performed on the women after the age of 50 years. Detection and prevention of osteoporosis should be mandatory at all primary centres. Women should be encouraged to have good diet with routine exercise and change in their lifestyle.

Conflict of Interest

None.

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