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Type of Job: An Important Determinant of Bone Mass Density

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Abstract: ***The present study is a comparative study between sedentary and moderately active women subjects. To assess the impact of activities carried out in day to day life were considered based on energy requirement and stress applied on the muscle-bone combination. The study included 300 women subjects from middle income group (MSES). A pretested schedule to enquire about the various activities and their frequency was used to tabulate the scores obtained. Which was utilized to compare with their respective score of BMD. Measured less than -1 was considered as an indicator of Osteopenia / osteoporosis. (WHO guidelines). The present study reveals the importance of active routine.***

Keywords: BMD, Osteopenia, Osteoporosis, MSES

1. Introduction

Osteoporosis is an osteo-metabolic disease characterized by substantial loss of bone mass and microarchitecture deterioration of bone tissue, affecting bone quality and strength and increasing fracture risk. Fractures affect the muscle and the skeletal systems, cause chronic pain, loss of functional capacity and compromise quality of life.[1]

It is a debilitating disease affecting the bones. Bones become very brittle and break easily. Osteoporosis occurs when bones do not contain enough calcium and minerals or the body does not make enough. This causes bones to look very porous and contain large holes. The large holes indicate bone density is low and there is simply not enough mass. Bones with less density break more easily. Osteoporosis is more common in women than in men and is more prevalent in adults over the age of fifty.[2]
In the beginning, there may be bone loss, but no pain or other physical symptoms. A person could have continuing bone loss over several years before receiving a diagnosis of osteoporosis. Over time, the condition becomes more serious. Loss in height is a major indicator of osteoporosis. As backbones deteriorate, they can cause vertebrae to collapse or fracture causing a compression fracture. This makes a person shorter in height over time. The collapsing or fracturing of vertebrae can also cause back pain or stooping in posture. A humped back is another common symptom of later-stage osteoporosis.[2]

Bone tissues are living and are continuously remodeled. As a dynamic tissue, it adapts and responds to various stimuli, such as physical exercise and mechanical vibration.[3]

During physical activity mechanical forces can be exerted on bones through ground reaction forces and by the contractile activity of muscles, resulting in maintenance or gain of bone mass. Studies have already pointed out many of the mechanical stimuli that are beneficial to bone tissue, including some physical activities as aquatic and ground exercises.[4]

Physical activity is beneficial for bone mass, muscle strength, balance performance and pain relief in persons suffering from osteoporosis.[5]

Although impact exercises are recognized as beneficial for the stimulation of bone tissue, other variables such as muscle strength, type of muscle contraction, duration and intensity of exercises are also determinants to induce changes in bone metabolism of postmenopausal women. Not only osteo - anabolic exercises should be recommended; activities aimed to develop muscle strength and body balance and improve the proprioception should be encouraged to prevent falls and fractures.[6]

Physical activity or exercise for preventing osteoporotic fractures is indicated. Baert et al. researched the specific motivators for and barriers to physical activity (PA) in older adults with osteoporosis. The results showed to give a broad interpretation of what they considered as PA (practicing sports, physical work, and performing household activities), whereas the professionals seemed to mainly focus on therapeutic exercise as PA.[7]

Though osteoporosis is considered as geriatric problem but Janz et al.[8] showed a positive effect of physical activity on bone strength and suggests benefits of childhood physical activity to the prevention of osteoporosis.

Strophe et al. showed that physical activity during growth increases bone mass and strength with benefits persistent, the authors concluded physical activity associated bone loading both during and after skeletal growth improve adult bone mass. Children and teens should get at least an hour of physical activity every day and adults should get at least 30 minutes of moderate physical activity every day.[9]

Disuse osteoporosis are often identified as decreased bone mass, it is common in patients subjected to prolonged immobility and bed-rest.[10]

Hakestad[11] et al. described rehabilitation program combining the use of weight vests and patient education in patients with

low bone mineral density. Forty-two postmenopausal women with osteopenia attended the exercises program for 6 months. The rehabilitation program brought positive improvements in lower extremity function and femoral trochanter.

The exercises have been shown to be an effective method for preventing falls in elderly people, especially when the strength and balance training are combined.[12]Madureira et al. observed that a balance training program favored significantly improving quality of life, overall health and balance performance with reduced risks of falling.[13]A combined program with resistance training, aerobic, balance and coordination run twice per week are beneficial for improving bone mass, muscle strength and ability to walk.[14]

In June 2015, the National Osteoporosis Foundation with the American Society for Nutrition concluded that there is strong evidence for the benefits of physical activity and calcium intake, moderate evidence for the benefits of vitamin D.[15]

Aerobics exercises, weightlifting and resistance exercises are all effective in increasing the BMD.[16]It is stressed that regular exercise improves health in many ways. People who exercise regularly have lower rates of depression, heart disease, dementia, cancer, diabetes and many other chronic diseases. Exercise can improve your physical fitness, strength, energy levels, stamina and mental health.[17]

Hypothesis: Significant difference will be obtained in Bone Mass Density of physically active female subjects when compared to sedentary female subjects.

2. Materials and Method

Present study was conducted in the year 2013-14. The twin cities of District Durg of Chhattisgarh were selected for the sampling asit represents India when compared in terms of Industrial development, social harmony and cultural diversity. In the present study purposive random sampling was done in order to select unbiased sample of women population of age group 30 to 45 to focus the study on the impact of Physical Activities and type of job.

The questionnaire contained the list of various activities both in Hindi and English languages. Frequency of each activity was marked. The approximate calories required per hour to perform different activities werescored and compared from the standard parameter.

The final data was collected by using pretested and predesigned schedules under a systematic plan inconstant consultation with orthopedic authorities for accuracy.

A questionnaire/ schedule was administered to all the examinees to explore their Socioeconomic Status which included type of residence, educational status, family income, possession of household articles, number of dependent family members, type of job, number of kids and their educational status etc.

Bone Density: Bone Mass Density of the subjects was tested by the calcaneal bone densitometer. This apparatus helps in screening the subjects who suffer from major bone related problems silently. Osteoporosis is a frailty disease which shows no symptoms before a fracture.Moreover this apparatus is portable, cost effective and noninvasive. Hence easy to reach a large population.

BMD was measured by calculating T-score. It is the difference, in standard deviations, between BMD of the patient, from the mean BMD of a young adult reference population (healthy30 year old adult population). A T-Score between +1 and -1 is considered normal. A T-Score less than -1.0 but higher than -2.5 indicates low bone mass density (Osteopenia), and a T-Score of -2.5 or less indicates Osteoporosis. The greater the negative number, the more severe the osteoporosis.

3. Result

Table 1: Comparison of Bone Density Score of Female Subjects of MSES with High and Low level of Physical Activity

Groups	N	Bone Density of Female Subjects		Mean Diff.	't'
		Mean	S.D.		
High Physical Activity	150	-1.33	0.82	.37	3.99 (p<.01)
Low Physical Activity	150	-1.71	0.80		

A perusal of statistical entries shown in table 1 reveal that bone density of women belonging to low physical activity group (M = -1.71) indicate that they are significantly more prone to bone related disease as compared to women subjects belonging to high physical activity group (M = -1.33). The calculated t=3.99 also confirms this finding at .01 level of significance.

Borer KT (2015), Diaz-Curiel M (2014) in their studies found that physical activity stimulate increases in bone diameter throughout the lifespan.

Osteoporosis ("silent" disease - bone loss occurs without symptoms) is associated with a number of lifestyle factors. These factors can be splitted in two groups. The nutritional factors (intake of calcium, protein, dairy food, fruits and vegetables and vitamin D) and behavioral factors such as physical activity, smoking and alcohol consumption. Studies have shown that smoking and excessive alcohol intake increase risks of osteoporosis.[18]

4. Conclusion

On the basis of result and associated discussion it may be concluded that female subjects of middle income group with sedentary lifestyle are more prone to bone related disease as compared to their counterpart with high physical activity. The present status found to be alarming, specifically with sedentary workers. Disuse or no stress condition is a strong predictor of low BMD. There may be various reasons for immobility.

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