Original Article

Low Trauma Fractures and Osteoporosis n Men: Early Onset Owing to Sedentary Life Style

Syed Sohail Abbas[1], Saeeda Baig[2], Asma Niaz Khan[3], Sajjid Sattar[4] and Syeda Abia Naqvi[1]

ABSTRACT

Objective: This study was designed for men to evaluate the role of daily physical activity and its association with osteoporosis and fractures in men.

Study Design: Cross-sectional / prospective study

Place and Duration of Study: This study was conducted at the Pathology Department, Ziauddin University, Karachi from February to November 2014.

Materials and Methods: Around 1000 subjects were selected through free orthopedic camps set up in different areas of Karachi during the year 2014. After an informed signed consent demographic data including dietary habits, lifestyle and medical history including overall low-trauma fractures was recorded through interviewer administered Performa and BMD assessed by heel scan device.

Results: Out of 1000 subjects (age 44.4±9.8 years), 113 (11.3%) had Osteoporosis. In 344 who had low physical activity 89 (26%) had osteoporosis compared to only 24 (3.6%) out of 656 (65.6%) physically active participants. Low trauma fractures were present in 155 (15.5%) participants including 110(71%) in non active (68(44%) upper and 42(27%) lower extremities fractures. In 45(29%) participants with active life style, 30(19%) had upper and 15(10%) lower extremities fracture. Out of 110 low trauma fracture patients 41(37%) were osteoporotic whereas, only 8(13%) of active participants were osteoporotic. Upper extremity fractures 98(63%) were more common compared to lower extremity 57(37%).

Conclusion: Low daily activity may be the highest risk factor for osteoporosis and low trauma fractures at younger age in Pakistanis belonging to lower socioeconomic group.

Key Words: Osteoporosis, Physical activity, Lifestyle, Fracture, Bone mineral density

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INTRODUCTION

Osteoporosis is as widely prevalent in men as in women leading to different type of osteoporotic dilemmas especially hip fractures leading to greater morbidity and mortality rates compared to women[1,2]. Earlier, there was a difference of 5–10 years delay in the onset in men compared to women. Now men and women have almost equivalent risk of sustaining fragility fracture[3] but men are less (<10%) likely to receive therapy because of lack of awareness among healthcare providers to appraise men for osteoporosis or bone pathology[4].

Throughout life bone keeps on modeling and remodeling, but with advancing age, the replaced bone level decreases as compare to the amount of bone resorbed. Due to this factor the patients comes with fragility fractures which may have occurred due to abnormalities in bony structure and material properties e.g; fewer and thinner trabeculae, larger or smaller bony size, thinned and porous cortices, and tissue mineral content could be either too high or too low.[5] Bones should be strong for load bearing and light enough for speed of movement. For serving different functions of the skeleton, stiffness of bones make them able to resist bending for load bearing and propulsion against gravity, bones are flexible enough to deforming during impact loading without fracturing.[6] Men at all ages after puberty have larger bones than women, resulting in greater bending strength, mortality after a hip fracture, one of the major complications of osteoporosis, is more common in men than in women.[7]

In men, there is a misconception of relating bone pathologies with age. Besides old age, there are other factors including nutritional variations, life style modification, endocrinological alterations etc. which may affect bones. In the first three decades of life, dietary calcium has a strong role influencing bone

1. Department of Pathology, Sir Syed College of Medical Sciences. Karachi.
2. Department of Biochemistry, Ziauddin University, Karachi.
3. Department of Medical Education & Anatomy, Karachi Institute of Medical Sciences, Karachi.
4. Department of Nuclear Medicine, Ziauddin Hospital Clifton, Karachi.

Correspondence: Dr Syed Sohail Abbas, Assistant Professor Pathology, Sir Syed College of Medical Sciences. Karachi.
Contact No: 03332256901, 03212247735
Email: dr_sabbas@hotmail.com

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mineral content which is well established during this time period, its intake decreases as a person grows older.[8]

In 1993 the Consensus Development Conference defined osteoporosis as; ‘‘A disease characterized by low bone mass and micro architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk”.[9] World Health Organization (WHO) in 1994, established a criteria; for the diagnosis of osteoporosis before incident of fractures, bone mineral density (BMD) measurements, describing osteopenia and osteoporosis levels.[10]

In men no study has been done as in women showing strong evidence of benefits of physical activity and multipurpose exercise programs on bone mass accretion and high anti-fracture efficiency.[11,12]

MATERIALS AND METHODS

This cross-sectional study was conducted in Ziauddin University Karachi February to November 2014 with prior approval from Ziauddin University ethics review committee. A total of 1000 males, ±45 years old, cigarette smoker or chewable tobacco users since ±15 years, who agreed to participate, were recruited in the study after an informed signed consent. Information on demographics, educational status, occupation, lifestyle, dietary and chewable habits, surgical and medical history was obtained by an interviewer-administered questionnaire. Excluded were, those men who had chronic disease (asthma or diabetes etc.) or were on drugs altering the equilibrium of bone such as calcium plus vitamin supplements.

The dietary evaluation was assessed on parameters such as milk and eggs intake, meat consumption, cereals, fruits and vegetables.

The bone mineral density through Single x-ray absorptiometry (SXA), being inexpensive and an effective way of establishing the risk of fracture in future, was done on right foot heel of all 987 subjects. For maximum exposure the patient placed his right foot on the moulded support plate. Statistical Analyses was done by entering the data on SPSS version 20. All qualitative variables are presented as percentages and frequencies. All quantitative variables are presented as mean and standard deviation. A P-value less than 0.05 were considered significant.

RESULTS

The patients with T-score ≥-2.5 on Single x-ray absorptiometry (SXA), were selected as osteoporotic according to WHO criteria. Out of total 1000 participants 656 (65.6%) had a habit of walking or cycling as a part of daily routine whereas, 344 (34.4%) were not. Incidence of Osteoporosis was found high among 25% of non active participants compared to only 3.5% in active participants. Participants at younger age (less than 40 yrs.) were found active and less osteoporotic. The incidence of osteoporosis was observed in participants on the average at 45 years of age. (figure-1)

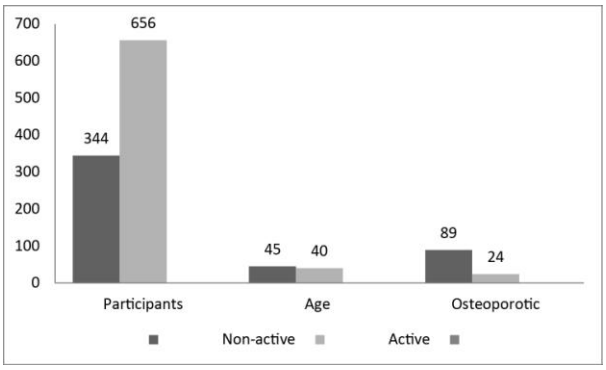

Figure No.1: Occurrence of osteoporosis in young age

When the relationship of diet was assessed in association with osteoporosis it was found that out of total 749 who were taking inappropriate diet, osteoporosis was found in 14% (n= 105) and out of the total 251 taking appropriate diet only n=8 (3.2%) were found to be osteoporotic. Physical activity was also found associated with osteoporosis; those who had high daily activity out of them only 24 (3.65%) had osteoporosis compared to 89 (25.8%) cases of osteoporosis in people who had low physical activity. Of the total participants 668 (66.8%) were tobacco users, osteoporosis was found in 67, whereas, 332 were non-smokers with only 46 of them were osteoporotic (Fig-2).

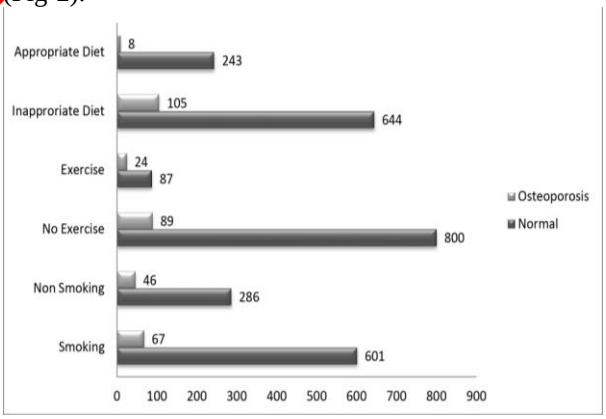

Figure No.2: Association of life style with Osteoporosis (n=1000).

Low trauma fractures were present in 155 (15.5%) participants including 110(71%) non active and n=45 (29%) active participants. Among active participants n= 30 (66.6%) had upper extremity fractures while n=15(33.4%) had lower extremity fractures. When assessed in non active participants n=42(61.8%) had upper extremity fractures while n=42 (38.2%) had lower extremity fractures. Out of 110 low trauma fracture patients 41(37%) non active partcipants were

osteoporotic whereas from n=45 active participants only n=8(13%) were osteoporotic (Table 1)

When osteoporosis was assessed with physical activity it was seen that non active participants had greater odds of being osteoporotic compared to active participants (OR=2.75 CI 1.09-7.11) (Winpepi version 11.39).

Table No.1: Low trauma fractures in active and non active participants

Subjects n=1000	Low trauma fracture [n=155 (15.5%)]			
	Active n= 45 (29%)			Non-active n=110 (71%)
	Cycling n(13%)	Walk n(6%)	Cycling/walk n(10%)	
Fracture	20	10	15	110
Upper Extremities	14	9	7	68
Lower Extremituies	9	4	2	42
Osteoporosis	4	2	2	41

DISCUSSION

Sedentary life style compromises bone strength even at young age, leading to osteoporosis and frequent low trauma fractures. Out of 110 low trauma fracture patients with low daily activity, 41(37%) were found osteoporotic whereas, only 8(13%) of active participants were osteoporotic.

Association of Physical activity with fractures has also been found by other researchers who showed that moderate to vigorous activity is associated with a 45% (95% confidence interval (CI), 31-56%) less risk of fractures in both men and women.[13] By doing exercise muscles are strengthened, flexibility is increased, and coordination and balance are improved. Daily tasks like walking, standing from a sitting posture are improved by strengthening of the muscles, improved balance prevent falls.[14] Compression fractures of the spine can be prevented by doing postural exercises that strengthen the back muscles.[15] Low trauma fracture was found highest in the upper extremities (63%) of our participants that occurred during daily routine activities compared to lower extremity (37%).

When low trauma fractures were compared with reference to life style 71% were present in non active people with sedentary life style having 44% in upper and 27% lower extremities fractures compared to only 9% in active life style participants having 19% in upper and 10% in lower extremities.

How mechanical signals are converted into biochemical response is important to understand in order to recognize how exercise plays a positive role in the prevention of osteoporosis. Primary bone mechano-sensors are the osteocytes which are embedded within the bone matrix; they sense mechanical signals via 'stress- generated fluid flow' inside the bone, through exercise. The formation of cyclooxygenase-2 (COX-2) and release of prostaglandins is increased after skeletal strain which are the intra-cellular and extra-cellular chemical mediators.[16,17] Decrease in bone mineral density and thinning of cortical bone at the diaphysis occurs after disuse of bones. Exercise can be in the form of machines, tubing, free weights, or one's own body weight. Push-ups, weight lifting, and squats apply resistance against the bones by contracting the muscles and pulling upon the tendons. These activities have a direct effect upon bone remodeling and bone formation and are site specific, thus increasing the BMD in young and older individuals.[18,19]

In this study it is evident that men who are not involved in any kind of exercise, like walking, running or cycling and are sitting for long hours, develop osteoporosis early in life. There was high incidence of low trauma fractures among the physically inactive group, while performing normal daily activities. According to a study in young men and women fragility fractures are uncommon because ability of the bone to withstand loads are well below.[20] As a person gets older bone fragility emerges, as the mechanism responsible for maintaining the material and structural properties of bone begin to fail, so according to this study low trauma fractures are not common in young men [(21)] in contrast to this studies our results show fractures at a age range up to 45 years which cannot be designated as old age. This proves that aging is only one of the many factors which lead to weakness of bones. Also highlight of this study was high prevalence of osteoporosis in subjects with inappropriate diet with low calcium content. The importance of getting accustomed to "healthy" balanced diet and a physically active lifestyle should begin from childhood continuing throughout life, for normal skeletal growth and aging.[22,23] Adequate calcium intake has been demonstrated to be significant for increasing and maintaining bone mass.[24, 25] On the role of exercise; a recent meta-analysis showed that both nonimpact and impact exercise had a positive effect on lumbar spine bone density in postmenopausal women, a positive effect at the femoral neck is produced by impact exercise only most probably.[26] Age-related declines in BMD is prevented by Resistance training exercises, as they leads into increase in bone mass.[27,28,29]

CONCLUSION

Low daily activity may be the highest risk factor for low trauma fractures and osteoporosis at age below 50 years in Pakistanis belonging to lower socioeconomic group. Further studies are required with larger sample size to investigate.

Author's Contribution:

Concept & Design of Study:	Syed Sohail Abbas
Drafting:	Saeed Baiq
Data Analysis:	Asma NK Qamar Jamal
Revisiting Critically:	Sajjid Sattar
Final Approval of version:	Syed Sohail Abbas

Conflict of Interest: The study has no conflict of interest to declare by any author.

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