Assessment of Osteoporosis and Osteopenia amongst Menopausal Women of North Nazimabad, Karachi, Pakistan

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Abstract: *Aim of the work:* The aim of present work is to explore the occurrence of bone problems in menopausal women of Karachi.

Material and methods: A cross-sectional study was carried out at Dr. Essa Laboratory & Diagnostic center, Karachi, Pakistan. All women included in this study were menopausal. Bone mineral density (BMD) was determined using dual energy X-ray absorptiometry (DXA) scan. Women were evaluated as osteoporotic or osteopenic on the basis of T-score and Z-score as followed by WHO criteria. Participant's basic anthropometric indices were recorded and body mass index was calculated.

Results: The mean ages of subjects were 65.42 ± 10.54, mean weight were 70.5 ± 44.47 and their mean BMI of 29.652 ± 4.895. The BMD of postmenopausal women were found 1.60 ± 0.17. Moreover, 73% women were osteoporotic and 27% women were osteopenic.

Conclusion: Menopausal women of north Nazimabad Karachi, Pakistan were highly suffering from bone illness such as hip bone fractures most of the evaluated women were suffering from osteoporosis followed osteopenia.

Keywords: Osteoporosis; Osteopenia; DEXA Scan; BMD; Menopausal women

1. INTRODUCTION

Osteoporosis is an illness in which bone mass decreases and bones softness increases in results humans are at high risks of fractures even from very minor distress (Johnell and Kanis. 2006) In our skeletal system decrease bone mass possess major threat for bones fractures anywhere, most of the reported from prevalence of bones fractures are distal radius, mid-thoraco, proximal femur and thoraco-lumbar area of the spine (Kanis 2002).

Globally, bones fractures are a severe human health illness. Annually,   all over the world osteoporosis roots above than 8.9 million fractures. In simple words after every three seconds there is a bone fracture (Shaheen *et al.,* 2015) Among those fractures mostly prevalent and highly risky are forearm, hip and vertebral bones, in results they create the risk for cardiovascular diseases up to 40%. For the literature it is clearly concluded that woman have very minimum knowledge of bones fracture risk factures and their defensive actions and significance (Iqbal, 2000).

Recently, the most extensive procedure to investigate the Bone mineral contests (BMC) and Bone mineral density (BMD) is Dual-energy X-ray absorptiometry (DXA). It developed the foundation for the determination of skeletal fitness in all age's humans (Binkovitz, and Henwood 2007). For determination of rate of mineralization in the various regions of skeleton DEXA scan is the most vital reference. It can investigate the bone losses as minor as less than 3% (Sheridan, 2010)

Bone strength has straight relation with osteoporosis. Strength of bones is determined through BMD which means the quantity of mineral present in one unit of space or in simple words mass divided by volume of the bones (Ali *et al.,* 2017) BMD inducing by many aspects and the chances of bones fractures such as sex, age, ethnicity, weight, height and body mass index (BMI) are reflected as autonomous indicators of bones fractures. Literature indicated that fat of body has important function in bone metabolism (Ibrahim *et al.,* 2011).

The incidence of osteoporosis in post-menopausal woman may be investigated in the lack of fractures by measuring Z and T-score as recommended by World health organization and the International Society for Clinical Densitometry, the association between T-score and reproductive woman is least clear as compare to post-menopausal woman, therefore a conformist method is required to attain at an analysis even with little bone density to avoid unnecessary usage of treatment (Binkovitz, and Henwood 2007).

DEXA scanning is possibly the highly familiar method used to determine bone minerals as

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recommended by WHO T-sore as an indicator of bone density. The subjects BMD is determined by transmitting a low energy X-ray beam through the subject and calculating the X-ray energy not absorbed by the subjects' bones, technically, femoral neck and lumbar spine (Robertson *et al.,*2002).

The model of DEXA includes the consumption of two X-ray beams of various energies to justification for the immersion of energy by the subject's soft tissues (Berger 2004). After performing the DEXA scan following equation used for calculations of T-Score

$$T\ score = \frac{Subject\ Bone\ Mineral\ Density - Population\ peak\ Bone\ Mineal\ Density}{Standard\ Deviation\ of\ Population\ Peak\ Bone\ Mineral\ Density}$$

WHO recommended that subject having T-score less than -2.5 is considered as osteoporosis.
After performing the DEXA scan subjects Z-score can be determined using following equation

$$Z-score = \frac{subject\ Bone\ Mineral\ Density - Population\ age - related\ Bone\ Mineral\ Density}{Standard\ Deviation\ of\ Popultion\ age - reelated\ of\ age}$$

There are many advantages of DEXA scan such as rapid and very less time consuming and no any anesthesia needed and most importantly very minor radiation exposure required. Notably there are no any side effects reported of DEXA scan (Katikaneni *et al.,*2009).

Universally, osteoporosis is less occurred in blacks and highly prevalent in whites especially in Asians. 1.5 million Osteoporosis bone fractures occurred annually. Sometimes these problems create permanent infirmity or death. It is reported that fractures related with osteoporosis happed in one out of every two woman and importantly 1 in every 8 men above 50 years of age. The cost of fractures treatment is very high especially in Pakistan and underdeveloped countries. Up to 2050 it is predicated that 50% of all hip fractures because of osteoporosis (Raza, 2011).

Pakistan is among the third world country which has the highest growing population ratio. Therefore there is slow continued increase in the percentage of older peoples in the Pakistan. It is predicated that population of country will increased up to 226 million till 2020 and 16 million peoples will be above 60 years of age (Samad and Qureshi, 2002). Due to poor diet especially low in rich protein and vitamin D and early and menopause are the major risk factors for Pakistani women developing Osteoporosis and Osteopenia (Baig, and Karim, 2006) (Elias, Sand herris, 2003). Considering the increasing burden of bones problem in

Pakistan we have investigated the prevalence of Osteoporosis and Osteopenia among the menopausal woman using T and Z-score.

2. MATERIAL AND METHODS

Cross sectional study was performed at Dr. Essa Laboratory & Diagnostic center Shahrah-e-Jahangir north Nazimabad Karachi, from November 2017-november 2018 for the period of one year.
Total 100 menopausal women were included in this study. Only menopausal women were included and women have age below 45 years and suffering any disease was excluded from the study.

Ethical committee of Dr. Essa laboratory& Diagnostic center has accepted the present study and Sindh university IRB approved the study sindhIRB/2019/110. Body mass index (BMI) was calculated using the formula weight in Kg divided by height in meter^2.

2.1 DEXA Scan:
Before performing scanning subjects were explained about procedure of DEXA scan (Hologic, Korea). The machine calculated T and Z-score automatically. Machine was operated by well trained and experienced technician. Machines take 10 minutes for scanning

2.2 Statistical analysis
Descriptive statistics were performed using Statistical Package for Social Sciences (SPSS) version 19.

3. RESULTS

The present study was performed on menopausal women of North Nazimabad, Karachi Pakistan. Total of 100 menopausal women were included in this study. The means age of subjects were 65.42±10.54, mean weight were 70.5±4.47 and their mean BMI of 29.652± 4.895. The BMD of postmenopausal women were found -1.60±0.17 **(Table 1).**

Table 1 Anthropometric indexof menopausal women.

Age (years)	weight (Kg	BMI	BMD
65.42 ± 10.54	70.5 ± 4.47	29.652 ± 4.895	-1.60±0.17

Values are presented in Mean ± standard deviation

On the basis of T Score as per WHO criteria women were categories as osteoporotic and osteopenia. The subject who's T-score above -1.0 was considered as normal and osteopenia were -2.5 followed by osteoporosis less than -2.5 Our study should that 73% women were osteoporotic and 27% women were Osteopenic. **(Fig. 1)**
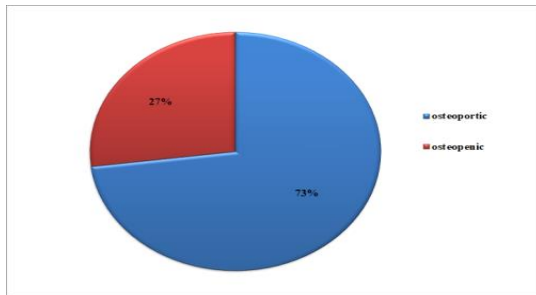

Fig 1.Osteoporosis and Osteopenic in Menopausal Women

4. DISCUSSION

Present was carried out in Pakistan's most populated city Karachi to determine the osteoporosis and osteopenia in menopausal women. We used the most advanced technology DEXA scan for estimation of BMD and BMC.For rapid determination of osteoporosis and osteopenia BMD considered as one of the best criteria (Guglielmi *et al.,*2011).

Our results indicated that body mass index mass may not be the cause of osteoporosis and osteopenia in menopausal women. Current results supported with another study that BMI may not be considered as risk factor for lesser bone mass or weakness in different bones in menopausal women (Nakavachara *et al.,*2014) (Ali *et al.,*2017)   In this study we have reported women age is slighter higher this is because of Pakistani woman generally underrate their age deliberately. Present study found that in menopausal woman osteoporosis is higher than osteopenia but in Turkey similar type of study was conducted and results showed that in menopausal women osteopenia is higher as compared to osteoporosis this variation of results may be because of their nutrition difference and their exercise habits similar type of study were also reported from (Baig *et al.,* 2009) (Russell-Aulet *et al.,*1995).

Women's BMD is steadily lesser in the Middle East than in west as reported in 2007 during a survey conducted in Middle East and North Africa. Literature witnessed that osteoporosis, osteopenia and obesity has been identified instantaneously in menopausal women. Several studies supported that bone weakness is the main problem in menopausal women (Akhlaque *et al.,* 2017)

The increasing ratio of osteoporosis in Pakistani females in all age groups because Pakistani women live sedentary life, most of the time they spend in homes without regular exercise and poor diet is also the main risk factor for bone fractures (Haris *et al.,*2014).

The frequency of bone problems in Pakistani women is very high as reported by several studies. Mostly menopausal women suffering from hip fractures when they were in early menopausal stages later stage of menopausal were found with decrease in BMI due to low financial status, absence of calcium additions and sometimes use of steroids and also lack of education (Khan, *et al.,* 2018) Threats for bone fractures were increasing for decrease BMI thought the world, most of the bones fractures reported were hip fractures are great risk for death in old women. In Pakistan ratio of old peoples are increasing day by day specially menopausal women are highly growing in number, these women are at high risk for bones fracture due to very little or no estrogen released from ovaries (Hussein *et al.,* 2010)

These problems in menopausal women can be solved through awareness seminar, workshops and training from government and private health providers. Print and electronic media could be useful for providing the awareness about managing menopause and how to cope or prevent from bone fractures (Lowe, 2011)

Conflict of interest
The authors declare that they have no conflict of interest

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