

**Research Article****Risk factors associated with Osteoporosis- Apopulation based study done in  
Rahim Yar Khan**

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**ABSTRACT-**

**Objective:** Osteoporosis is becoming major health problem in Pakistan due to steady increase in elderly population and poor nutrition .This global problem affecting 150 million men and women worldwide. Osteoporosis is defined as a reduction of bone mass (or density) or the presence of a fragility fracture. Objective of this study to diagnose osteopenia and its associated risk factors in our population. **Materials and methods:** This population based cross sectional study conducted to measure the peripheral ie.heel bone mineral density (BMD) by p-DEXA technique in adults. **Results:** Among total of 170 individuals (106 women and 64 men) Women had 137 risk factors and men had 71 risk factors. Among them there are 38 people who had no risk factors and 132 people had one or more risk factors. Among 132 individuals 64 people (50%) had one risk factor and 67 people (50%) had two risk factors. **Conclusion:** p-DEXA method was useful to identify people at increased risk of osteoporosis so they would be able to take preventive measures to improve bone health and It will reduce the personal economic burden and also on national health resources due to osteoporosis.

**Index Terms-** Peripheral - dexa, calcaneus, bone mineral density.

**INTRODUCTION**

Osteoporosis is a global problem occurring in every geographic area and affecting 150 million men and women worldwide. Ethnicity and race are well-known causative factors of skeletal health and bone mineral density. Osteoporosis is a condition characterized by low bone mass, structural deterioration, and porous bone which are associated with higher bone fracture. Women are four times likely to develop osteoporosis

than men and every 1 in 6 women over age of 50 affected by osteoporosis. Over 50 % of women above age of 60 years live in developing countries <sup>1</sup>. It is more prevalent in post-menopausal women due to increased fragility of bone but also occurs in men and women with risk factors associated with bone demineralization. Its clinical manifestations include fractures at any clinical sites most

common vertebral and hip fractures.. Osteoporosis ranks as one of the 5 expensive diseases of aging after diabetes, hyperlipidemia, hypertension and heart diseases.

The incidence of osteopenia and osteoporosis increase with age. There will be a resultant increase in the osteoporotic fractures. Proportion of elderly people is growing steadily in Pakistan and 4 % of our population persons are more than 65 years old.

It is estimated that cost of hip fracture treatment varies between 4000-10000USD depending on health facility and lead to increased hospital stay 8 to 10 days. So osteoporosis becoming increasing burden on our health resources.<sup>2</sup> Exact prevalence of osteoporosis in our country not known due to sparse data but some evidences showing wide variation between 6.7% to 18.6%.<sup>4</sup>

Osteoporosis Screening and diagnosis based on measurement of bone mineral density (BMD). Most validated and widely used technique to measure BMD is Dual energy X-ray absorptiometry (DEXA).<sup>5</sup> DEXA can be used for measurements at any skeletal site but hip, bone and vertebrae are used more frequently. Other techniques include densitometer which assess vertebral fracture, quantitative computed tomography, and quantitative ultrasound densitometry.<sup>6</sup> Based on recommendation of a WHO osteoporosis is defined as a bone density that falls 2.5 standard deviation (SD) below the average of same race and gender also referred to as T-score of -2.5. Those who fall at the lower end of the normal range ( T-score of  $>1SD$  below the mean ) are defined as osteopenic having low bone density and are considered to be at increased risk of osteoporosis.<sup>7</sup>

Portable DEXA machines have been developed that measure the heel (calcaneus), forearm (radius and ulna) or fingers (phalanges). In the DEXA technique two X-ray energies are used to estimate the area of mineralized tissue and the mineral content is divided by the area, which partially corrects for body size. However, this correction is only partial since DEXA is a two dimensional scanning technique and cannot estimate the depth or posterior anterior width of the

bone, thus small people tend to have lower than average bone mineral density.

#### **Risk factors associated with generalized osteoporosis:**

These include non modifiable risks like personal history of fracture as an adult, female sex, advanced age, Dementia, Caucasian and Asian ethnicity. Some potential modifiable risk factors include like current cigarette smoker, low body weight, Estrogen deficiency due to prolonged secondary amenorrhea more than 1 year, Early menopause (<45 years ) bilateral salpingo-oophorectomy, Low calcium intake, Inadequate physical activity, Poor health/fragility and recurrent falls are recognized factors for osteoporosis.

#### **MATERIALS AND METHODS**

Objective of this study is to evaluate bone mineral density in adult with peripheral-DEXA (p-DEXA) heel bone mineral density (BMD) measurement. It also aims to detect risk factors associated with osteoporosis and the effect of age, height, weight, menopause, physical activity, food habits on BMD. Year of menopause onset, treatment for osteoporosis, calcium, vitamin D, presence of DM / HTN, other clinical disorders, steroid intake and physician intervention were also assessed.

**Study Setting:** This study is population based observational study conducted in Hamza Medicare and Orthopedic department of Sheikh Zayed Hospital Rahim Yar Khan. Duration of study is 6 months from 13-2018 to 30.8.2018. The study included 170 patients who visited health camps arranged to measure BMD.

**Subjects:** BMD was measured in 170 individuals of both genders with minor bone related complaints who came to health camp for BMD testing. Among them, there were 106 females and 64 males. Their age was ranging from 25 to 80 years.

All patients included in study were subjected to measure bone mineral density by P-DEXA heel (calcaneous) technique. Height and weight of all patients also measured in study. Personal data collected from all patients including name, age, gender and to assess risk factors for osteoporosis patient detailed history taken

about their activity level, smoking, bone related complaints, jointproblems, history of diabetes and hypertension, medications(steroids),thyroid disorders.From females patients history of prolonged amenorrhea and injectable contraceptive use. Menopausal status of elderly women also recorded. Patients are also inquired about calcium and vitamin D supplement intake. All variables recorded on performa.

**Procedure to measure BMD**

The patient was made to sit on a chair and asked to place his or her ankle on the machine. After jell was applied to ankle the probes were pressed gently upon ankle to measure BMD.The BMD value printed on machine was noted. This was plotted on BMD chart and calculated for T-score by plotting against age of the patient.

**Table.1:** Presence of Selected Risk Factors among women

Risk Factors	Women	Men
Postmenopausal	41	-
Immobility	7	-
Hysterectomy(oophrectomy)	7	-
Cigarette smoking	0	3
	1	4
Hypothyroidism	3	
Fracture	1	
Premature menopause	3	-
Family history of osteoporosis	1	-
Joint disorders	8	6
Low BMI	8	6
Steroid therapy	3	-
Diabetes mellites type II	6	5
H/o bone related complaints	45	47
Total	132	71

Positive screening Tests		
P-dexa Osteopenia	52(50%) women	38(50%) men
p-dexa Osteoporosis	24(25%) women	8(15%) men
n = 173		

Among total of 170 individuals (105 women and 65 men) Women had more risk factors 132 and men had 70 risk factors. On average they reported one osteoporosis riskfactor.Among them 39 people had no risk factors. Risk factors for osteoporosis present in 132 people. Among 132 individuals 50% (65) people had one risk factor and 69(50%) had two risk factors.

**Table. 2:** Effect of menopause on BMD and T-score

Variables	Groups		P value
	Premenopausal N <sub>1</sub> =62	Postmenopausal N <sub>2</sub> =43	
BMD (gm/cm <sup>2</sup> )	0.48± .09	0.44 ± 0.1	0.027*
T-Score	-0.9 ± 0.86	-1.2± 0.83	0.06 (NS)

According to the T-score, the diagnosis of osteoporosis, osteopenia weremade according to WHO criteria.

The WHO equivalent for heel BMD includes >-0.6 for a Normal T-score, -0.6 to -1.6 for osteopenia, and less than -1.6 for osteoporosis (6,7). Men and women who were found to have heel BMD T-scores of <-.6 (suggested by the World Health Organization) were considered osteopenic and<-1.6 was considered as osteoporotic and > -0.6 were considered as normal.WHO values for T- score for heel is different from for hip spine andforearmbecause heel has slower bone loss than other sites in body. This means that T-score used from other skeletal are as may underestimate BMD loss if same standard are used.

Values are expressed as Mean $\pm$ SD (P Value <0.05 is considered statistically significant) Among all (n=105) females, women (N<sub>2</sub>=41) female aremenopausal, and had mean BMD of 0.44 gm/cm<sup>2</sup> and premenopausal women who (N<sub>1</sub>=65) had mean BMD of 0.48 gm/cm<sup>2</sup> (table 2). Post menopausal women had significantly lower BMD than pre menopausal women. P <0.05 (significant). As shown in table 1, premenopausal women had mean T- score of -0.9 and post menopausal women had mean T- score of -1.2 proving increased risk of fractures in postmenopausal women but not statistically significant. P value 0.061 (non significant)

## DISCUSSION

In the present study, we measured bone mineral density by using peripheral (calcaneal) - DEXA scan to assess the strength of bones and the probability of fractures by using T score. We also detect risk factors associated with osteoporosis.

One risk factor for osteoporosis is low BMI which was also confirmed by a study of Ravn et al (1994)<sup>(9)</sup>. Sharon et al observed that BMD was closely associated with increasing quantities of each weight measures (total weight, BMI, lean mass, fat mass) and percentage of fat mass than with other body size measures (waist hip ratio, height). Similarly our study showed that obese women with high BMI are at lesser risk for osteoporosis as compared to lean women. Postmenopausal women are at increased risk of developing osteoporosis as compare to menstruating women. Most of women above age of 50 years had decrease bone mineral density observed in our study. Same results shown by Aoki T T et al (2000)<sup>(10)</sup>, his study on 625 postmenopausal women showed that incidence of osteoporosis increases from 15.5% in women less than 50 years of age to 59.6% in those older than 69 years of age.

B. Lawrence et al (1986)<sup>(11)</sup> concluded that the rapid phase of bone loss in early postmenopausal women was caused mainly by loss of osteoblastic activity due to decreased estrogen and in aging men were mainly caused by loss of the calcium- retaining effects of

estrogen on the gut and the kidney.

In our study it was also observed that people who are taking mixed diet including protein have more BMD as compare to who are strict vegetarian. Prominslow J H et al (2002)<sup>(12)</sup> observed a same association between high protein intake and increase in BMD.

Understanding that osteoporosis varies in various ethnic population, our data and that obtained by other Indian researchers revealed investigators (Pande KC, Johansen K B et al 2001)<sup>(13)</sup> showed that Indian women have 5-15% lower bone mass compared to Cuacasian women. Results of our study showing that women are more affected by osteoporosis as compared to men. Similar observations were made in research of Shah Rashmi, Sarvardekar et al (2004)<sup>(10)</sup> osteoporosis affected women to men ratio is 6:1. Many studies done by using DEXA had predicted that one in every eight men and one in every two women over age 50 years will have osteoporosis related fractures in his or her life time (Brunner L. C and Eshillion Ostes et al 2003)<sup>(14,15)</sup>, which means women are 4 times at risk for fracture compared to men after 50 years of age. According to our studies one in every six men and one in three women had osteoporosis related risk of fractures..

Earlier studies have concluded that when females compared with males of similar age groupss (Pacifci R et al 1987)<sup>(16,17)</sup>, their BMD is 10 to 15% lesser than males. Almost same results shown in our research that 2-4% decrease in BMD in females when compared with males of same age group.

## CONCLUSION

p-DEXA is highly accurate low dose X- ray technique for Identification of high risk patients for osteoporosis by Measuring bone mineral density. Women most commonly Postmenopausal are at increased risk for developing osteoporosis as compare to men. Screening of high risk patients is useful as we can implement preventive strategies like medication Supplements to improve bone health. and to reduce Economic burden due to osteoporosis related fracture Expenditure.

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