Original Research Paper

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Anatomy

SEXUAL DIMORPHISM IN BONE DENSITY

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ABSTRACT Women are assumed to be the weaker sex. Our study aims to demonstrate that their male counterparts are at a physiological advantage with respect to bone mass at all ages and that females lose more bone than males. Both sexes undergo hormonal changes around menopause and andropause respectively resulting in accelerated bone loss after fifty years .Therefore we see an increase in individuals affected by bone loss after fifty than before fifty years of age. We have also proved that females are twice as much affected than males adjusted at all ages . This could be due to various factors like genetic , environmental, cultural, nutritional, hormonal, child birth, number of deliveries and exposure to sunshine.

KEYWORDS : Metacarpal Radiogrammetry , osteopenia , menopause ,andropause

INTRODUCTION.

Osteoporosis is a silent killer disease affecting women more than men all over the world and leads to an increase in morbidity and mortality in the form of fractures. Due to early menarche and menopause Indian females suffer from osteoporosis earlier than their western counterparts. Metacarpal radiogrammetry has evolved as a screening tool for the detection of osteoporosis being first described by Barnett and Nordin[1]. The hormonal decline during menopause leads to decay of bones increasing the probability of fragility fractures in elder women[2] .

The various factors affecting bone density are age, gender, limb dominance , nutrition, hormones , race, genes, skin colour to name a few[3].

Usually women sustain more fragility fractures than men related to their biological roles of motherhood and the ever changing ovarian cycle discriminating them in fracture eitiology when compared to latter[4].

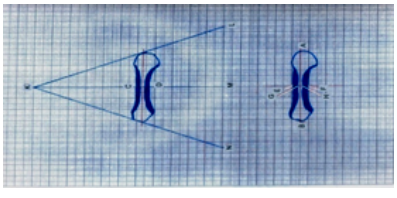
AIM

The present study aims to study various morphometric parameters on the second metacarpal bone of left side on both sexes through metacarpal radiogrammetry and compare .

MATERIALAND METHOD

The present study was conducted in Dayanand Medical College And Hospital, Ludhiana. 120 apparently healthy subjects were selected for study out of which half were(60) female and half were(60) males. Half of each group of men and women (30) were aged less than 50 years and the other half (30)were aged greater than 50 years. This study is a part of thesis. Ethical clearance was given and consent was obtained before the study was conducted. Hand X rays of PA view were obtained using standardized protocol. Vernier callipers were used to take readings of length and subperiosteal diameter and endosteal diameter at the mid-shaft of second metacarpal of left hands as shown in Figure1. Calculations were done using formulae as given further. Appropriate statistics were applied and values were compared as given in Table 1 .

Figure1. Metacarpal Morphometric Parameters



1. MEASUREMENTS

1.1. LENGTH (AB) = L
1.2. SUBPERIOSTEAL DIAMETER(EF) = D
1.3. ENDOSTEAL DIAMETER(GH)= d

2. FORMULAE

2.1. COMBINED CORTICAL THICKNESS CCT = D – d

2.2. METACARPAL INDEX
MCI = D – d / D X 100

Table no 1 comparison of gender

PARAMETERS Measured & calculated on x rays of both hands	MALES Mean value MCI	FEMALES Mean value MCI
<50YEARS	60.67	59.12
<50%MCI	2/30	5/30
>50YEARS	56.97	51.10
<50%MCI	6/30	14/30

RESULTS AND DISCUSSION

The present study once again proves that the skeleton size and mass is greater in males than in females. We found that there is a significant increase in all variables related to bone size like length and breadth ; and bone density like cortical thickness and metacarpal index of the second metacarpal bone among men in relation to women indicating a greater bone mass at all ages . The loss of cortical thickness of skeleton is linked to hormonal decline which takes place around fifty years and the metacarpal index (MCI) is a good indicator of bone density [5,6] . If <50% value of MCI is taken as a threshold there is greater sensitivity and specificity in the detection of bone loss and identification of high risk individuals [7] .We found among both men and women that the number of osteopenic individuals tripled after fifty years. As usual women outnumbered men in all age groups by more than a factor of two. After the age of fifty one in five men and every alternate woman can be susceptible to a fragility fracture. The reason behind the change in epidemiology could lie in andropause amongst males and menopause amongst females.

CONCLUSION

Bones are a storehouse of calcium and depend on Vitamin D for maintaining optimum strength and integrity. Due to cultural barriers women often get neglected in terms of nutrition and general well being though playing a major role of childbearing and rearing of young ones resulting in increased fracture probability which can be further complicated by lack of exercise, sunshine exposure, and the female climacteric. Cortical bone loss accounts for an increased probability of pathological fracture among postmenopausal women [8] . Hence we see more women in outpatient department with low bone mass than men [9] .

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