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RESEARCH ARTICLE

ROLE OF AGE OF MENARCHE AND AGE OF MENOPAUSE IN DETERMINING BONE MINERAL DENSITY IN POST MENOPAUSAL WOMENAT SMS MEDICAL COLLEGE JAIPUR, RAJASTHAN

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ABSTRACT

Introduction: Reduction of bone density and development of osteoporosis in postmenopausal women is very commonly seen in India and causes significant morbidity. Many of these women were found to have age of menarche and age of menopause affecting the bone mineral density of postmenopausal women. derangements in lipid profiles especially serum cholesterol levels. AIMS AND **Objectives:** To find a correlation between age of menarche as well as age of menopause and Bone mineral density in post menopausal women. **Material & Methods:** The study was carried on matched cases and controls. The experimental group consisted of 55 females at postmenopausal age, in which by the DEXA method was diagnosed osteoporosis while the control group consisted of 55 females in a postmenopausal age but without diagnosed osteoporosis who served as controls. Age of menarche and age of menopause were determined in both cases and controls. **Results:** Most women achieved their menopause at 51-55 years of age in both the groups and majority amongst them achieved their menarche between 12-13 years. The mean age at menopause in Group I women was 50.32±1.41 years and in Group II was 49.67±1.36 years. The difference in menopausal age in both the groups was found to be statistically insignificant (p-value=0.865). The result was also not significantly associated with the age of achieving menarche(p value 0.060). CONCLUSION: No correlation was found between age of attaining menarche or menopause in this study however The sample is relatively small and not large enough to cause adequate study power to the results. Second, repeat measurement of lipids may be necessary for decreasing confounding factors such as diet on lipid profile

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INTRODUCTION

Menopause is a transition phase from the reproductive to the nonreproductive phase in a woman's life. Menopause is nature's protective phenomenon against reproductive morbidity and mortality in the aging population. Today we are aware that menopause has much wider implications, than simply loss of fertility. It sets the stage for aging and accelerates the process of noncommunicable disorders (Meeta, 2013; McKinlay, 1992).

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In India, the range of mean age at menopause reported in different studies was found between 41.9 and 49.42 (Singh, 2012; Utian, 1999) years. According to the Indian National Family Health Survey (NFHS-4) carried out during 2015-2016, about 17.5 per cent of currently married women in the age group of 30-49 years had reached menopause (World Health Organization, 1996; National family health survey, 2015). Menopausal women face a variety of health problems, osteoporosis being one of them. Osteoporosis is defined as a progressive, systemic, skeletal disease characterized by low bone mass and micro architectural deterioration of bone tissues with a consequent increase in bone fragility and susceptibility to fracture.

In postmenopausal women, osteoporotic fractures are more common than stroke, myocardial infarction, and breast cancer combined. Fractures can be costly and result in disability or death. Because there are no signs or symptoms of osteoporosis other than fracture, risk assessment is necessary to identify those at higher risk for clinical events. Bone mineral density (BMD), a golden criterion recommended by the WHO, is the primary diagnostic index for osteopenia and osteoporosis. LATE MENARCHE and early menopause found to be significant factors in decreasing bone mineral density in postmenopausal women.

Aim: The present study was undertaken to examine the role of age of menarche and age of menopause in affecting the bone mineral density of post menopausal women.

MATERIAL AND METHODS

Women fulfilling the following inclusion and exclusion criteria were enrolled for the study. Inclusion criteria-All postmenopausal women (1-5 years after the last menstrual cycle) with BMI 18.5-25 who are willing to participate in the study. Exclusion criteria -Diabetes, chronic renal disease, inflammatory arthritis, diseases of thyroid and para thyroid glands, liver disease, malignancy, GIT disease like Crohn's disease and malabsorption, Use of drugs like statins, corticosteroid, hormone replacement therapy, diuretics, drugs for osteoporosis, Secondary osteoporosis due to endocrine diseases .Study group I consisted of 55 postmenopausal females who had been diagnosed with osteoporosis in the Cabinet for Osteodensitometry by determining bone mineral density by DEXA method at the lumbar spine (L2-L4).Group II consisted of 55 females in the postmenopausal age which after determination of bone mineral density by DEXA method, has not been diagnosed with osteoporosis.

Age of menopause and age of menarche were determined from the enrolled postmenopausal women. A correlation between the above variables and osteoporosis was done. The data obtained was tabulated, compared and analysed by $\chi 2$ tests to identify differences in baseline characteristics between both the groups. Data were presented as mean ± standard error values for continuous variables and as percentage ± standard error for categorical variables. Statistical analysis was performed. A p value < 0.05 was considered to be statistically significant.

RESULTS

Maximum number of women in both the groups were in the age group 56-60 years suggesting that it is the age in which women attains her menopause mostly. The mean age of this study was 53.27±5.07 in group Ⅰ and 54.47±4.64 in group Ⅱ. No significant difference was observed according to age between both the groups (p-value 0.354). Among the osteoporotic women in the study, maximum cases were multiparous [34 (61.82%)]. Similarly, in Group Ⅱ also, maximum cases were multiparous [37(67.27%)]. When the number of multiparous women in the two groups was compared with P 0-2 or P>5, this difference was found to be statistically insignificant. (p=0.96). in Group Ⅰ,49 (89.10%) women were literate and Group Ⅱ,50 (90.90%) women were literate.This difference in both groups was found statistically insignificant. (p-value=0.99).

Table No. 1

BMI(Kg/Mt^2)	Group Ⅰ	Group Ⅱ
Mean	22.16	21.98
SD	1.88	2.18
P-value	0.616	
T-value	0.503	

Postmenopausal women in the BMI range 18.5 to 25 (normal)were only included in the study. Others were excluded from the study to avoid confounding factors. The mean BMI in women with osteoporosis was 22.16±1.88 and in Group II was 21.98±2.18. The results were statistically insignificant. Sadat-Ali M *et al* (2005) observed that the mean BMI in group A with women of >6 children was 31.95 kg/m2 and in group B with women of <5 children was 29.14 kg/m2. The BMD of the lumbar spine of group A was 0.850 g/cm^2 (SD±0.112) compared to group B in which it is 0.699 g/cm^2 (SD±0.141), p<0.005. This difference was statistically significant. Skrzek A *et al* (2014) suggested the optimal values of the body mass index (BMI) which would indicate the most favourable preservation of the bone mineral density in postmenopausal women is 26.9 kg/m^2.

Table No. 2 distribution of patients according to age at menarche

Age at menarche (Years)	Group I	Group II
8-9	0	0
10-11	0	0
12-13	31	47
14-15	19	13
total	50	50
P-value	0.061	
T-value	2.41	

Table No. 3 Distribution of patients according to age at menopause

Age at menopause	Group I	Group II
40-45 YEARS	12	10
46-50 YEARS	13	12
51-55 YEARS	24	27
56-60 YEARS	06	06
TOTAL	55	55
Mean	50.32	49.67
SD	1.41	1.36
P-value	0.865	
T-value	0.12	

DISCUSSION

Gerdhem *et al.* (2004) found small but significant correlation of early menarcheal age with high BMD of the lumbar spine (r =-0.08; P = 0.017) and femoral neck (r =-0.10; P =0.002) in postmenopausal women. Excluding the extremes (5% of the women) with very early or very late menarche, age at menarche no longer influenced the BMD (r =-0.06; P =0.113). Age at menopause had no influence on the BMD of the lumbar spine (r =0.04; P= 0.246) or femoral neck (r = 0.00; P =0.985). The length of the fertile period did not influence BMD in postmenopausal women. The influence of menarcheal or menopausal age on BMD was not substantially altered after including body mass index (BMI) in a multiple regression model. HL Li *et al* (2005)[51] observed significant increase in osteoporosis of lumbar spine in women with the age of menarche ≥ 17 (119 out of 336 cases were with osteoporosis in lumbar) compared with women with age of menarche ≤ 13 (75 out of 276 cases were with osteoporosis in lumbar).

In women with menarche age of 11-13, 14-16, 17-19, lumbar vertebral (L (2-4)) BMD values were (0.83 +/- 0.16), (0.82 +/- 0.16), (0.80 +/- 0.14) g/cm^2, respectively. There was significant increase in BMD of lumbar in the menarche age group of 11-13 compared with the age group of 17-19 in women attaining menopause 1-10 years ($P < 0.05$). Among all women aged between 55-65, there was significant increase in osteoporosis in women with menopause age ≤ 48 compared with menopause age ≥ 54 ($P < 0.01$). BMD of the L (2-4), Sioka *et al* (2010) investigate the relationship of osteopenia and osteoporosis in apparently healthy 124 postmenopausal patients with age at menarche, age at menopause and duration of fertility. Among them, 47 were classified as normal (control group), 52 as osteopenic, and 25 as having osteoporosis. These groups were compared according to their age at menarche (three subgroups of 10–12, 13 and 14–16 years old), at menopause (three subgroups of 40–45, 46–50 and ≥51 years old) and duration of fertility (four subgroups of ≤30, 31–35, 36– 40 and 41–45 years).The groups were not found to differ statistically according to age and age at menarche. However, decreased bone mineral density was found in patients with duration of fertility not exceeding 30 years (p=0.034) and age at menopause less than 45 years (p=0.034). No association was found between bone mineral density in postmenopausal women and either number of live births or lactation. Parker *et al* (2013) investigate the association between age at menarche, age at menopause, and years of menstruation with incidence of osteoporosis. The IRRs for osteoporosis incidence with age at menarche less than 11 years and age at menopause of 50 years or younger were 0.82 (CI 0.59, 1.14) and 0.61 (CI 0.40, 0.92), respectively.

Fewer than 25 years of menstruation was associated with an increased incidence of osteoporosis (IRR1.80; CI1.14,2.86) compared with 35years or more of menstruation. Mendoza-Romo MA *et al* (2014) conducted a transversal, retrospective and analytical study. Reproductive history and age of menarche were added to the previously validated Albrand questionnaire. Women were divided into groups according to the number of pregnancies: 112 patients (46%) with normal parity (0 to 3 childbirths) and131women (54%) with multiparity (≥ 4 pregnancies). Average age of menarche was 12.98 years and were divided on the basis of the age at which they attained their menarche i.e. Early menarche (before the age of 13) and late menarche (at 13 years of age or after). Bone mineral density was measured with dual distal forearm X-ray absorptiometry of all patients.243 women were studied, with an average age of 55.92 years, ranging from 31 to 80 years. Using the criteria of World Health Organization, 18% of postmenopausal women had osteoporosis, 39% had osteopenia and 41% had bone normality. Also, there was significant negative correlation (r=-0.43) between age and densitometry. In addition, it was found that women who attained her menarche at more than 13 years of age were related to osteoporosis more (OR 4.46; p = 0.035). Sioka *et al* (2010) and Li LH *et al* (2005) observed significant increase in osteoporosis in women achieving menopause at ≤ 48 years. Sivas M, P (2004)[13] found no correlation of menopausal age to either BMD of the lumbar spine (r - 0.04; P - 0.246) or BMI at age 75 (r - 0.004; P - 0.90). Most women achieved their menopause at 51-55 years of age in both the groups and majority amongst them achieved their menarche between 12-13 years. The mean age at menopause in Group I women was 50.32±1.41 years and in Group II was 49.67±1.36 years. The difference in menopausal age in both the groups was found to be statistically insignificant (p-value=0.865). The result was also not significantly associated with the age of achieving menarche (p value 0.060)

Conclusion

A lipid profile is recommended in postmenopausal women as an atherogenic lipid profile is a risk factor for the development of osteoporosis in the elderly postmenopausal females. No correlation was found between age of attaining menarche or menopause in this study however. The sample is relatively small and not large enough to cause adequate study power to the results. Second, repeat measurement of lipids may be necessary for decreasing confounding factors such as diet on lipid profile.

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