Original article:

To Assess the Changes of Bone Mineral Density in Pregnant Women: An Institutional Based Study

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Abstract:

Background: The positive effect of exercises on BMD has been well supported in the literature. Pregnancy and lactation constitute a unique series of physiologic states with marked changes in maternal calcium homeostasis. Hence; we planned the present study to assess of change in BMD in pregnant women.

Materials & Methods: The present study included assessment of change in BMD in pregnant women. A total of 160 pregnant subjects were included in the present study. Complete detail about the occupation and exercise detail of all the subjects was obtained by the mean of a self-administered questionnaire. Bone mineral density in all the subjects was assessed during the early phase of density. Reassessment of the bone mineral density of the subjects was done during the late phase of pregnancy.

Results: Significant reuslts were obtaine dwhile comapring the mean BMI of the women during the early and late phase of pregnancy. Mean BMD of the subejcts during the ealry phase of pregnancy was 0.615 gm/cm^2 while mean BMD of the subejcts during the late phase of pregnancy was 0.593 gm/cm^2 respectivley. Significant reuslts were obtained while compaing the mean BMD of the subejcts during the early and late phase of pregnancy.

Conclusion: BMD of the pregnant women do decrease significantly during pregnancy period

Key words: Bone Mineral Density, Pregnant, Women.

INTRODUCTION

The positive effect of exercises on BMD has been well supported in the literature. In pre-pubertal children and adolescents, physical training and high-impact exercises have been associated with higher BMD accrual. This effect was observed to continue into reproductive age women. There is also evidence that physical activity effectively slows bone loss in postmenopausal women in a dose-dependent manner.[1-3]

Pregnancy and lactation constitute a unique series of physiologic states with marked changes in maternal calcium homeostasis. There are significant alterations in calcium metabolism during pregnancy and lactation in mammals, and in pregnant women, calcium absorption is increased to compensate for calcium loss through placental transfer and breast-feeding.[4-7] The present study planned assess of change in BMD in pregnant women.

MATERIALS & METHODS

The present study was conducted in the Department of Orthopaedics, S.P. Medical College, Bikaner, Rajasthan, India. It included assessment of change in BMD in pregnant women. A total of 160 pregnant subjects were included in the present study. Complete detail about the occupation and exercise detail of all the subjects was obtained by the mean of a self-administered questionnaire. Inclusion criteria for the present study included:

- Subjects with negative history of intake any bone metabolism altering drug,
- Subjects with negative history of any other systemic illness,
- Subjects with negative history of any bone related metabolic disorder

Bone mineral density in all the subjects was assessed during the early phase of density. Reassessment of the bone mineral density of the subjects was done during the late phase of pregnancy. Quantitative ultrasound bone density measurement was the method employed for evaluation of BMD. All the results were recorded and analysed by SPSS software. Chi- square test was sued for assessment of level of significance.

RESULTS

A total of 160 subjects were included in the present study. mean age of the subejcts of the present study was 25.6 years. Mean weight of the subjects during the early phase of pregnancy was 49.6 Kg. mean weight of the subejcts during the late phase of pregnancy was 60.4 kg. Signifcant reuslts were obtained while comparing the mean weight of the subjects during the ealry and late phase of pregnancy. Mean BMI of the subejcts during the early phase of pregnancy and during the late phase of pregnancy was 22.5 and 26.1 Kg/m^2 respectively. Significant reuslts were obtaine dwhile comapring the mean BMI of the women during the early and late phase of pregnancy. Mean BMD of the subejcts during the ealry phase of pregnancy was 0.615 gm/cm^2 while mean BMD of the subejcts during the late phase of pregnancy was 0.593 gm/cm^2 respectivley. Significant reuslts were obtained while compaing the mean BMD of the subejcts during the early and late phase of pregnancy.

Table 1: Change in parameter from early to late pregnancy

Parameter	Early pregnancy	Late pregnancy	P- value
Mean weight	49.6	60.4	0.02*
BMI (Kg/m^2)	22.5	26.1	0.01*
Mean BMD (gm/cm^2)	0.615	0.593	0.04*

*: Significant

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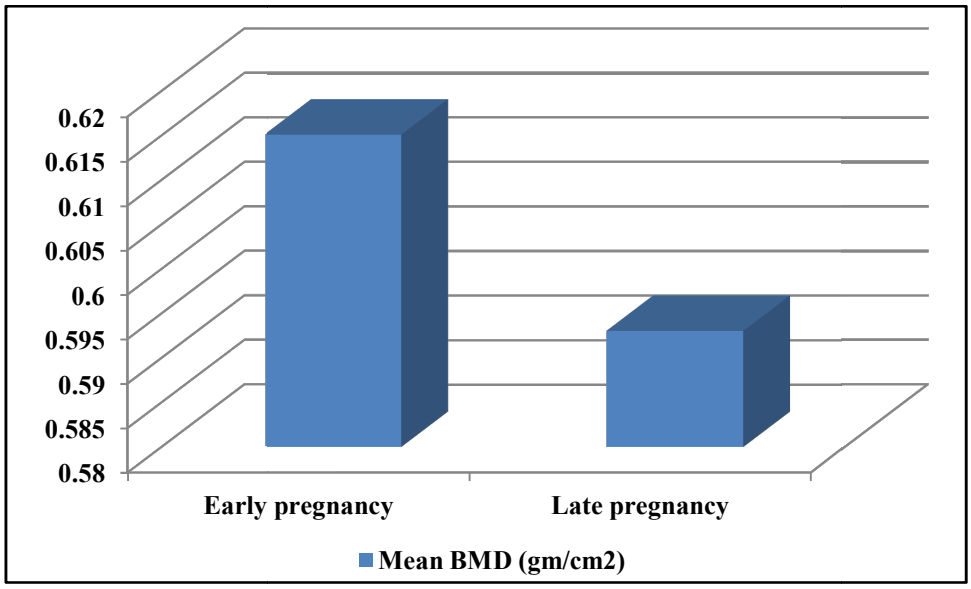
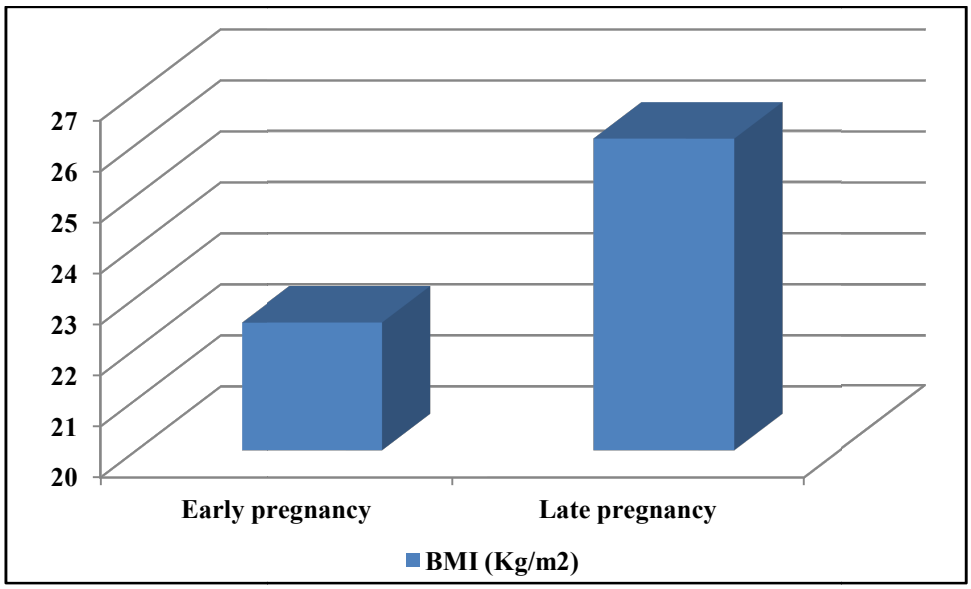
Graph 1: Comparison of mean BMD in subjects during early pregnancy and late pregnancy phase



Graph 2: Comparison of BMI during the early and late phase of pregnancy



DISCUSSION

In the present study, signifcant reuslts were obtained while comparing the mean weight of the subjects during the ealry and late phase of pregnancy. Mean BMI of the subejcts during the early phase of pregnancy and during the late phase of pregnancy was 22.5 and 26.1 Kg/m^2 respectively. Significant reuslts were obtaine dwhile comapring the mean BMI of the women during the early and late phase of pregnancy. Matsumoto I et al explored the effects of pregnancy and postpartal lactation on bone mineral density (BMD). In this study, the BMD of 22 pregnant women in a longitudinal study, and of 75 pregnant and 111 puerperant women in a cross-sectional study was estimated at the distal radius of the forearm by dual energy X-ray absorptiometry. BMD was measured on 8 separate occasions from the first trimester of pregnancy to 24 months' postpartum. In none of 22

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pregnant women was there any noticeable change in BMD during pregnancy. Whereas no significant change in BMD occurred during the 12-month postpartum period in 11 non-lactating women, 11 women who breastfed had a significant decrease in BMD at 1, 3, and 6 months' postpartum, with all of them showing a further decrease in BMD at 12 months' postpartum. The BMD of the radius was significantly lower in the breast-feeders than in the formula-feeders at all postpartal times of evaluation except at 24 months' postpartum. It can be recommended that lactating women receive appropriate treatments for saving BMD during lactation.[8]

Mean BMD of the subejcts during the ealry phase of pregnancy was 0.615 gm/cm^2 while mean BMD of the subejcts during the late phase of pregnancy was 0.593 gm/cm^2 respectivley. Significant reuslts were obtained while compaing the mean BMD of the subejcts during the early and late phase of pregnancy. Holmberg-Marttila D et al compared the reproduction-related BMD changes with twice the standard deviation (SD) of the BMD changes in healthy premenopausal women (about +/- 5%), and with the SD of the BMD in a cross-sectional sample of young healthy women. The duration of postpartum amenorrhea (PPA) and of lactation in our subjects ranged from about 2 months to 1 year and from 5 months to almost 2 years, respectively. No clear association between PPA and lactation could be seen. The magnitudes of reproduction-related BMD changes in general seemed not to differ substantially from about +/- 5% variability in BMD changes in healthy nonpregnant and nonlactating women. There was, however, some tendency toward systematic bone loss at the lumbar spine (about -3%) during pregnancy and at the femoral neck during PPA (about -5% as compared with prepregnancy data). Some individuals can yet show large, systematic bone losses comparable to 1 SD in magnitude. The site-specific reproduction-induced bone loss and consequent recovery are apparently multifactorial phenomena that may be related not only to duration and magnitude of lactation and/or duration of postpartum amenorrhea, but also to prevailing biomechanical and dietary factors, and other yet unknown individually modulated factors.[9]

Møller UK et al elucidated changes in BMD and bod composition (BC) during and following a pregnancy. They measured BMD and BC in 153 women planning pregnancy (n = 92 conceived), once in each trimester during pregnancy and 15, 129, and 280 days postpartum. Moreover, BMD was measured 19 months postpartum (n = 31). Seventy-five age-matched controls, without pregnancy plans, were followed in parallel. Compared with controls, BMD decreased significantly during pregnancy by $1.8 \pm 0.5\%$ at the lumbar spine, $3.2 \pm 0.5\%$ at the total hip, $2.4 \pm 0.3\%$ at the whole body, and $4.2 \pm 0.7\%$ at the ultra distal forearm. Postpartum, BMD decreased further with an effect of breastfeeding. At 9 months postpartum, women who had breastfed for <9 months had a BMD similar to that of the controls, whereas BMD at the lumbar spine and hip was decreased in women who were still breastfeeding. During prolonged breastfeeding, BMD at sites which consist of mostly trabecular bone started to be regained, whereas BMD at sites rich in cortical bone decreased further. At 19 months postpartum, BMD did not differ from baseline at any site. During pregnancy, fat- and lean-tissue mass increased by $19 \pm 22\%$ and $5 \pm 6\%$ ($p < 0.001$), respectively. Postpartum, changes in fat mass differed according to breastfeeding status with a slower decline in women who continued breastfeeding. Calcium and vitamin D intake was not associated with BMD changes. Pregnancy and breastfeeding cause a reversible bone loss. At 19 months postpartum, BMD has returned to pre-pregnancy level independently of breastfeeding length[10]

CONCLUSION

Under the light of above results, the authors conclude that BMD of the pregnant women do decrease significantly during pregnancy period. However; further studies are recommended.

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