

# The association between amount of exercises and bone mineral density changes during pregnancy



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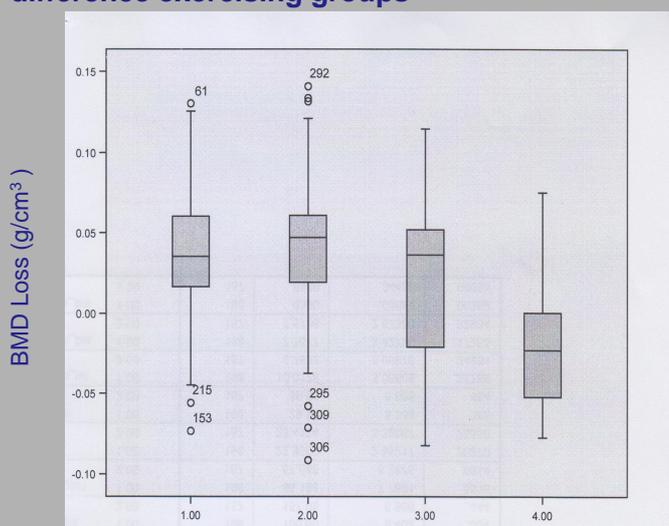


**Objectives:** To evaluate the association between bone mineral density (BMD) changes and amount of exercises during pregnancy in low risk women

**Methods:** Consecutive patients were recruited from a general obstetric clinic over a period of 9 months. Quantitative USG measurements of BMD were performed at the os calcis bilaterally between 14-20 weeks, and at 36-38 weeks. A questionnaire survey was done on all recruited women at the time of the first BMD measurement. Categorizable exercises included brisk walking, jogging, yoga or Pilates, and formal sports activities. The average amount of exercises performed in the week prior to the survey was recorded.

**Results:** A total of 390 women were recruited, and the mean BMD loss from early to late pregnancy was 0.0301 g/cm<sup>2</sup>, SD 0.043. Within this cohort, 224 (57.4%)(Group 1) reported exercising less than 1 hour per week, 94 (24%)(Group 2) between 1-2 hours, 37 (9.5%)(Group 3) between 2-3 hours, and 35 (8.9%)(Group 4) reported exercising for more than 3 hours. The mean BMD loss was 0.0368g/cm<sup>2</sup> (SD 0.036), 0.0408 (SD 0.042), 0.0147 (SD 0.049) and -0.0247 (SD 0.034) respectively for each group, indicating a trend from progressively lower BMD loss to a marginal positive gain with increasing exercise duration ( $p < 0.005$ , ANOVA)(Figure 1). Post-hoc Bonferroni test showed no significant differences in BMD loss between Group 1 and 2, but significantly lower BMD loss when Group 3 was compared to Group 1 ( $p = 0.01$ ) or Group 2 ( $p = 0.004$ ), or when Group 4 was compared to Group 1 ( $p < 0.005$ ) or Group 2 ( $p < 0.005$ ). This difference was maintained when comparing those with exercise less than to those with 2 hrs or above (Table 1).

**Figure 1.**  
Comparison of BMD loss during pregnancy in difference exercising groups



Group 1 < 1 hr / wk; Group 2 1-2 hrs/ wk;  
Group 3 2-3 hrs/ wk; Group 4 > 3 hrs / wk

**Table 1.**  
Comparison of pregnancy anthropometric characteristics of those with weekly exercise < 2 hrs or 2 hours or more

Weekly Exercise	<2 hrs; n= 224 (SD)	>= 2 hrs; n =116(SD)	p-value; Mean difference (95% CI)
Age (yrs)	31.07 (3.94)	31.25 (4.17)	0.67; - 0.17 (-0.99 to 0.63)
Height (cm)	156 (5.59)	156 (5.06)	0.82; 0.12 (-0.96 to 1.20)
Weight (kg)	56.5 (8.25)	57.5 (8.11)	0.23; -0.99 (-2.64 to 0.65)
Initial Body Mass Index	23 (3.02)	23.4 (3.31)	0.14; -0.47 (-1.11 to 0.15)
Initial Body Fat %	29.9 (5.48)	30.9 (6.09)	0.10; -0.95 (-2.1 to -0.197)
Initial BMD (g/cm <sup>3</sup> )	0.586 (0.10)	0.612 (0.10)	0.01; - 0.025 (-0.0004 to 0.0047)
Weight gain in pregnancy (kg)	10.0 (3.10)	9.64 (3.07)	0.22; 0.38 (-0.23 to 1.01)
Fat % gain in pregnancy(%)	7.83 (2.38)	7.37 (3.23)	0.11 0.455 (-0.10 to 1.01)
Pregnancy BMD loss (g/cm <sup>3</sup> )	0.0368 (0.036)	0.0211 (0.049)	0.001; 0.015 (0.007 to 0.024)

**Conclusion:** Mild to moderate exercises during early pregnancy of 2 to 3 hours per week at mid trimester and beyond were apparently protective against the physiological fall in BMD during pregnancy compared to those who were sedentary.