

## **Bone mineral density and hip structure analysis of UK Bangladeshi women compared with indigenous British women**

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*Background:* Bone mineral density (BMD) is lower in UK South Asian women compared to indigenous British (IB), possibly due to smaller skeletal size. Bangladeshi (BD) women have particularly small height, although BD daughters who have grown up in the UK have greater height than their mothers. Related ethnic and generational differences in bone geometry, and consequences for bone strength, are unknown.

*Objective:* To determine whether BMD and bone structural variables differ according to ethnicity or generation.

*Methods:* Participants were 100 women: 24 BD and 26 IB mother-daughter pairs. Mothers were pre- and post-menopausal whereas daughters, aged 18+, were all premenopausal. Proximal femur, spine and radius BMD and hip structural variables were determined using a GE Lunar dual X-ray absorptiometer. To account for skeletal size differences bone mineral apparent density (BMAD) was estimated using published equations. Ethnic and generational differences were analysed using ANOVA, adjusting for mothers' time since menopause.

*Results:* BD women had significantly lower height and weight than their IB counterparts, whilst BD mothers were smaller than their daughters. BD women had lower distal radius BMD than IB, although BMAD was similar. BD women had significantly lower hip axis length (HAL) and femoral neck width and section modulus, but strength index and buckling ratio did not differ significantly between ethnic groups. Geometric parameters did not differ according to generation.

*Discussion:* In estimating hip strength index, the negative impact of lower section modulus in BD women is offset by the positive influence of lower weight and shorter HAL. Although BD daughters were taller than their mothers, bone geometric parameters did not differ significantly.

*Conclusion:* Smaller body size in BD women could explain their maintained bone strength despite lower section modulus at the hip.

Table: Mean (SD) for anthropometric, BMD, BMAD and HSA parameters of study participants including results for ANOVA (adjusted for mothers' time since menopause)

	BD Mothers (n=24)	BD Daughters (n=24)	IB Mothers (n=26)	IB Daughters (n=26)	Main Effect Generation P value	Main Effect Ethnicity P value	Interaction Gen* Ethnicity P value
Height (cm)	152.2 (4.8)	154.3 (5.6)	163.1 (6.3)	166.3 (6.2)	.009	<.001	.558
Weight (kg)	66.5 (12.7)	58.9 (12.6)	72.5 (16.9)	75.9 (21.4)	.099	.005	.033
Radius BMD (g/cm <sup>2</sup> )	0.76 (0.10)	0.81 (0.08)	0.82 (0.10)	0.86 (0.06)	.811	.017	.744
Radius BMAD (g/cm <sup>3</sup> )	0.34 (0.05)	0.36 (0.05)	0.33 (0.06)	0.35 (0.05)	.992	.455	.711
Hip Strength Index	1.58 (0.37)	1.72 (0.36)	1.63 (0.40)	1.56 (0.47)	.941	.586	.167
Buckling Ratio	2.87 (0.78)	2.90 (1.17)	2.97 (1.04)	2.76 (1.13)	.900	.991	.596
Section Modulus (mm <sup>3</sup> )	501.5 (130.3)	535.9 (123.7)	583.9 (101.3)	659.7 (114.7)	.925	<.001	.180
Minimum Neck Width	27.7 (2.2)	27.4 (1.9)	29.9 (2.7)	28.9 (1.9)	.273	.000	.343
Hip Axis Length (HAL)	94.2 (5.6)	95.8 (5.2)	104.2 (5.8)	103.4 (5.9)	.526	<.001	.203