

Differences in volumetric bone mineral density (vBMD) at the radius and tibia in premenopausal Caucasian, South Asian, and Arab women

O. Hakim^{1,2}, A. Darling³, L. Tripkovic³, L. Wilson³, K. Hart³, J. Berry⁴ and S. Lanham-New³.

¹Clinical Nutrition, Applied Medical Sciences, King Abdul Aziz University, Jeddah, Saudi Arabia; ² Food and Nutrition Department, Gachon University, Seoul, South Korea; ³Nutritional Sciences Division, Faculty of Health and Medical Sciences, University of Surrey, Guildford UK; ⁴Vitamin D Research Group, Department of Medicine, University of Manchester, Manchester UK.

INTRODUCTION

Current studies assessing the bone health of different population sub-groups indicate Middle-Eastern females are at high risk of low bone density among premenopausal groups¹, however, limited data is available to compare these young females to other ethnic groups.

AIMS

To undertake a secondary analysis of data derived from PQCT scans to investigate differences in volumetric bone mineral density (vBMD) between Caucasian, South Asian, and Arab women.

METHODS

- Fifty-seven healthy premenopausal women (22 Caucasian, 19 South Asian and 16 Arab, age range 18-55 yrs, were studied.
- Peripheral Quantitative Computed Tomography (pQCT) measurements were taken at the radius and tibia (non-dominant) using a Stratec XCT 2000 pQCT scanner.

RESULTS

- Caucasian women were significantly taller ($p < 0.01$) than South Asian and Arab women groups, with lower weights and BMIs but non significant.

Table 1 below shows the vBMD at 4% and 66% radius; 4%, 14%, and 38% tibia in Caucasian, South Asian and Arab women

	Caucasian (n=22)	South Asians (n=19)	Arab (n=16)	
pQCT 4% radius	Mass (g/cm)	1.17[0.1] ^a	1.06[0.1]	0.97[0.1] ^b
	Total area (mm ²)	374.8[43.2] ^a	340.9[36.9] ^b	323.7[47.8] ^b
	Total density (mg/cm ³)	315.6[45.3]	312.1[45.6]	303.1[50.3]
	Trabecular area (mm ²)	168.5[19.4] ^a	153.3[16.6] ^b	145.5[21.5] ^b
	Trabecular density (mg/cm ³)	178.9[35.5]	175.3[37.2]	171.6[31.6]
	pQCT 66% radius	Mass (g/cm)	1.19[0.4]	1.0[0.2]
Total area (mm ²)		165.3[88.2]	130.7[22.5]	137.2[17.6]
Total density (mg/cm ³)		746.6[86.3]	768.8[85.9]	709.7[65.4]
Cortical area (mm ²)		83.42[29.4] ^a	72.6[16.8]	65.1[12.2] ^b
Cortical thickness (mm)		2.20[0.3] ^b	2.16[0.4] ^b	1.83[0.3] ^a
Cortical density (mg/cm ³)		1134.7[38.4]	1126.3[42.5]	1111.6[47.0]
pQCT 4% tibia	Total Density (mg/cm ³)	303.3[31.7] ^b	343.6[53.4] ^a	278.6[32.4] ^b
	Trabecular Density (mg/cm ³)	228.7[29.2]	272.4[66.9]	205.1[37.2]
pQCT 14% tibia	Total Density (mg/cm ³)	571.6[117.4]	495.5[92.1]	552.8[131.2]
	Cortical density (mg/cm ³)	1135.6[24.4] ^b	1095.0[65.5] ^a	1143.1[19.4] ^b
pQCT 38% tibia	Total Density (mg/cm ³)	903.6[76.9]	856.8[85.2]	862.5[65.9]
	Cortical Density (mg/cm ³)	1179.8[19.4]	1160.9[53.3]	1187.3[26.9]

Cells within a row with different superscript letters are significantly different ($p < 0.05$). Data expressed as the mean [SD]

- Caucasian women had significantly higher total area at 4%, trabecular area at 4% and cortical area at 66% radius than South Asian and Arab women. Caucasian women also had higher 4% bone mass than Arab women.
- Arab women had significantly lower cortical bone thickness at 66% compared to both Caucasian and South Asian groups. There were no other significance differences in vBMD observed between the ethnic groups at the two radial sites.
- South Asian had significantly higher total density at 4% tibia than Caucasian and Arab women but significantly lower cortical density at 14% tibia site than Caucasian and Arab women.
- When data were adjusted for height, values remained significant except for cortical area at 66% radius.
- Figure 1 below compares the pQCT variables between the ethnic groups.

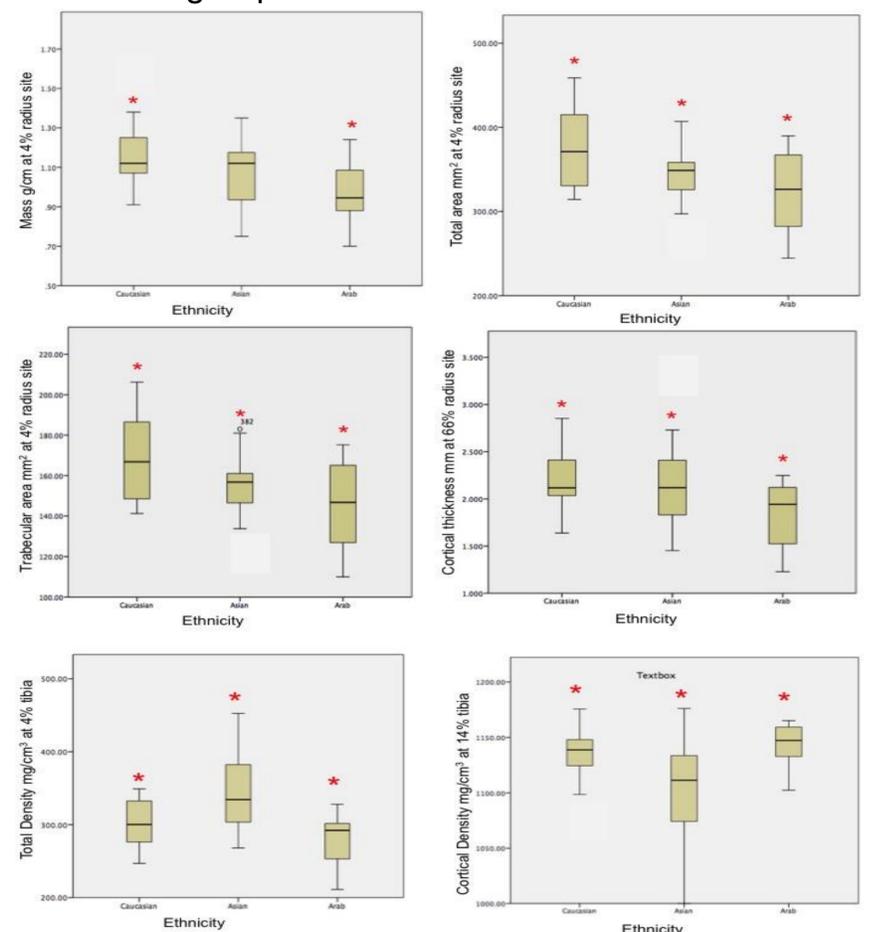


Figure 1: Boxplots of pQCT variables from the radius site for Caucasian, South Asian and Arab women

DISCUSSION

- The significant differences identified between the ethnic groups were in relation to bone area and length and warrant further investigation.
- As this is the first study to report on the comparative radial bone characteristics of premenopausal women of different ethnicities further investigation is required to understand the physiology underlying these differences and the consequences for health.

REFERENCES

1 Saadi HF, et. Al., East Mediterr Health J.2001; 730-7