Determinants of Blood Pressure in Adults with Sickle Cell Disease

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Objective: To determine in an age- and gender-matched cohort of young adults with homozygous S (HbSS) and heterozygous C (HbSC) disease, the anthropometric, haematological and renal functional determinants of blood pressure and, whether there were differences in blood pressure by genotype, controlling for these factors.
Method: Three blood pressure readings were obtained in the seated position on the right arm using a Dinamap™ with appropriate size cuffs in 51 subjects with HbSC (29 males, 22 females) and 88 subjects with HbSS (43 males, 45 females) attending the sickle cell clinic as part of the 2005 annual cohort review. Height and weight were measured and fat free mass (FFM) was determined by bioelectric impedance. Blood was taken for serum creatinine and haemoglobin measurements and a random urine sample was obtained for protein-creatinine ratio.
Results: The age of the subjects ranged from 23.1 to 31.6 years. Subjects with HbSS had lower body mass index ($p < 0.001$), fat free mass ($p < 0.001$), steady state haemoglobin ($p < 0.001$) and serum creatinine ($p < 0.001$). However, urinary protein-creatinine ratio was higher in subjects with HbSS ($p < 0.01$). In step-wise regression analyses, the significant predictors of diastolic blood pressure were age ($p < 0.05$) and steady state haemoglobin ($p < 0.05$) and there was no difference by genotype. For systolic blood pressure, the major determinants were FFM ($p < 0.001$), male gender ($p = 0.05$) and steady state haemoglobin ($p < 0.04$). Adjusting for these factors, subjects with HbSS had higher blood pressure (mean difference with 95% CI; 7.3, -0.9 to 15.4 mmHg).
Conclusions: The higher systolic blood pressure with lower haemoglobin, more wasting and higher urinary protein-creatinine ratio is suggestive of more severe renal dysfunction in subjects with HbSS.