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Salt intake and blood pressure in an urban developing community of African descent

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Abstract

Cardiovascular diseases (CVD) often share similar risk factors, and are presently a leading cause of death in South Africa and sub-Sahara Africa. Hypertension (HT) remains the commonest risk factor for strokes and heart attacks. There are several behavioural and environmental contributory factors to the development of HT. In an effort to lessen worldwide prevalence of HT, global strategies have focused on the reduction of salt/sodium (Na^+) intake as a means of lowering BP in populations. In the present study I first validated the 24-hour urine collection method by comparing a one day 24-hour urine sample with six consecutive day 24-hour urine samples and then evaluated the relationship between dietary Na^+ intake and blood pressure (BP) in 629 South Africans of African ancestry. All participants had complete conventional BP measurements, 489 had complete ambulatory BP measurements, and 597 had complete urine collection. The mean age of the participants was 43.9±18.4. The average body mass index (BMI) of the population sample was 29.2±7.9. 37.1% were hypertensive, 23.0% regularly consumed alcohol, 16.9% were tobacco smokers, and 12.2% had diabetes mellitus. The average 24-hour urinary Na^+ excretion rate was 111.2 mmol/day, and K^+ excretion rates were 28.9 mmol/day. There was no significant difference between the one day urine collection and the subsequent six day collection in terms of Na^+ and K^+ intake. The averages were 109.2 mmol/day and 113.2mmol/day respectively. The Bland-Augment curve showed a bias of -2.4 which is clinically insignificant, suggesting that the two procedures are similar. After correcting for covariates, there was no significant relationship between Na^+ intake and conventional BP {SBP (P=0.49), DBP (P=0.95)}, ambulatory BP {24-hour SBP (P=0.17), DBP (P=0.59); daytime SBP (P=0.15), DBP (P=0.68); night-time SBP (P=0.69), DBP (P=0.25)}. Even when participants were grouped according to age, there was no significant increase in BP in participants whose daily sodium

intake was above the threshold of 100mmol/day when compared to participants with normal sodium intake. However there was strong relationship between BP and Na^+/K^+. A multivariate data analysis revealed a strong inverse relationship between urinary Na^+ and age ($P \leq 0.001$). Plasma renin was related to BP ($P=0.0001$). In conclusion, the present study has demonstrated that in a randomly recruited urban community sample of African ancestry, a single 24-hour urine measurement is sufficient to estimate the levels of Na^+ intake. There is no relationship between both Na^+ and K^+ with BP. However there is a strong association between BP and the sodium-to-potassium ratio indicating that, in this population, the interaction between sodium and potassium ions plays a more important role in the regulation of BP than K^+ and Na^+ alone.