THE INFLUENCE OF TESTOSTERONE ON BLOOD PRESSURE AND RISK FACTORS FOR CARDIOVASCULAR DISEASE IN A BLACK SOUTH AFRICAN POPULATION

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INTRODUCTION

Hypertension is a health concern in the Black population of South Africa, and epidemiologic studies are needed in Africa to determine risk factors for the development of hypertension.1 Reports from the literature show beneficial and detrimental effects of testosterone on blood pressure and other risk factors for cardiovascular disease, like lipid profiles.2–6 Low androgen levels in men are associated with low levels of high-density lipoprotein (HDL) cholesterol, elevated triglycerides (TG), and high levels of low-density lipoprotein (LDL) cholesterol. Traditionally, high testosterone levels are thought to have a detrimental effect on lipid profiles.5,6 Reports also exist that show that testosterone has a beneficial effect on total and LDL cholesterol without changing HDL cholesterol and TG.6–11 In some studies, higher plasma levels of HDL cholesterol and lower TG plasma levels were reported with high testosterone levels.6–11 However, some reports show a decrease in plasma levels of HDL cholesterol with higher levels of testosterone.3,9,11–13 Therefore, results are contradictory regarding the influence of testosterone on the lipid profile. Most previous studies3–13 were experimental studies in which exogenous androgens were applied.

A lower-than-normal testosterone level in humans is associated with atherosclerotic disease, coronary disease, and myocardial infarction.6,11,14–19 In animals, high levels of testosterone are associated with atheroma and endothelial dysfunction.13,20,21

Blood pressure is also influenced when the delicate balance between vasoconstriction and vasodilatation is disturbed by testosterone. Testosterone may act as a direct vasodilator through influence on the vascular wall endocrine/paracrine factors,6,12,14,16,22 but other studies reported decreased endothelium-dependent dilatation with androgen replacement therapy.23 Elevated blood pressure may be the outcome of a disturbed lipid profile (high LDL and low HDL cholesterol levels).24

Blood pressure may also be increased by androgens via the renin-angiotensin system.25–27 Androgens may stimulate the renin-angiotensin system, which leads to increased levels of angiotensin II, which will cause vasoconstriction and concomitant increase in blood pressure.25–27 In addition, blood pressure and the risk of coronary disease may also be increased via the influence of testosterone on cortisol production.15,28

The outcome of androgen effects on the vasculature is changes in blood pressure. In a previous study, we found an increase in testosterone levels with increasing levels of westernization in the Black population, especially in the males, as well as a positive correlation between blood pressure and westernization.29–31 Therefore, the aim of this study was to determine whether the level of testosterone is increased in Black hypertensive subjects. A second aim was to determine whether differences exist in the lipid parameters or endocrine factors between high- and low-testosterone subjects that

Objectives: Traditionally high testosterone levels have been thought to have a detrimental effect on lipid profiles. Recently, reports have shown that testosterone has a beneficial effect on lipid profiles. On the other hand, androgens may increase blood pressure via the renin-angiotensin system. The aim of this study was to determine whether the level of testosterone is increased in hypertensive subjects or if other cardiovascular risk factors are altered with increased levels of testosterone in the Black population of South Africa.

Methods: For this study, 536 male and 666 female Black subjects were included. The subjects were divided into hypertensive and normotensive groups and high and low testosterone groups. Resting blood pressure was recorded with a finger arterial pressure device. Blood sampling and biochemical analyses were done by using standardized methods.

Results: The levels of testosterone in the hypertensive males and females were significantly higher compared to the normotensives. In the male high testosterone group, the level of triglyceride was significantly lower, while the high-density lipoprotein cholesterol level was significantly higher. In the female high testosterone group, systolic blood pressure, cortisol level, and renin activity were significantly higher.

Conclusion: In the males, we found beneficial effects of testosterone, which may explain the reported lower incidence of atheroma. However, the testosterone level is also higher with hypertension. The elevated levels of systolic blood pressure and renin activity that were found in the female group with high testosterone levels may be an indication of the role of the renin-angiotensin system in this regard. (Ethn Dis. 2006;16:693–698)

Key Words: Blood Pressure, Lipid Profile, Renin-Angiotensin System, Testosterone

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