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ORIGINAL ARTICLE

Associations of serum adiponectin with markers of cardio-metabolic disease risk in Indigenous Australian adults with good health, diabetes and chronic kidney disease

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Summary The higher serum adiponectin concentrations observed in females are often attributed to differences in adiposity or sex hormones. There is little data describing adiponectin in Indigenous Australians, and no studies examining its association with cardio-metabolic disease risk markers and chronic kidney disease (CKD).
Aim: To describe the relationship of serum adiponectin with cardio-metabolic disease risk markers and kidney function in a community-based sample of Indigenous Australian adults, with particular reference to sex-specific differences.
Methods: A cross-sectional analysis of a community-based volunteer sample of 548 Indigenous Australian adults (62% female), stratified into five cardio-metabolic risk groups ranging from good health (strata-1) to high cardio-metabolic risk and low

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measured glomerular filtration rate (mGFR, <60 ml/min/1.73 m^2) (strata-5). We examined serum adiponectin concentrations with cardio-metabolic risk markers, albuminuria and mGFR.

Results: Indigenous Australian females had a lower than expected adiponectin concentration (3.5 μg/ml), which was higher than males in strata 1—4 (as in other populations), but not in strata-5 (mGFR < 60, $p = 0.19$), and higher leptin: adiponectin ratio than other populations (7.8 ng/μg — strata-1, healthy females; 12.2 ng/μg — strata-3, females with diabetes and mGFR ≥ 90). Female-gender, HDL-cholesterol (positive), mGFR and waist: hip ratio (WHR) (inverse) were independently associated with log-adiponectin when mGFR ≥ 60; when mGFR < 60, female-gender was associated with 0.27 units lower log-adiponectin.

Conclusion: Female-gender was not associated with higher adiponectin concentrations in Indigenous Australians with mGFR < 60 ml/min/1.73 m^2. High WHR was frequent in both genders, and inversely associated with adiponectin. Longitudinal studies are needed to examine relationships of serum adiponectin, obesity and cardiovascular disease events in Indigenous Australians.

Introduction

Traditional biomarkers of cardio-metabolic disease (dyslipidaemia, elevated blood pressure and abnormal glucose regulation) have underscored algorithms designed to improve the prediction of cardiovascular disease development in an individual [1]. Overweight, type 2 diabetes and chronic kidney disease (CKD) overlap in the Indigenous Australian population [2,3], develop at a younger age, and are associated with a lower life expectancy [4] than in other Australians. The high burden of premature cardiovascular disease in some populations, including Indigenous Australian females [5], has been poorly identified by prediction algorithms developed in populations of European origin [6]. Unmeasured factors beyond traditional cardio-metabolic disease risk markers may explain this disproportionate burden of risk. Recommendations proposed to address this include: developing ''indigenous'' prediction models which include the unique characteristics of specific high risk groups [6]; evaluating other biomarkers of cardio-metabolic disease risk [7]; and identifying disease risk at earlier stages [8]. Additional biomarkers of cardio-metabolic disease risk which have been recognised more recently include: psychosocial stress, low physical activity, poor nutrition [9], inflammation [10], chronic kidney disease (CKD) manifest as low glomerular filtration rate (GFR) (less than 60 ml/min/1.73 m^2) [11] and/or albuminuria [12], abdominal obesity [9], and adipocyte derived proteins, including adiponectin.

It is also recognised that cut-offs for overweight and obesity which have been validated in European populations may not accurately apply in non-European populations [13,14]. While the waist to hip ratio (WHR) was confirmed as a stronger cardiovascular disease risk marker than body mass index (BMI) across both European and non-European populations [9], the risk cut-offs vary across populations of differing body build. Several studies highlight differences in fat mass and fat distribution for body size in Indigenous Australians [15], and a stronger association between cardio-metabolic conditions and central obesity [16,17]. The relationship between overweight, body fat distribution and the role of adiponectin in the establishment and progression of cardio-metabolic diseases among Indigenous Australian populations has not been previously described.

Adiponectin is secreted from mature subcutaneous adipocytes [18,19] and has anti-inflammatory, insulin-sensitising and anti-atherogenic properties [20]. High serum concentrations are observed in females [21], and low concentrations are associated with visceral adiposity [22]. Leptin is predominantly secreted from mature subcutaneous adipocytes and several non-adipose body tissues and has multiple functions including reproductive, immune and appetite suppressant effects [18]. In the setting

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