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Microalbuminuria(MAU) And Its Relationship With Anthropometric Variables In Type 2 Diabetic And Non Diabetic Females Of Dakshina Kannada District In Indian Population

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Research Article

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ABSTRACT

We aimed at studying MAU and its relationship with anthropometric variables in type 2 diabetic and non diabetic females of Dakishina Kannada district in Indian population. 205 participants without diabetes and 226 participants with type 2 diabetes of the study group were recruited. Out of which 73 females were diabetic and 111 were healthy subjects and used as control. These participants were free from any pre existing complications. Their anthropometric variables, blood pressure and MAU contents were assessed accordingly. When the anthropometric variables and diastolic blood pressure with MAU in two groups were compared, we found a highly significant (p<0.001) relationship. The mean value of MAU (30.8±26.9) in type 2 diabetics was higher when compared with Non diabetic females(17.3±12.7).Diastolic blood pressure showed statistical significance in type 2 diabetics when compared with non diabetic females(p<0.001). Anthropometric variables showed a high significance in type 2 diabetic and non diabetic females when compared with MAU. Diastolic blood pressure was significantly high in type 2 diabetic when compared with non diabetic females. Thus it reveals that anthropometric variables can be used as a target for primary adjourner of renal and cardio vascular disease.

KEYWORDS: MAU, anthropometric variable, type 2 diabetes, diastolic blood pressure.

Introduction

The 'Asian Indian Phenotype' is complied with increased waist circumference and increased visceral fat despite of low body mass index (BMI). This has been associated with metabolic abnormalities inclusive of greater degree of insulin resistance, high prevalence rates of diabetes and cardiovascular disease. Microalbuminuria, also known as urinary albumin excretion (UAE) is a result of generalized endothelial dysfunction and is an independent predictor of cardiovascular morbidity and mortality in persons with or without diabetes mellitus. UAE is highly prevalent in hypertension or other various metabolic factors, including visceral obesity, insulin resistance, and dyslipidemia. Thus, UAE reflects a clustering of these metabolic risks[1-3] .

Several studies have supported the role of anthropometric measures with microalbuminuria. The important role of central or abdominal *versus peripheral* fat distribution on urinary albumin excretion has been highlighted by various authors. Results of Scaglione *et al*[4] report that both in normotensive and hypertensive (non-diabetic) individuals, only those with centrally located obesity but not those with peripheral obesity had elevated urinary albumin excretion rates. Waist circumference which measures central obesity reflects metabolically active visceral fat [5,6].

Research suggests that abdominal obesity, as measured by regional anthropometry, may be independently associated with microalbuminuria. Previous studies in patients with type 1 diabetes describe the correlations among central obesity, insulin resistance and microalbuminuria, an early sign of kidney disease and an important risk factor for overt nephropathy[7-11].

Such findings suggest a possible causal role for central obesity and insulin resistance in the pathogenesis of renal complication. In view of

these considerations, we decided to study the relationship of MAU with anthropometric variables in type 2 diabetic and non diabetic female population of Dakshina Kannada district.

Materials and Methods

A total of 205 patients (73 females) aged 30-60 years who have been diagnosed as diabetic for at least one year and 226 healthy subjects (111 were females) attending the outpatient clinic at Department of Medicine were included in the study.

The inclusion criteria:

Patients who were diabetic for at least one year and who were on oral hypoglycemic drugs and patients with no pre-existing CVD or any other complication of type 2 diabetes mellitus including nephropathy, retinopathy, chemical or physical trauma, and immunological disorder or co-existing infection.

Anthropometric assessment includes record of weight, height, waist circumference (WC) and hip circumference (HC). WC and HC were measured in duplicate with a flexible but elastic measuring tape while the subject was standing relaxed. Waist measurement was taken at the level of the natural waist (the narrowest part of the torso). HC was measured at the maximum circumference of the buttocks posteriorly and the symphysis pubis anteriorly in horizontal plane.

BMI (Basal Metabolic Index) was calculated by dividing the body weight (in kilograms) by square of height (in meters).The electronic scale used to measure weight was reset before every weighing procedure**.** Blood pressure (SBP and DBP) was measured with an interval of 5 minutes gap when the subject was in recumbent posture. Microalbuminuria was defined as a urinary albumin >18 micrograms/ml. Microalbuminuria was checked using immuno turbidometry.

Statistical analysis:

All analyses were performed with the Statistical Package for the Social Sciences (SPSS) version 15.0. Student's unpaired't' test was used to find the relationship between the diabetic and non-diabetic groups. Pearson's correlation was used to find association between MAU with anthropometric variables and BP. P value<0.05 was considered to be significant.

Results

A total of 205 diabetic patients were recruited out of which 73 were females, and 226 healthy subjects were included in the study of which 111 were females.

Table 1 represents the characteristics of female subjects expressed as mean ±SD. Mean of all the anthropometric variables and DBP are higher in type 2 diabetics when compared to non diabetic females except SBP.

When unpaired 't' test was applied within the group to view the significance with respect to MAU, anthropometric parameters like weight, height, waist circumference, hip circumference and also waist hip ratio were significant ($p<0.0001$) in both diabetic and non- diabetic groups. In type 2 diabetics only BMI was not significant when compared with MAU ($p<0.7584$). Diastolic blood pressure and systolic blood pressure have shown significance ($p<0.0001$) in both groups when compared with MAU.Correlation of MAU with anthropometric variables and blood pressure in diabetic females is shown in **table 2**. Pearson's correlation of MAU with waist circumference, hip circumference and BMI showed a significant positive correlation among the anthropometric variables. Only systolic blood pressure showed a significant positive correlation with MAU in the diabetic female population.

Table 1: Characteristics of female subjects with and without diabetes

Characteristics	Type 2 diabetes (n=73)	Non-diabetes (n=111)	P value
Weight(kg)	76±10	69.2±8.16	<0.0001
Waist circumference(cm)	96±4.3	90.5±5.24	<0.0001
Hip circumference (cm)	98±4.8	92.8±6.59	<0.0001
Waist/Hip ratio	1±0	0.98±.04	<0.0001
BMI	28±5	27.1±3.38	<0.0001
SBP	123±8.5	125±9.69	0.29^{NS}
DBP	100±6.5	91.4±8.27	<0.0001
MAU	30.8±26.9	17.3±12.7	0.0002

Student's unpaired't' test used to find the significance between the groups
Values expressed as mean ± SD
NS= Not significant

Table 2: Correlation of MAU with anthropometric variables and blood pressure in diabetic Females.

Characteristics(n=73)	Mean ± SD	Correlation coefficient(r)	P value
Weight(kg)	76±10	0.08	0.05
Waist circumference(cm)	96±4.3	0.247	0.03*
Hip circumference(cm)	98±4.8	0.300	0.009*
Waist/Hip ratio	1±0	-0.065	0.58
BMI	28±5	0.016	0.03*
SBP	123±8.5	0.246	0.02*
DBP	100±6.5	0.273	0.89

Pearson's correlation p value <0.05 is considered significant

*Significant

Table 3 shows correlation of MAU with anthropometric variable and blood pressure in non-diabetic female population. Pearson's correlation analysis did not show any significance with waist circumference, hip circumference and waist/hip ratio in this non-diabetic female population.

Table 3: Correlation of MAU with anthropometric variables and blood pressure in non-diabetic females

Characteristics(n=111)	Mean ± SD	Correlation Coefficient(r)	P Value
Weight(kg)	69.2±8.16	0.183	0.05*
Waist circumference(cm)	90.5±5.24	0.109	0.25
Hip circumference(cm)	92.8±6.59	0.091	0.34
Waist/hip ratio	0.98±.04	0.041	0.67
BMI	27.1±3.38	0.263	0.005*
SBP	125±9.69	0.280	0.003*
DBP	91.4±8.27	0.280	0.003*

Pearson's correlation p value <0.05 is considered significant

* Significant

Discussion

Asian Indians have higher upper body adiposity and higher visceral fat for a given BMI when compared with the Western population. Our data suggest a highly significant relationship between anthropometric variables and MAU in our female population. The changes in the anthropometric variable seems to be strongly associated with MAU in females which might be due to potential sex-based discrepancy in fat distribution patterns and renal outcomes concerned to differential steroid hormone levels[12-14] .

Waist circumference is a measure of central obesity that reflects metabolically active visceral fat[15,16]. As per our results central obesity has been associated with microalbuminuria among individuals with diabetes which is true among other studies also[17-20] .This suggests that the waist circumference can act as a link with MAU. Other studies suggest that signifying the measurement of WC may improve the identification of non-diabetic individuals at risk of developing microalbuminuria[21].

The specific pathophysiological link between obesity and MAU can only be hypothesized. Abdominal obesity symbolizes a key component of the metabolic syndrome. The fundamental component that associates abdominal obesity to other features of the metabolic syndrome and end-organ damage are apparently due to elevated insulin levels, peripheral tissue resistance to the insulin-sensitizing action of leptin, and increased macrophage infiltration in fat tissues with concomitant release of proinflammatory cytokines[22,23]. These metabolic changes favor intracellular lipid deposition in adipose tissue, hepatocytes, skeletal and cardiac myocytes as well as in endothelial cells[24,25]. These intracellular fat depositions are associated with production of inflammatory cytokines and ischemia (pro-

thrombotic state), which is continually linked with abdominal obesity. This further decreases the functional integrity of the renal endothelial wall and lead to MAU.

The data presented from a large international cohort of hypertensive patients confirms the presence of an increased cardiovascular risk profile in patients with overweight and specifically abdominal obesity[26]. Furthermore, the study also had shown a linear relationship of different measures of overweight/obesity with MAU, which is an established marker of cardiovascular disease and renal damage. However, only abdominal obesity, as measured by WC was independently associated with a higher prevalence of MAU which supports the view that visceral fat is more related to MAU. Thus these data underline the importance of weight loss-efforts in the risk management of cardiovascular disease and also the prevention of renal damage. Hence it is important to detect and treat the incipient diabetic nephropathy using anthropometric measures.

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