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General Medicine

ASSOCIATION BETWEEN RENAL FUNCTION AND CENTRAL OBESITY IN METABOLIC SYNDROME PATIENTS

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ABSTRACT **Introduction** Central obesity is an excess accumulation of visceral adipose tissue in the abdominal area. This adiposopathy leads to insulin resistance resulting in development of metabolic syndrome. It is also responsible for obesity related glomerulopathy, which can progress to chronic kidney disease (CKD) later. **Aim** To determine microalbuminuria in adults having various waist to hip ratio as a measure of central obesity **Materials and methods** It is a Cross-sectional observational study done on 220 subjects after applying the inclusion and exclusion criteria at Swami Dayanand Hospital. 110 subjects were included in no metabolic syndrome (control) group, whereas other 110 subjects were included in metabolic syndrome (central-obesity) group. **Results** There is a significant positive correlation between waist to hip ratio and micoalbuminuria. **Conclusion** Microalbuminuria levels increases with increasing grades of central obesity, hence prone to develop CKD later in life.

KEYWORDS : Central obesity, Metabolic syndrome, Obesity related glomerulopathy, Microalbuminuria

INTRODUCTION

Central obesity is an excess accumulation of fat in the abdominal area, particularly due to excess visceral fat[1]. It is defined as waist to hip ratio (WHR) of >0.90 for males and >0.85 for females or waist circumference (WC) of >94 cm for males and >80 cm for females[2]. WHR is a better tool for predicting metabolic syndrome than WC.

Metabolic syndrome is a multifactorial disease that arises from insulin resistance accompanying abnormal adipose deposition and function. Any 3 out of following 5 criteria are required for diagnosing metabolic syndrome[3]: Fasting triglycerides ≥150 mg/dl; fasting HDL cholesterol ≤40 mg/dl (males) & ≤50 mg/dl (females); elevated blood pressure SBP ≥130 mm of Hg or DBP ≥85 mm of Hg; waist to hip ratio >0.90 (males) & >0.85 (females); and fasting glucose ≥100 mg/dl.

Obesity related glomerulopathy (ORG) is mainly caused by glomerular hyperfilteration, dysregulation of hormone and cytokine secretion in adipose tissue, and pathologically characterized by glomerular hypertrophy, with or without focal and segmental glomerulosclerosis. Patients with ORG presents with proteinuria concomitant with metabolic disorders such as dyslipidemia and hypertension[4].

AIM

To determine microalbuminuria in healthy adults having various waist to hip ratio as a measure of central obesity.

MATERIALS AND METHODS

Study design- Cross-sectional observational study

Study setting- The study was carried out in the Department of General Medicine, Swami Dayanand Hospital, where the outpatients were recruited.

Study duration- September 2022 to December 2023

Sample size- 220, of which 110 in no metabolic syndrome group (control) & 110 in metabolic syndrome group (central obesity)

Inclusion criteria

- Age : 40 - 60 years
- Sex : Male and female

Exclusion criteria

- Diabetes
- Hypertension
- History of any primary or secondary renal disease
- History of thyroid disorders
- Patient on steroids
- History of prolonged (>1 month) intake of any nephrotoxic drugs (e.g. NSAIDs)
- Patients with CHF
- Patients with chronic liver disease
- History of any medical illness within one month prior to the enrolment in the study
- Current smoker or history of smoking / tobacco consumption during the last three months.

220 Subjects were recruited into the study after satisfying the inclusion and exclusion criteria.

Statistical analysis

The collected data was entered in Microsoft Excel and statistically evaluated using SPSS-25 version

RESULTS

Table 1: Comparison between control and central obesity group

Parameter	Control	Central Obesity	T test or Chi square value	P value
Socio-demographic variable				
Age	50.40±7.14	49.13±7.01	1.33	0.18
Gender M:F	1.9:1 (M=73, F=37)	1.3:1 (M=63, F=47)	1.92	0.16
Anthropometric variable				
Waist circumference	78.25±8.64	91.58±8.71	11.38	<0.001
Hip circumference	93.95±10.33	99.26±9.84	3.90	<0.001
Waist to hip ratio	0.83±0.04	0.92±0.04	14.87	<0.001
Blood pressure				
SBP	122.20±7.01	129.31±4.57	8.90	<0.001
DBP	80.72±6.01	83.09±5.17	3.13	<0.001
Lipid profile				
TC	162.45±37.19	179.95±42.46	3.25	0.001
LDL-C	88.45±32.95	95.98±31.81	1.72	0.08
HDL-C	42.29±6.25	43.75±7.31	1.58	0.11
VLDL-C	29.68±9.65	38.15±17.82	4.37	<0.001
TG	148.35±48.28	186.85±85.20	4.12	<0.001
Urine albumin level				
Urine albumin	18.22±6.47	46.92±31.76	-	<0.001

- The commonest age group in the study cohort was 40 - 50 years (58% overall; 64% cases and 52% controls), followed by 51 - 60 years (42% overall; 36% cases and 48% controls).
- There were 62% (n=136) males and 38% (n=84) females overall in the study population.
- Mean WHR in control group was 0.83±0.04, whereas in the cases group was 0.92±0.04, and the difference was statistically significant.

- Mean SBP and DBP in the cases group was significantly higher than the control group.
- Mean total cholesterol (TC), VLDL cholesterol (VLDL-C) and triglyceride (TG) was significantly higher in cases group as compared to that of control group.
- Mean urine albumin levels in the cases group was 46.92±31.76 mg/24hrs, which is significantly higher than in the control group where mean urine albumin levels were 18.22±6.47 mg/24hrs.

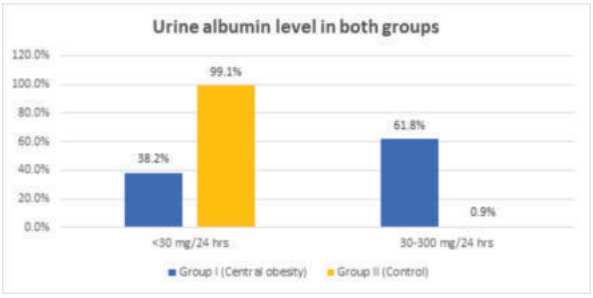
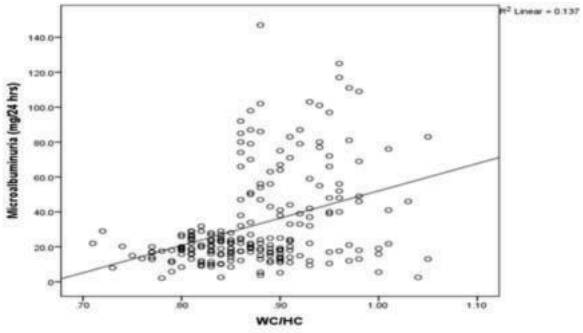


Figure 1: Subjects with & without microalbuminuria in both study groups

Microalbuminuria is defined as an abnormal elevated excretion of albumin of 30-300 mg/24hrs or 20-200 µg/ min in urine but without clinical proteinuria. It is an early marker of renal vascular damage. In the present study, 61.8% (n=68) of cases group had microalbuminuria compared to that of control group, where only 0.9% (n=1) had microalbuminuria.



Graph 1: Scatterplot showing correlation between Waist to hip ratio and microalbuminuria

The R^2 is 0.137 which explains 13.7% variation in microalbuminuria by WHR.There is a weakly positive correlation between the incidence of microalbuminuria and WHR (r = .338), but is *highly significant* (p =. 000).

DISCUSSION

In the present study, the mean WHR in central obesity subjects was more compared to that of the controls and the difference was statistically significant. Also, SBP of 85% centrally obese subjects were higher than the mean SBP of 125.75±6.89 mm of Hg, as compared to that 42% of the controls .This result is comparable to the results obtained by *Doll et al* which revealed that SBP and DBP were found to increase linearly with WHR and waist circumference (WC). A gain of 4.5cm of WC or 3.4% in WHR corresponded to an elevation of 1 mm of Hg in SBP[5]. Also,*Kanai et al* concluded that change in mean blood pressure after weight reduction was correlated with changes in visceral fat area[6].

The mean TC, VLDL-C, TG, LDL-C and HDL-C in centrally obese subjects were higher than that of the controls and the difference in the proportions were statistically significant for TC, VLDL-C and TG. *Manjareeka et al* reported a significant correlation between WHR and TG (r=0.31)[7]. *Saghafi-Asl et al* concluded that WHR showed the strongest correlation with TC (r=0.37; P=0.004) and LDL-C (r=0.33; P=0.011)[8]. *Magkos et al* observed that centrally obese as compared to lean individuals had increased plasma concentrations of VLDL (by≈50%), LDL (by≈50%) and to some extent, HDL (by≈10%) particles[9].

Mean urine albumin levels were higher in centrally obese subjects than that in the controls and the difference was statistically significant.The results are comparable to the study conducted by *Solerte et al*, which concluded that there was increased urinary excretion rate of albumin (P < 0.001) in subjects with central obesity than the controls and the subjects with peripheral fat distribution[10]. *Hoebel et al* in their SABPA study revealed a positive association between high WHR and development of microalbuminuria in both sexes[11]. *Hemayati et al* found that prevalence of microalbuminuria was significantly higher in people with higher WHR (P=0.02)[12]. *Chen et al* in their cross-sectional study concluded that there was significantly positive correlation between prevalence of microalbuminuria and metabolic syndrome (P <0.001), which reached upto 20.3%[13]. *Liu et al* in their China Stroke Primary Prevention Trial (CSPPT) reported that increased waist circumference was associated with a higher risk of new-onset proteinuria[14]. *Hyunsuk et al* in their study conducted at Seoul National University Hospital found that visceral adipose tissue (VAT) cross-sectional area is associated with the prevalence of microalbuminuria as well as insulin-resistance[15].

CONCLUSION

The present study concludes that microalbuminuria levels increases with increasing grades of central obesity. Hence, centrally obese individuals are prone to develop Chronic kidney disease later in life. Education and awareness of the risks of central obesity and healthy lifestyle, including proper nutrition and exercise, can dramatically help in preventing it.

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