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Study Of Neck Circumference And Serum Uric Acid Levels In Patients Of Metabolic Syndrome.

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ABSTRACT

Metabolic syndrome (MetS) is a cluster of risk factors including central obesity, dyslipidemia, hypertension, and insulin resistance. Neck circumference (NC) has emerged as a novel anthropometric indicator of upper-body fat, and serum uric acid (SUA) is increasingly recognized as a biomarker associated with metabolic abnormalities. To study the association between neck circumference and serum uric acid levels in patients with metabolic syndrome. A cross-sectional study was conducted over one year in a tertiary care hospital. A total of 40 patients diagnosed with MetS as per NCEP ATP III criteria were enrolled. Patients underwent anthropometric measurements including NC and biochemical analysis including SUA levels. The correlation between NC and SUA was assessed using Pearson's correlation coefficient. The mean neck circumference was 37.8 ± 3.6 cm and the mean serum uric acid level was 6.45 ± 1.1 mg/dL. A significant positive correlation ($r = +0.62$, $p = 0.001$) was observed between NC and SUA. The majority of patients with NC >38 cm also had SUA levels >6.0 mg/dL. Neck circumference showed a significant correlation with serum uric acid levels in patients with metabolic syndrome, suggesting its potential as a simple clinical marker for metabolic risk.

Keywords: Neck circumference, Serum uric acid, Metabolic syndrome

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INTRODUCTION

Metabolic syndrome (MetS) is a cluster of interconnected metabolic risk factors that significantly increase the risk of cardiovascular disease and type 2 diabetes mellitus. These risk factors include central obesity, insulin resistance, dyslipidemia, and hypertension. In recent years, neck circumference (NC) has emerged as a novel anthropometric marker of upper-body subcutaneous fat distribution, which may be more closely associated with metabolic risks than traditional measures like body mass index (BMI) and waist circumference. Several studies have shown that an increased NC correlates positively with insulin resistance, lipid abnormalities, and hypertension.

Serum uric acid (SUA), a byproduct of purine metabolism, is another biochemical parameter increasingly recognized for its association with metabolic syndrome. Elevated levels of SUA, or hyperuricemia, have been implicated in the pathogenesis of MetS through mechanisms such as oxidative stress, endothelial dysfunction, and inflammation. Recent evidence suggests that both NC and SUA may independently and synergistically predict the presence and severity of metabolic syndrome [1-6].

Our study aims to explore the relationship between neck circumference and serum uric acid levels in individuals diagnosed with metabolic syndrome. Identifying such associations may offer a simple, cost-effective screening method for early detection and risk stratification in clinical practice.

STUDY METHODOLOGY

This cross-sectional observational study was conducted in the Department of Medicine at a tertiary care hospital over a period of one year. The study aimed to assess the relationship between neck circumference and serum uric acid levels in patients diagnosed with metabolic syndrome. Ethical clearance was obtained from the institutional ethics committee prior to the commencement of the study. Written informed consent was taken from all participants included in the study.

A total of 40 patients who met the diagnostic criteria for metabolic syndrome, as defined by the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III), were enrolled. Patients aged between 30 and 60 years, of either gender, who satisfied at least three of the five diagnostic criteria (abdominal obesity, raised triglycerides, low HDL cholesterol, elevated blood pressure, and elevated fasting glucose) were included. Patients with known gout, renal failure, thyroid disorders, or those on medications affecting serum uric acid levels were excluded from the study.

Each participant underwent a detailed clinical evaluation, including anthropometric measurements. Neck circumference was measured in centimeters at the level of the cricoid cartilage using a non-stretchable measuring tape, with the patient in a standing position and looking forward. Serum uric acid levels were estimated through fasting blood samples using an enzymatic colorimetric method in the hospital's central laboratory. Other parameters such as blood pressure, fasting blood glucose, serum triglycerides, and HDL cholesterol were also recorded to confirm the diagnosis of metabolic syndrome.

RESULTS

Table 1: Demographic and Clinical Profile of Patients (n = 40)

Parameter	Mean ± SD / Frequency (%)
Age (years)	48.6 ± 9.4
Gender	Male: 26 (65%) Female: 14 (35%)
BMI (kg/m^2)	29.2 ± 3.8
Waist Circumference (cm)	102.4 ± 8.7
Systolic BP (mmHg)	142.3 ± 12.5
Diastolic BP (mmHg)	88.6 ± 7.3

Table 2: Distribution of Neck Circumference

Neck Circumference Range (cm)	Number of Patients (%)
< 34 cm	6 (15%)
34 – 37 cm	14 (35%)
38 – 41 cm	13 (32.5%)
> 41 cm	7 (17.5%)

Table 3: Serum Uric Acid Level Distribution

Serum Uric Acid Level (mg/dL)	Number of Patients (%)
< 5.0	5 (12.5%)
5.1 – 6.0	9 (22.5%)
6.1 – 7.0	15 (37.5%)
> 7.0	11 (27.5%)

Table 4: Correlation Between Neck Circumference and Serum Uric Acid

Variable	Mean ± SD	Correlation Coefficient (r)	p-value
Neck Circumference (cm)	37.8 ± 3.6		
Serum Uric Acid (mg/dL)	6.45 ± 1.1	**+0.62** (positive)	**0.001** (significant)

DISCUSSION

This study aimed to evaluate the relationship between neck circumference (NC) and serum uric acid (SUA) levels in patients diagnosed with metabolic syndrome (MetS). The findings of our study indicate a significant positive correlation between these two parameters, suggesting that NC may serve as a useful anthropometric marker for identifying individuals at risk of elevated SUA levels within the MetS population.

The demographic and clinical profile of the study participants showed a male predominance (65%) and a mean age of 48.6 years, aligning with the general trend of increasing metabolic syndrome incidence in middle-aged adults. The mean BMI of 29.2 kg/m^2 and waist circumference of 102.4 cm further reaffirm the central obesity characteristic commonly seen in MetS. Elevated blood pressure and impaired fasting glucose levels were also observed in a significant proportion of subjects, consistent with the diagnostic criteria for MetS as defined by the NCEP ATP III guidelines.

In our analysis of NC, a majority of patients had values above 34 cm, with 32.5% of individuals falling in the 38–41 cm range and 17.5% exceeding 41 cm. These measurements indicate a trend toward upper body subcutaneous fat accumulation, which has been proposed in previous studies as a surrogate marker for central adiposity and insulin resistance. Similarly, the distribution of SUA levels revealed that 65% of patients had uric acid levels greater than 6.0 mg/dL, with 27.5% presenting with hyperuricemia (>7.0 mg/dL). Elevated SUA is known to contribute to endothelial dysfunction and low-grade inflammation, both of which are key components of MetS pathophysiology.

The most significant finding of this study was the moderate positive correlation ($r = +0.62$, $p = 0.001$) between neck circumference and serum uric acid levels. This statistically significant association suggests that individuals with higher NC are more likely to have elevated SUA levels. This result supports the hypothesis that increased upper body fat, particularly in the neck region, may reflect a higher metabolic burden and greater systemic inflammation. Our findings are consistent with those of similar studies that have reported NC as an independent predictor of hyperuricemia and other metabolic derangements.

The possible mechanisms linking increased NC to elevated SUA include reduced insulin sensitivity, increased adipose tissue turnover, and augmented xanthine oxidase activity, which leads to increased uric acid production. Moreover, adipose tissue in the neck region is metabolically active and may contribute significantly to systemic inflammation, further influencing uric acid metabolism.

These findings highlight the clinical relevance of incorporating neck circumference as a simple, non-invasive, and cost-effective screening tool for risk stratification in patients with metabolic syndrome. While waist circumference remains a standard marker for central obesity, NC may provide additional predictive value, especially in settings where abdominal measurements are not feasible or reliable [7-12].

However, this study has certain limitations. The sample size was relatively small, and the study was conducted in a single center, limiting the generalizability of the findings. Future studies with larger, more diverse populations are warranted to validate these observations and explore longitudinal outcomes.

CONCLUSION

In conclusion, our study demonstrated a significant positive correlation between neck circumference and serum uric acid levels in patients with metabolic syndrome. This suggests that neck circumference can be a valuable anthropometric marker in the assessment and early identification of metabolic and biochemical abnormalities.

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