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ORIGINAL ARTICLE

Metabolic syndrome in carpal tunnel syndrome patients.

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ABSTRACT… Objective: To determine frequency of metabolic syndrome in patients with carpel tunnel syndrome (CTS). **Study Design:** Cross sectional study. **Setting:** Department of Neurology, Jinnah Postgraduate Medical Centre (JPMC), Karachi. **Period:** December 2024 to March 2025. **Methods:** A total of 54 diagnosed patients of CTS with duration ≤ 3 months having age between 18-70 years of either gender were included. The diagnostic criteria for CTS was patient with complaint of numbness, tingling sensation, weakness or pain of hand (on history and clinical evaluation) and was confirmed on electrodiagnostic test CTS showed demyelinating lesion of median nerve with conduction block at wrist. Metabolic syndrome was diagnosed as by existence of >3 of the below mentioned criteria; 1) Waist circumference (WC) > 102 cm for men & > 88 cm for women, 2) Blood Pressure (BP) > 130/85 mmHg 3) Fasting blood glucose (FBG) > 100 mg/dl 4) Fasting triglycerides > 150 mg/dl 5) Fasting HDL cholesterol < 40 mg/dl for men & < 50 mg/dl for women. SPSS version-26 was utilized for data analysis. **Results:** The mean age of individuals was 47.3 + 16.03 years, mean BMI was 27.69 + 5.06 kg/m^2 & mean duration of symptoms was 2.296 + 1.5 months. Male/Female ratio was same 50:50. 30 (54.5%) of the CTS patients had metabolic syndrome. **Conclusion:** Although small proportion of individuals with CTS was included, outcomes of this research revealed that metabolic syndrome seems to be highly prevalent in individuals with Carpel tunnel Syndrome.

Key words: Carpel Tunnel Syndrome, Diabetes, Metabolic Syndrome, Metabolic Disorders.

INTRODUCTION

Elevated levels of glucose in blood are hallmark of a set of metabolic illnesses known as diabetes mellitus. Diabetes mellitus is a significant global public health issue that is leading to increased mortality, lower quality of life, and greater medical care expenses.[1] Metabolic syndrome is characterized by hyperglycemia, hypertension, dyslipidemia, and abdominal obesity. Prior epidemiological research has demonstrated that musculoskeletal, hormonal, and constitutional risk factors are linked to CTS, and more recent investigations have suggested that MS is a significant contributor to CTS.[2-3] It is a group of symptoms & indicators brought on by local entrapment of median nerve inside the wrist's carpal tunnel, which impairs function and causes local ischemia of the nerve inside the tunnel.[4]

As contemporary living has become more prevalent, so too has the prevalence of CTS. The causes of CTS are multifaceted and include both personal and professional facets.[5] Elderly population, sex, DM, hypothyroidism, obesity, smoking, & professional characteristics are major risk factors.[5,6] Between the ages of 40 and 74, CTS is commonly reported, with typical frequency of 2.7 to 5.8% in population.[7]

The commonness of CTS is 2% in population & 14% in those with diabetes.[8] There has been a higher prevalence of CTS even among pre-diabetics, whose exposure to hyperglycemia has often been less severe & persistent. CTS is more likely to be female.[9,10]

The objective of this research was to estimate commonness of metabolic syndrome in patients with CTS. Early screening of metabolic syndrome in carpel tunnel syndrome would be helpful in prevention and management of metabolic syndrome that would decrease the development

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of chronic diseases including type 2 DM, CVDs. Results of this study would be a valuable contribution to decrease the risk of increasing morbidity, mortality and life-long disability ultimate the health care expenditure.

METHODS

This cross sectional study was conducted from December 2024 to March 2025 in department of Neurology, Jinnah Postgraduate Medical Centre (JPMC), Karachi. A written informed consent was taken. The study protocol was approved by the Institutional Review Board Committee of Jinnah Postgraduate Medical Centre (No.F.2-81/2024-GENL/155/JPMC). A total of 54 diagnosed patients of carpal tunnel syndrome with duration ≤ 3 months having age between 18-70 years of either gender were included via non-probability sampling technique.

Patient with connective tissue disorders, hypothyroidism, hormone replacement therapy, cervical radiculopathy, polyneuropathy or thoracic outlet syndrome, pregnant women were expelled. Patient of rheumatoid arthritis, osteoarthritis or corticosteroid use, with previous wrist fracture & with history of trauma were also excluded. OPENEPI calculator was used to calculate sample size by taking occurrence of metabolic syndrome in individuals with carpal tunnel i.e., P = 72%[11], margin of error d = 12%, with the confidence interval = 95%, then calculated sample size n = 54. The diagnostic criteria for Carpal Tunnel Syndrome (CTS) was patient with complaint of numbness, tingling sensation, weakness or pain of hand (on history and clinical evaluation) and was confirmed on electrodiagnostic test CTS showed demyelinating lesion of median nerve with conduction block at wrist. Demographics data of each patient in terms of age, sex, height, weight, BMI, duration of disease, residential status, education & occupation was noted & Metabolic syndrome was defined as by prevalence of 3 or more in patients of following criteria;

Data was entered and analyzed with the help of SPSS version 26. Mean & Standard Deviation was calculated for quantitative variables & frequency & percentages were calculated for qualitative variables.

Metabolic Syndrome Criteria		
S. No.	**Criteria**	**Cut-off**
1	Waist circumference (WC) (a measuring tape will be used to measure the WC)	> 102 cm for men & > 88 cm for women
2	Blood Pressure (BP)	> 130/85 mmHg
3	Fasting blood glucose (FBG)	> 100 mg/dl
4	Fasting triglycerides	> 150 mg/dl
5	Fasting HDL cholesterol	< 40 mg/dl for men & < 50 mg/dl for women

RESULTS

A total of 54 patients of CTS were included. The mean age of patients was 47.3 + 16.03 years, mean BMI was 27.69 + 5.06 kg/m^2 & mean duration of symptoms was 2.296 + 1.5 months. Male/Female ratio was same 50:50. 29 (52.7%) of the patients were urban resided and 25 (45.5%) were rural resided. Most of the patients had education till primary i.e. 14 (25.5%) followed by 12 (21.8%), 10 (18.2%), illiterate and intermediate were 9 (16.4%) each, as shown in Table-I.

Demographics Data	Mean + SD/ n (%)
Age (mean + SD)	47.3 + 16.03 years
Duration of disease (mean + SD)	2.296 + 1.5months
BMI (mean + SD)	27.69 + 5.06 kg/m^2
Gender	
Male	27(49.1%)
Female	27(49.1%)
Residential Status	
Urban	28(52.7%)
Rural	25(45.5%)
Educational Status	
Illiterate	9 (16.4%)
Primary	14 (25.5%)
Secondary	12 (21.8%)
Intermediate	9 (16.4%)
Graduate	10 (18.2%)

Table-I. Demographics data of the patients

30 (54.5%) of CTS patients had metabolic syndrome. The frequency of metabolic syndrome was further stratified with respect to age, gender, residential status and educational status,

significant difference was observed (p-value < 0.05), however, no significant difference was, when same was stratified with respect to BMI and duration of symptoms (p-value <>0.05), as shown in Table-II & III.

Metabolic Syndrome	n (%)
Yes	30 (54.5%)
No	24 (43.6%)

Table-II. Frequency of metabolic syndrome in patients with carpel tunnel syndrome

Demographics Data	Metabolic Syndrome		P-Value
	Yes (n=30)	No (n=54)	
Age			
18-35	12	11	0.00
>35-70	18	13	
BMI			
< 29	22	18	1.000
>29	08	06	
Duration of disease (mean +sd)			
<3	20	19	0.370
>3	10	05	
Gender			
Male	16	11	0.00
Female	14	13	
Residential status			
Urban	11	18	0.00
Rural	19	06	
Educational status			
Illiterate	8	1	0.00
Primary	7	7	
Secondary	8	4	
Intermediate	6	3	
Graduate	1	9	

Table-III. Frequency of metabolic syndrome with respect to demographics data of the patients

DISCUSSION

Abdominal obesity, dyslipidaemia, hyperglycemia, and hypertension are the hallmarks of the metabolic syndrome, a serious public health issue. It is commonly known that individuals with metabolic syndrome are more likely to die from heart disease and other causes.[12,13] The incidence of metabolic syndrome in patients with CTS was assessed in our study. Clinical research has revealed that CTS is more severe in people with MS, and MS is almost 3fold more common in individuals with CTS.[14,15] The fact that MS is an inflammatory disease with a wide range of biomarkers & cell types emerging as important mediators of this inflammation may be one explanation for the higher prevalence of CTS in MS. It appears that mast cells in subcutaneous adipose tissue are essential for promoting fibrosis and inflammation surrounding and inside the median nerve, which inhibits nerve gliding.[15-17] CTS is more prevalent in women & those between ages of 40 & 60. In one study, 89.7% of 107 CTS patients (mean age 53.9 ± 8.9) were female.[10]

Among the 200 CTS patients (mean age 51.61 ± 11.86) in Yurdakul et al., 140 (70%) were female.[2] 65% of the 112 patients in the descriptive cross-sectional study, who had an average age of 54 ± 5 years, were female.[11] The patients' mean age was 47.3 + 16.03 years, although the male to female ratio was 50:50, which is consistent with these findings. The large sample sizes employed in the prior study may be the cause of these discrepancies. The current study indicated that 30 (54.4%) of carpel tunnel patients had metabolic syndrome, which is consistent with the results of a study by Yurdakul FG and et al. that found 48%. In contrast, a similar study by Sadaf I and colleagues from Pakistan revealed a significant frequency of MT, reporting that 72.0% of patients with carpal tunnel syndrome also had metabolic syndrome.[11] According to another study by Onder B et al., metabolic syndrome was present in 73.5% of individuals with carpal tunnel syndrome.[12] These documented disparities in MS prevalence rates among CTS patients could be due to a variety of variables, including lifestyle choices, age differences across the groups under study, environmental/occupational factors, and genetic factors. In line with these conclusions.[18,19] There are certain restrictions on the current investigation. First off, these findings cannot be extrapolated to the broader community because the study was carried out at a public hospital with patients of a particular socioeconomic position and a distinct clinical and risk factor profile. Second, there aren't many cases, thus more research with bigger sample sizes is required to validate and enhance the accuracy of the findings.

CONCLUSION

Despite the small number of included patients with CTS, the results of the present study revealed that metabolic syndrome appears to be highly prevalent in patients with Carpel tunnel Syndrome patients. However, further research with larger samples is needed to enforce these results.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Aiman Shafique:** Data collection, Manuscript writing.
2	**Khalid Sher:** Proof reading.