FREQUENCY OF OBESITY AND METABOLIC SYNDROME IN CTS

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ABSTRACT

BACKGROUND

Carpal Tunnel syndrome (CTS) is the most common compressive neuropathy. There are several risk factors for the development of CTS. Medical risk factors include diabetes, hypothyroidism, metabolic syndrome, rheumatoid arthritis, prior wrist fracture and pregnancy. Square wrist and high BMI are the two main anthropometric abnormalities associated with CTS. Metabolic syndrome (MetS) is a constellation of cardiometabolic risk factors that promote the development of atherosclerotic cardiovascular diseases (CVD) and Type 2 Diabetes. Many studies had shown that CTS was severe in patients with MetS. As the two conditions are related and frequently found together, it is important to screen all patients with CTS for the presence of metabolic syndrome.

This study was intended to evaluate the frequency of obesity and metabolic syndrome in patients with CTS which was conducted in a medical college situated in a rural area of Kerala.

MATERIALS AND METHODS

This is a study carried out in the Department of Physical Medicine and Rehabilitation, Government TD Medical College, Alappuzha, during a period of two years from January 2015 to December 2016 to evaluate the frequency of obesity and metabolic syndrome in patients with CTS. This was a descriptive study on secondary data of hospital records conducted by evaluating the records of clinically diagnosed and electrophysiologically confirmed cases of CTS in the Electrophysiology Lab which is functioning in the department.

RESULTS

193 patients were included. 164 (85%) were females. Mean age was 45.5 years. Metabolic Syndrome was seen in 36.3%. Among females 37.8% and among males 27.6% were found to have MetS. Increased waist circumference was observed in 79.2%. It was found in 86.6% in females and 37.9% of males. Abnormal fasting plasma glucose was present in 30.1%. Among females 31% and in males 24% were having abnormal FPG. 15.5% were having hypertension. 34.5% of males and 12.2% of females had abnormal BP. Raised triglycerides were seen in 23.8%. Among females 25.6% were detected to have raised TG and in males it was seen in only 13.6%. 53.4% had reduced HDL. 60% of females and 27.6% of males had reduced HDL. Obesity was detected in 87 (45.1 %). 45.7% of females and 41.4% of males were obese.

CONCLUSION

Obesity and metabolic syndrome were detected frequently among patients with CTS. This association was not as high as that seen in western studies. This might be due to the fact that this study was conducted in a centre which caters mainly persons belonging to low socioeconomic strata and manual labourers.

KEYWORDS

Carpal Tunnel Syndrome, Obesity, Metabolic Syndrome.

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BACKGROUND

Carpal tunnel syndrome (CTS) is the compressive neuropathy of the median nerve at the carpal tunnel. The main symptoms are pain and paraesthesia in the upper extremities.[1,2] The symptoms are more during activities involving repetitive use of wrist and gripping activities and during night hours.

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CTS is three to four times more common in females. The diagnosis of CTS is based on clinical history, physical examination and electrodiagnostic studies.

CTS is the most common compressive neuropathy and it constitutes a major part of the occupational upper-extremity musculoskeletal disorders and is associated with considerable healthcare and indemnity costs.[3,4] CTS claimants recover to about half of their pre-injury earnings level relative to that of comparison groups after 6 years; they also endured periods on time-loss three times longer than claimants with upper extremity fractures. Cumulative excess loss of earnings of the 4,443 CTS claimants was 197 million dollars to 382 million dollars over 6 years, a loss of 45,000-89,000 dollars per claimant.

Although CTS has been described as the most common compressive neuropathy,[2] there are only few studies on the

prevalence in the general population. A prospective population-based study by de Krom et al performed in the Netherlands attempted to determine the prevalence of CTS.[5] In this study on 715 subjects (33% men) aged 25 to 74 years; the prevalence of electro-physiologically confirmed CTS was 5.8% in women and 0.6% in men.[5] Higher prevalence rates for CTS have been found in certain occupational groups like computer professionals, jobs using vibrating tools, etc[6,7,8,] and some studies showed positive family history[9] too.

There are several risk factors for the development of CTS. Medical risk factors include diabetes, hypothyroidism, metabolic syndrome, rheumatoid arthritis, prior wrist fracture and pregnancy.[10,11] Square wrist and high BMI are the two main anthropometric abnormalities associated with CTS.[12]

Metabolic syndrome (MetS) is a constellation of cardiometabolic risk factors that promote the development of atherosclerotic cardiovascular diseases (CVD) and Type 2 Diabetes.[13] The components are hypertension, elevated fasting blood glucose, hypertriglyceridaemia, reduced high density lipoprotein (HDL) cholesterol and truncal obesity. The prevalence of obesity and metabolic syndrome is rapidly increasing in India and other South Asian countries, leading to increased mortality and morbidity due to CVD and T2 DM.[14,15] The metabolic syndrome and the components of metabolic syndrome alone were reported as causative factors for CTS.[16,17,18] Hyperglycaemia and dyslipidaemia were reported as risk factors for CTS in many studies.[19,20] Obesity, hypertriglyceridaemia, elevated LDL cholesterol and hypertension were strongly associated with CTS.[21] Some studies like that of Balci et al[16] had shown a definite association between CTS and metabolic syndrome. In that study by Balci et al, 75% patients with CTS were found to have metabolic syndrome.

A recent research by Fatma Gul Yurdakula et al[18] demonstrated that CTS was more severe in the patients with metabolic syndrome than those without this syndrome. They also stated that CTS appears to be more severe in patients with metabolic syndrome than patients with diabetes. Diabetes is one of the well-known risk factors for CTS, but other components of metabolic syndrome may have a greater effect on the severity of CTS.[18]

As the two conditions are related and frequently found together, it is important to screen all patients with CTS for the presence of metabolic syndrome. This early detection can help in prevention of cardiovascular and other complications associated with metabolic syndrome by proper lifestyle interventions, thus decreasing the socioeconomic burden of patient and society as a whole.

MATERIALS AND METHODS

The study entitled- "Frequency of obesity and metabolic syndrome in CTS" is a hospital-based study carried out in the Department of Physical Medicine and Rehabilitation, Government TD Medical College, Alappuzha, during a period of two years from January 2015 to December 2016 to evaluate the frequency of obesity, metabolic syndrome and its components in patients with CTS. This was a descriptive study on secondary data of hospital records conducted by evaluating the records of clinically diagnosed and electrophysiologically confirmed cases of CTS in the electrophysiology lab which is functioning in the department.

Obesity is defined by a BMI ≥ 25. A BMI between 18.5-22.9 was taken as normal. [In accordance with Health Ministry of India's diagnostic cut-offs for BMI 2008.][22]

Metabolic syndrome was defined according to the consensus definition for adult Asian Indians. NCEP, ATP III recommends that three out of five clinical and/or biochemical abnormalities should be present to satisfy this labeling.[22,23]

1. Abdominal obesity [waist circumference in cm]: males ≥ 90, females ≥ 80.
2. Elevated fasting blood glucose: ≥ 100 mg% or type 2 diabetes mellitus on treatment.
3. Hypertension: BP >130/85 [SBP>135 and / DBP>85 mm of Hg] or hypertension on treatment.
4. High triglycerides: ≥ 150 [mg/dL].
5. Low HDL: males <40, females <50 [mg/dL].

Presence of three of the above criteria is required for the diagnosis of metabolic syndrome. IDF recognised and emphasised ethnic differences in the correlation between abdominal obesity and other metabolic syndrome risk factors. For this reason, criteria of abdominal obesity were specified by nationality or ethnicity based on best available population estimates. For Asian population, except for Japan, thresholds were ≥90 cm in men and ≥80 cm in women.

Statistical Analysis

A total of 193 patients with clinically and electrophysiologically (NCS) confirmed carpal tunnel syndrome who were evaluated in the Electrophysiology lab during the study period were included in the study. All the data were entered in Microsoft excel sheet, rechecked and analysed with SPSS16 statistical software. For categorical variables chi-square test and for continuous variables descriptive analysis was used in statistical analysis.

RESULTS

193 patients with clinically diagnosed and electrophysiologically (NCS) confirmed carpal tunnel syndrome were included. Among them, 164 (85%) were females. CTS was more prevalent in females (Female-Male ratio: 5.7:1).

155 (94.5%) of females were home makers. 25 were manual labourers (22 males and 3 females). 6 were computer professionals.

191 (99%) were right-handed persons. 143 (74%) persons had bilateral symptoms with more involvement on the dominant hand.

Age of patients ranged between 20 to 72 years (mean age 45.5 years). 88.6% belonged to 30-60 years age group and 42.5 % of them were in the 41 to 50 years age group. (Table 1, Figure 1).

Metabolic Syndrome was seen in 36.3%. Among females 37.8% and among males 27.6% were found to have metabolic syndrome. There was a slight female predominance but no statistically significant association between genders was detected. (Table 2).

24% of males and 19.5% of females were diabetic. No statistically significant gender difference was noticed.

Components of Metabolic Syndrome

Increased Waist Circumference

Increased waist circumference was observed in 79.2%. It was found in 86.6% in females and 37.9% of males. This difference was statistically significant (P: 0.000). (Table 3, Figure 2).

Dysglycaemia

Abnormal fasting plasma glucose was present 30.1%. Among females 31% and in males 24% were having this metabolic profile abnormality. This was seen more in females, but not found to be statistically significant. (Table 3, Figure 2).

Hypertension

15.5% of the study population were having hypertension. 34.5% of males and 12.2% of females had abnormal BP. This was statistically significant among males (P value: 0.004). (Table 3, Figure 2).

Raised triglycerides

Raised TG was seen in 23.8%. Among females 25.6% were detected to have raised TG and in males it was seen in only 13.6%. No significant association was noticed. (Table 3, Figure 2).

Reduced HDL

53.4% had reduced HDL. 60% of females were having this metabolic profile abnormality when compared to males who had only 27.6%. This association of decrease in good cholesterol among females with CTS was statistically significant (P: 0.002). (Table 3, Figure 2).

The Anthropometric Abnormalities Detected were-

Obesity was detected in 87 (45.1 %). 45.7% of females and 41.4% of males were obese. No statistically significant association exists between gender and obesity among persons with CTS. (Table 2).

Age Group	CTS N: 193 (%)
<30 years	14 (7.3%)
31 -40 years	50 (25.9%)
41 -50 years	82 (42.5%)
51 -60 years	39 (20.2%)
61 -70 years	5 (2.6%)
>71 years	3 (1.6%)

Table 1. Association of CTS with Age

CTS: Carpal tunnel syndrome.

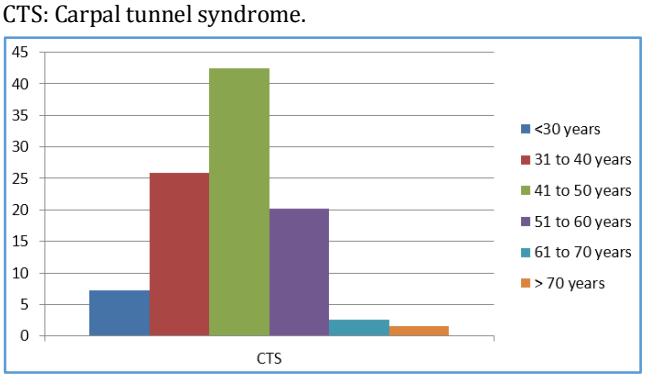

Figure 1. Association of CTS with Age

CTS: Carpal tunnel syndrome

Conditions Associated	Total (n= 193)	Females (n= 164)	Males (n=29)	P value
Obesity	87 (45.1%)	75(45.7%)	12(41.4%)	0.691
MetS	70 (36.3%)	62 (37.8%)	8 (27.6%)	0.402

Table 2. Association of Obesity and Metabolic Syndrome with CTS

MetS: metabolic syndrome.

MetS	Total (n= 193)	Females (n= 164)	Males (n=29)	P value
Abdominal obesity	153 (79.2%)	142 (86.6%)	11 (37.9%)	0.00
Elevated FBG	58 (30.1%)	51 (31%)	7 (24%)	0.516
Hypertension	30 (15.5%)	20 (12.2%)	10 (34.5%)	0.004
High triglycerides	46 (23.8%)	42 (25.6%)	4 (13.7%)	0.237
Low HDL	103 (53.4%)	98 (60.1%)	8 (27.6%)	0.002

Table 3. Components of MetS

Elevated FBG

Elevated Fasting Blood Glucose; Low HDL: Low High Density Lipoprotein.

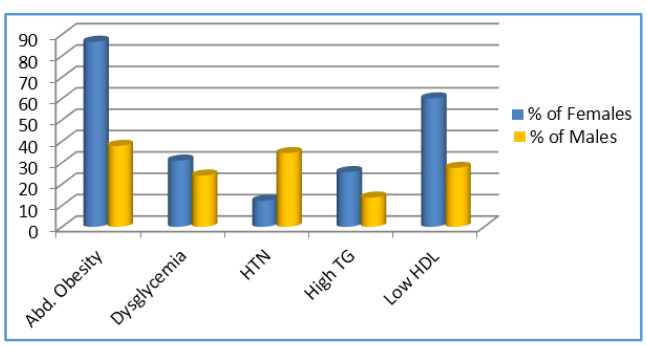

Figure 2. Components of MetS

DISCUSSION

Carpal tunnel syndrome is the most common type of compressive neuropathy and is associated with many medical conditions and demographic factors. It is one of the most common neurological conditions seeking treatment from Physical Medicine and Rehabilitation Department and also a main reason of referral to this department for electro-diagnostic evaluation.

There are many associated conditions which trigger the development of CTS. The metabolic syndrome and some components of metabolic syndrome alone were reported as causative factors for CTS. Some studies confirmed the association of Obesity with CTS.[21] But unfortunately there have been only few studies done in past reporting these associations from India. No similar studies were conducted in PM&R departments in India. In this study; we found that the incidence of CTS in females is much more than the western literature (Female-Male ratio: 5.7:1) and 94.5% of females were home makers. This may be related to the more manual jobs that our females carry out, which demand more forceful repetitive movements of wrists than their western

counterparts where they depend more on machines for performing household jobs.

88.6% belonged to the 30-60 years age group; this is in full agreement with the literature.[24] CTS is predominantly a disease of 30s or 40s. This shows the importance of years of occupational exposure in revealing the symptoms. Hence, CTS is considered as one among the group of repetitive strain injuries.

Metabolic syndrome was detected in more than one third of study population (36.3%). Among its components, increased waist circumference was seen in 79.2%; that was predominantly seen in females. The second most common metabolic profile abnormality was low HDL which was seen in 53.4% and statistically significant among females.

Another important finding was the high incidence of obesity. 45% were detected to have high BMI.

This relevant association of metabolic syndrome, diabetes and obesity with CTS mandates detailed clinical and laboratory evaluation of all persons with CTS. The early detection may help in prevention of cardiovascular and other complications associated with metabolic syndrome or its components by initiating proper lifestyle interventions.

CONCLUSIONS

1. Females were more prone to develop CTS. This has been shown by a higher female to male ratio (5.7:1).
2. CTS is predominantly a disease of middle age; i.e., 30-60 years. 88.6% belonged to this age group.
3. A significant association of obesity was noticed among patients with CTS. 45% of study population had obesity.
4. Metabolic syndrome was detected in 36.3% of study population.
5. Among the components of metabolic syndrome, increased waist circumference was seen in 79.2%; that was predominantly seen in females. The second most common metabolic profile abnormality was low HDL which was seen in 53.4% and statistically significant among females.
6. The frequency of metabolic syndrome in the study population was less as compared to western literature. This might be due to the fact that the study was conducted in a medical college; situated in a rural area which caters mainly persons belonging to low socioeconomic strata and manual labourers.
7. This high frequency of obesity and metabolic syndrome in persons with CTS mandates detailed clinical and laboratory evaluation for the presence of metabolic syndrome.

Limitations

1. This study was a hospital-based study conducted in a tertiary care centre and also mainly on patients belonging to lower socioeconomic status having a different clinical and risk factor profile, these results cannot be applied to the general population
2. Having a control group would definitely make the study results and associations stronger.

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