Original Article

A Clinical and Neurophysiological Analysis of Idiopathic Carpal Tunnel Syndrome with Respect to Gender and Occupation

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Abstract

Background: Carpal tunnel syndrome (CTS) predominantly affects women. Previous studies observed more intense symptoms among women without a corresponding increase in disease severity and attributed it to reporting bias. In this study, we examined whether women are inherently more vulnerable to work related median nerve dysfunction at wrist and whether reported CTS symptoms among women correspond to the degree of median neuropathy at wrist. **Methods:** A cross-sectional study was designed for outpatients (aged 25-59 years) diagnosed with CTS. Occupational categorisation was done based on the analysis of their individual job tasks. Symptom severity (Boston Symptom Severity Scale – SSS), functional disability (Boston Functional Status Scale - FSS), and clinical (Hi – Ob scale) and neurophysiological severity (NCS grade) were determined, compared among occupational groups and were statistically analysed. **Results:** A total of 454 patients (348 women and 106 men; F: M ratio 3.28:1) were included. Among them, 191 were housewives. Female manual workers and housewives reported significantly more intense symptoms with a corresponding increase in clinical and electrophysiological severity ($p < 0.001$) when compared to female non-manual workers. However, no significant difference in symptoms, clinical or neurophysiological severity was found between male non-manual and manual workers. Among manual workers, women were more symptomatic than men, but clinical and neurophysiological severities were significantly higher only in the older age groups. **Conclusion:** The differential vulnerability of the female population to hand-intensive work predisposes them to severe median nerve dysfunction at wrist with proportionately higher CTS symptoms. Therefore, working women need focussed attention for remedial measures.

Keywords: Carpal tunnel, carpal tunnel syndrome, cumulative trauma disorder, entrapment neuropathy, median neuropathy at wrist, occupational disease

Introduction

Carpal tunnel syndrome (CTS) predominantly affects women and they often report more intense symptoms.[1] Many previous studies found that the greater severity in symptoms in women were not associated with a corresponding increase in clinical or electrophysiological severity.[1,2] Many researchers opined that women over report their symptoms, and attributed this reporting bias as one of the major reason for the female preponderance.[2,3] More than 60% of women in India in the age group of 15-59 years are engaged in full-time household work,[4] and along with women doing manual work, form the bulk of the female population in India; hence CTS is a major health problem for them. It is possible that their hand-intensive routine work makes them particularly likely to develop median nerve damage at wrist, precipitating more intense symptoms. Many previous studies[5,6] suggest that due to inherent physiological limitations and the nature of their work, women are more vulnerable than men to develop median nerve damage at wrist. Many longitudinal and cross-sectional studies have proposed that occupations involving high force, repetitive wrist and hand movements, vibration, and off-neutral wrist postures are risk factors for CTS.[7,8] However, the analysis and quantification of hand-intensive activities in unskilled/semiskilled labour and domestic chores is cumbersome, unlike in the case of repetitive mono-tasks in industrial settings. Therefore, the exact relevance of the nature of their work in causing median nerve dysfunction at wrist is difficult to assess and has been little studied. A few prior studies have found high prevalence of CTS among housewives and female blue-collar workers.[9-12] Apostoli *et al*.,[13] who analysed the workload of housewives, also found that many household tasks require substantial biomechanical load in the upper limbs.

Most Indian women are often continuously engaged in hand-intensive household or other manual tasks, and if their regular work is a risk factor for progressive median nerve damage at wrist, there is a risk of thenar muscle weakness and wasting with continuous work. The resulting impaired hand dexterity and disability is likely to affect them significantly.

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Moreover, many previous studies report poorer surgical outcomes in patients with advanced CTS.[14]

In this study, we compared reported symptoms and clinical and electrophysiological severity of CTS among men and women of different occupational groups. The aim was to examine whether the hand-intensive work of housewives and manual workers precipitates more intense symptoms compared to non-manual white-collar workers affected with CTS and if so, whether their symptom severity corresponds to greater disease severity. We also looked for gender differences in symptoms and disease severity in similar occupational categories (manual and non-manual workers) and examined whether women are inherently more susceptible to work-related median nerve dysfunction at wrist than men.

Methods

Study design and setting

A cross-sectional study was designed among CTS patients who attended outpatient clinics of a major teaching hospital from 1st January 2019 to 31th December 2020. The diagnosis of CTS was based on the Clinical Diagnostic Criteria for CTS Research proposed by the American Association of Electro Diagnostic Medicine, the American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation.[15] To avoid any selection bias related to occupational status, we restricted the study to subjects aged 25–59 years and excluded retired persons. Only idiopathic CTS[16] (with absent etiologic clues except age, high BMI, and jobs involving high intensity wrist and hand activity) were included. All patients had normal blood glucose and TSH levels as estimated within 6 months prior to their enrolment. We excluded patients with secondary CTS and symptoms suggestive of a generalised neuropathy. Informed consent was taken from all participants. The study design was approved by the Institutional Research Committee and the Institutional Ethics Committee (AIMS 02/06/2020).

Study procedure

Personal data of each patient including age, gender, and educational status were documented. Further, handedness, age of onset of symptoms, and duration of symptoms were also recorded. Height and weight of each patient was taken and BMI calculated. Detailed occupational data were collected by a trained staff. Jobs which consist of tasks involving the following activities that have been identified as increasing the risk of CTS prior to the development of symptoms were documented.[7,8]

1. Frequent and repetitive use of the same or similar movements of the wrist or hand on the affected side, cyclical or repetitive activities that involve gripping or wrist extension/flexion, ulnar/radial deviation, and supination or pronation.
2. Regular tasks which require the generation of high force by the hand on the affected side (s).
3. Regular or sustained tasks requiring awkward hand positions, extreme flexion or extension of the wrist, or use of fingers with the wrist flexed on the affected side.
4. Regular use of vibrating hand tools.
5. Prolonged or frequent pressure on the wrist or base of the palm on the affected side.

Manual and non-manual job categorization was based on the history and description of the tasks provided by patients. Persons engaged in full-time jobs consisting of the above-mentioned tasks for at least 2 years immediately preceding the onset of CTS symptoms were included in the manual worker group. Patients whose work did not involve such tasks were included in the non-manual worker group. Eight common household tasks routinely done at home, such as cleaning floors (manual), sweeping the courtyard, washing clothes (manual), scrubbing cooked surfaces, washing vessels, manually drawing water from deep wells, carrying water pots, and ironing, were selected for housewives. This selection was based on the study conducted by Apostoli *et al*.[13] which assessed the biomechanical workload of a few household tasks using objective instruments mainly used in industrial settings. These household tasks were identified and their duration analysed for all women enrolled in this study. We collected data on the time spent on each of these tasks per day and calculated and documented the total duration. If the total duration of these tasks averaged at least 2 hour per day for more than 5 days per week for at least 2 years prior to the onset of CTS symptoms, the patients were included in the category of housewives. We did not take into account the contributions of the entire range of household tasks, as many of them involve movements that cannot be easily standardized like carrying toddlers, preparing meals, etc.

If a person stated their occupation as housewife, but the above tasks routinely performed did not meet the required duration, they were not included in the housewife category, and were instead included in the non-manual worker category. This was often observed in the case of women belonging to large joint families. Similarly, if an office-going employee or teacher (non-manual worker) performed the above household tasks, and the duration of tasks performed exceeded the required limit, they were included in the housewife group. However, female manual workers who also undertook similar household tasks were still included in the manual worker group.

For assessing the symptoms and functional disability, we used the validated regional language version of the Boston Carpal Tunnel Questionnaire[17] which includes a Symptom Severity subscale (SSS) and a Functional Status subscale (FSS). Clinical assessment of CTS severity was done using a validated five-stage scale (Hi – Ob Scale).[18] Nerve conduction study (NCS) was done as per the AANEM practice recommendations for CTS.[19] During electrophysiological examination, skin temperature (mid palm) was measured and maintained above 32°C.

Patients were grouped into 6 severity grades (NCS grade) as per the neurophysiological grading proposed by Bland.[20] The

clinical and electrophysiological data of the most affected hand were taken. If both hands were affected equally, dominant hand data were selected.

Statistical analysis

Data were analysed using SPSS software (v16, IBM, US). The categorical variables were provided as numbers. The Chi-square test was used to find significant differences between different groups. The parametric data were subjected to unpaired t test or one-way ANOVA with Bonferroni multiple comparison test. The median data were compared using Mann-Whitney test. $P < 0.05$ was considered significant.

Results

A total of 860 patients were diagnosed with CTS during the selected time period. Among them, 306 patients with diabetes mellitus, hypothyroidism and other proposed risk factors[15] of CTS were excluded from the study. Seven patients below 25 years and 93 patients above 60 years were also excluded from the study. The remaining 454 patients were included. Nerve conduction studies did not show any evidence of median mononeuropathy at wrist in 17 (3.7%) patients, and the diagnosis of CTS was clinical in their case. There were 348 (77%) women and 106 (23%) men, with a male to female ratio of 1: 3.28. The patients included 191 housewives, 123 manual workers (62 male and 63 female) and 140 non-manual workers (44 male and 96 female). The mean age of the patients was 43.4 ± 9.2 years. The job details of patients in each occupational category are given in Table 1. A significant number of women included in the non-manual worker group were unemployed, and were not routinely performing the above-described household tasks. Persons doing strenuous hand-intensive coolie work, cooking in hotels and canteens, carpentry work, tailoring, cleaning work in hospitals and commercial institutions, and full-time driving of auto-rickshaw or motorbikes dominate the manual worker group.

For non-manual workers, the age group 45–54 showed the highest proportion of patients [Figure 1]. For manual workers, the proportion of patients in the 35-44 and the 45-54 age groups were almost similar [Figure 2]. For housewives, the greatest numbers were in the 45-54 age groups [Figure 3], but a lot of younger patients were also affected. Among non-manual workers, for all age groups, women outnumbered men, whereas within the manual worker category, both genders were almost equally affected.

Age and gender-wise comparison of reported SSS, FSS, clinical Hi-Ob and NCS grade between different occupational groups is set out in Tables 2 and 3. Female manual workers and housewives had significantly higher ($p < 0.001$) SSS and FSS when compared to female non-manual workers both in younger (< 43 years) and older (> 43 years) age groups. However, no significant difference was found in the reported symptoms (SSS) of housewives and female manual workers.

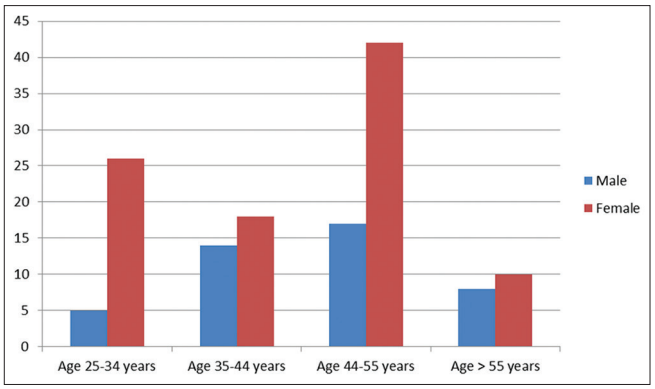

Figure 1: Age distribution among Non-manual workers. Chi-square = 7.22, $P = 0.065$, insignificant difference between males and females non-manual workers in various age groups

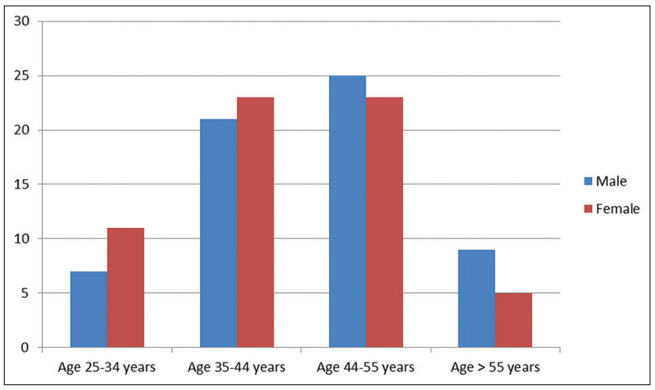

Figure 2: Age distribution among Manual workers. Chi-square = 2.31, $P = 0.511$, insignificant difference between male and female manual workers in various age groups

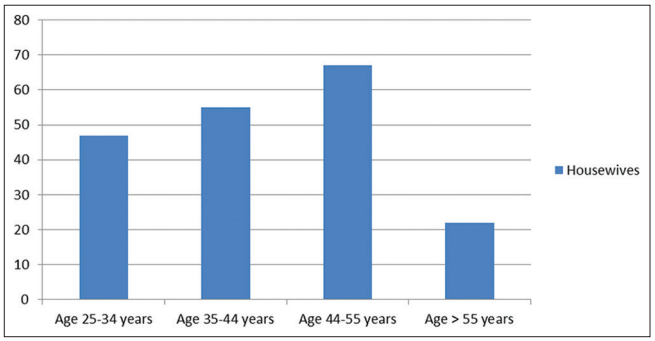

Figure 3: Age distribution among housewives

Clinical severity (Hi–Ob scale) and electrophysiological (NCS grade) severity were higher among female manual workers and housewives compared to female non-manual workers in both younger (< 43 years) and older (> 43 years) age groups, and the difference was significant ($p < 0.001$). Male manual workers showed higher SSS, FSS, and Hi-Ob compared to male non-manual workers, but this was significant only in younger age groups. Comparison of both genders in the manual worker group showed higher symptoms and greater clinical and electrophysiological severity among women, but the difference was statistically significant only in older age

groups (P < 0.05). However, among non-manual workers, there was no gender-based difference in symptoms and clinical and neurophysiological severity. Detailed analysis of various electrophysiological parameters also followed an essentially similar trend [Table 4]. Both mildly and severely symptomatic female manual workers and housewives had significantly abnormal electrophysiological parameters except few motor parameters, when compared to similarly symptomatic women doing non-manual works. Thirteen of 28 (46.4%) female manual workers with mild symptoms had electro-physiologically advanced disease with unelicitable SNAPs. Moreover, the gender-based differences in disease severity among manual and non-manual workers, as observed above, were also reflected in most of the electrophysiological parameters at all levels of symptom severity [Table 4].

Table 1: Gender wise distribution of employment category

Employment category	Men	Women
Manual workers		
Manual workers (coolie work)	16	15
Mechanics	12	0
Cooks	7	12
Cleaning staff	1	17
Driving bike/auto-rickshaw	9	0
Carpenters	9	0
House painting	3	0
Tailors	2	7
Beedi making		6
Pappad making	2	4
Barbers	1	0
Non-manual workers		
Clerical/Accountants	13	19
Managers/Other office works	14	17
Teachers	3	19
Supervisors	8	5
Security men	3	0
Unemployed	3	36
Housewives	0	191

Across all occupational groups and genders, clinical and electrophysiological severity was higher in the older age groups. Mean BMI of patients in all occupational groups was in the obese range (≥25, as per the Indian guidelines). Housewives had a higher mean BMI, which was significantly different from that of female manual workers. The BMI of female manual workers was comparatively lower, but statistically insignificant difference was found when compared to female non-manual workers.

Discussion

In our study, women regularly engaged in hand-intensive tasks (housewives and female manual workers) not only

Table 2: Symptom severity (SSS), Functional disability (FSS), Clinical severity (Hi – Ob Score), Neurophysiological severity (NCS grade) and BMI in patients below 43 years of age

	Non-manual workers		Manual workers		Housewife
	Male	Female	Male	Female	
	N=18	N=43	N=26	N=33	N=93
SSS	20.6±4.6***	23.7±9.0[a]	28.0±9.0[##]	34.1±8.02[b]	34.7±8.5[b]
FSS	13.3±6.0*	11.7±4.9[a]	17.6±6.0[###]	22.6±7.8[b]	18.8±7.0[c]
Hi-Ob	1.5±0.5**	1.7±0.5[a]	2.1±0.8	2.5±1.1[b]	2.2±0.8[b]
NCS grade	1.6±0.9	1.7±1.1[a]	2.1±1.1	2.7±1.4[b]	2.3±1.1[b]
BMI	26.6±3.9	27.9±3.0	26.5±4.5	25.4±4.7	28.0±5.4[¶]

Values are mean±SD. Different alphabets represent mean values of female groups which are significantly (Bonferroni test, $P<0.001$) different from each other. ***$P=0.002$, ** $P=0.007$ and * $P=0.02$ (Unpaired t test, Two- tailed) male non-manual workers are significantly different from male manual workers ###$P=0.001$ and ##$P=0.008$ (Unpaired t test, Two- tailed) male manual workers are significantly different from female manual workers.[¶] $P<0.05$ BMI of house wives is significantly (Bonferroni test, $P<0.001$) different from female manual workers

Table 3: Symptom severity (SSS), Functional disability (FSS), Clinical severity (Hi – Ob Score), Neurophysiological severity (NCS grade) and BMI in patients above 43 years of age

	Non-manual workers		Manual workers		Housewife
	Male	Female	Male	Female	
	N=26	N=53	N=36	N=28	N=98
SSS	22.6±6.1	22.0±8.5[a]	24.3±6.1[###]	31.6±8.2[b]	27.9±8.6[b]
FSS	13.8±5.9	14.1±7.8[a]	17.3±8.5[###]	24.3±8.6[b]	20.7±7.7[b]
Hi-Ob	2.0±0.4	2.0±0.5[a]	2.5±0.9[#]	3.1±1.2[b]	2.6±1.0[c]
NCS grade	2.1±1.2	2.3±0.9[a]	2.6±0.9[###]	3.5±1.3[b]	3.0±1.1[b]
BMI	26.9±2.7*	28.7±3.8	26.5±3.9	26.3±3.8	27.9±4.5

Values are mean±SD. Different alphabets represent mean values of female groups which are significantly (Bonferroni test, $P<0.001$) different from each other. #$P=0.02$, ###$P=0.001$ (Unpaired *t* test, Two- tailed) male manual workers are significantly different from female manual workers.* $P=0.03$ BMI (Unpaired t test, Two- tailed) of male non-manual workers is significantly different from that of female manual workers

Table 4: Analysis of various median electrophysiological parameters in both genders of different occupational groups with different symptom severities

Parameter	Non-manual workers				Manual workers				Housewives	
	Male (Mean SSS=21.8)		Female (Mean SSS=22.8)		Male (Mean SSS=25.87)		Female (Mean SSS=32.98)		(Mean SSS=31.28)	
Symptom severity	**Mild**	**Severe**	**Mild**	**Severe**	**Mild**	**Severe**	**Mild**	**Severe**	**Mild**	**Severe**
N =	20	24	53	43	26	36	28	33	87	104
Mean SSS	16.95	25.92	16.38	30.7	18.77	31	25.82	39.06	22.8	38.4
(SD)	(2.21)	(4.15)	(3.12)	(6.71)	(4.31)	(4.87)	(4.32)	(5.17)	(4.9)	(4.98)
Motor	3.62	3.82	3.63	3.75	3.65	3.89	4.55	5.25	4.74	4.57
DL (ms)	(2.75-10.5)	(2.75-10.68)	(2.75-10.84)	(2.5-10.45)	(2.85-10.83)	(2.75-10.25)	(2.75-10)	(2.9-10.15)	(2.63-11.05)	(2.75-10.63)
CMAP	12.57	10.47	11.06	11.53	10.44	10.27	10.09	8.72	10.11	9.05
Amplitude (mV)	(2.13-21.64)	(1.86-23.43)	(2.07-20.86)	(2.12-23.57)	(0-19.42)	(2.62-21.15)	(0-21.8)	(2.26-20.62)	(0-26.71)	(2.24-22.61)
Motor CV (ms)	27.89	32.67	30.74	31.77	24.55	29.35	22.54	23.33	24.35	23.5
	(8.67-50.72)	(9.43-50.67)	(8.24-70)	(7-50.37)	(0-51.61)	(7.06-53.08)	(0-51.67)	(8.74-57.43)	(0-61.43)	(8.6-63.88)
Peak SNAP latency (ms)	3.55	3.5	3.55	3.7	3.85	4.05	3.45*	5.03	4.73#	4.78
	(2.6-8.35)	(2.9-9.85)	(2.7-9.85)	(2.75-9.8)	(2.82-9.15)	(2.9-9.55)	(3.05-8.9)	(3.15-9.05)	(2.65-9.95)	(2.8-10.4)
SNAP amplitude (μV)	30.9	36.5	35.8	37	35.2	30.5	17.26*	18.27	15.7#	24.6
	(0-80.2)	(0-66.5)	(0-69.4)	(0-80.4)	(0-73.9)	(0-72.8)	(0-56.36)	(0-62.2)	(0-74.8)	(5.12-75.4)
Sensory CV (ms)	40.74	42.51	41.2	42.62	38.7	38.07	18.33*	22.68	26.62#	30.06
	(0-66.79)	(0-63.64)	(0-68.68)	(0-65.68)	(0-65.22)	(0-68.32)	(0-68.29)	(0-63.85)	(0-68.33)	(7.92-63.6)

Values are median with range in parenthesis. Significant differences ($p<0.05$, Mann-Whitney test, Two- tailed) were found between a) male and female manual workers in the severe (except CMAP amp) and mild groups (except CMAP amp, motor CV and motor DL), b) Female non-manual workers and housewives in the severe and mild (except peak SNAP latency and CMAP amplitude) groups, c) Female non-manual workers and female manual workers in the severe and mild (except motor DL and CMAP amplitude) groups, d) Male non-manual workers and male manual workers in the severe group (only for peak SNAP latency and sensory CV) and e) Female manual workers and housewives in the severe group (only for sensory CV). All other comparisons were found insignificant. * SNAP unelicitable in 13 patients. # SNAP unelicitable in 25 patients. Symptom severity based on mean Boston SSS. CMAP and SNAP amplitudes were measured baseline to peak

reported more symptoms but also showed higher clinical and electrophysiological severity compared to women not routinely performing similar tasks (female non-manual workers). The more pronounced electrophysiological severity among them was associated with worsening of most of the electrophysiological parameters, especially the sensory ones. There was no difference in the intensity of symptoms and electrophysiological severity between housewives and female manual workers. This indicates that hand-intensive work produces more severe median nerve dysfunction at wrist, which in turn precipitates more intense symptoms. Among manual workers, women reported more symptoms and showed greater clinical and electrophysiological severity (though non-significant in the younger age groups) compared to men. No such gender difference in symptoms or clinical and electrophysiological severity was observed among non-manual workers. Among men, the differences in symptoms and disease severity between manual and non-manual workers were significant only in the younger age groups. This shows that women are differentially more vulnerable to work-related median nerve damage. We also found an overall female preponderance with a female: male ratio of 3.28:1; but among manual workers the gender ratio was almost equal. Moreover, a large number of housewives and female manual workers were affected at younger ages when compared to female non-manual workers, who showed the typical perimenopausal peak incidence in the 44–55 age brackets.

Apart from the female preponderance in incidence and prevalence, no previous studies have reported higher clinical and electrophysiological severity among working women. In a longitudinal study among industrial workers, Nathan *et al*.[21] reported that the female gender is a risk factor for CTS but could not identify work as a risk factor. Thurston *et al*.[22] argue that work only causes the patient to become aware of the symptoms of latent CTS and does not in itself produce median neuropathy. They hold that anatomical factors, obesity, and hormonal changes associated with menopause are the real risk factors for CTS. Our patients had a mean BMI in the obese range for all occupational groups, which was likely a risk factor for all. However, the most severely affected female manual workers were in the lowest BMI range.

Atroshi *et al*.,[12] in a survey of the general population of Southern Sweden, found that blue-collar workers had approximately double the risk of CTS compared to white-collar workers. Mattioli *et al*.[10] found that the incidence rate of surgically treated idiopathic CTS is significantly higher among full time housewives when compared to white-collar workers. A Chinese case–control study[11] indicated that some household tasks performed by women in Beijing were associated with an elevated risk of CTS. Most of these studies were done based on census data or hospital records; individual task analysis was not done, confounding factors like BMI were not considered and clinical and electrophysiological severity were not assessed.

A population-based incidence study of CTS using the Washington State Workers' Compensation database demonstrated that the female/male ratio for CTS decreases from 3:1 to 1.2:1 in an occupational setting.[23] McDiarmid[24] observed that if one carefully analyses individual job tasks rather than the broad occupational title, there is no statistically significant gender difference in the risk for CTS, implying that the job and not the gender is the problem. The almost equal gender ratio among manual workers in our study supports these findings.

Padua *et al*.[1] observed that while women reported more intense symptoms than men, clinical severity was similar in both genders, and electro-physiologically, men were more severely affected. Mondelli *et al*.[2] found higher reported symptoms among women, but no difference in clinical and electrophysiological severity between women and men, and opined that for a given clinical severity, women with CTS were more sensitive in reporting their symptoms than men. We did not find any gender differences in the reported symptoms or clinical or electrophysiological severity of patients included in the non-manual worker group. However, among manual workers women reported more intense symptoms, and presented greater clinical and electrophysiological severity compared to men. Even among those female manual workers with mild symptoms, many had electro physiologically advanced end-stage CTS. Bongers *et al*.[9] analysed data from Dutch National Surveys in 1987 and 2001, observed that the incidence rate of CTS was higher in women engaged in unskilled/semi-skilled work when compared to women performing higher-skilled jobs. However, for men, no such association was found between the skill level of work and incidence of CTS. Violante *et al*.[5] suggested that women have physiologically lower strength relative to the demands of the task, such that a task may require a greater percentage of her maximum voluntary contraction when compared to a male counterpart, and/or greater deviations in wrist posture. It is also possible that even though women's work is lighter than men's, the household chores women routinely undertake are more detailed and often consist of repetitive motions requiring greater finger dexterity.[6] Our study shows that reporting bias among women, targeted by many researchers,[2,3] may not be a major reason for the high female preponderance in all populations. The higher disease severity observed among working women (manual workers and housewives) in this study when compared to male manual workers may suggest that women doing hand-intensive work are inherently more prone to a severe disease associated with more intense symptoms.

The combined group of women doing either household work or paid manual work forms the bulk of the female population in our society. Studies assessing the incidence and prevalence of CTS in the general population are not available in India. In a resource poor society like ours where most household tasks are done manually without electrical home appliances, the incidence and prevalence of CTS are likely to be higher than that reported in affluent societies. Moreover, if the nature of their work increases the severity of CTS, the number of

housewives and female manual workers crippled by the disability secondary to thenar muscle weakness and wasting and the resultant loss of hand dexterity will be very high.

Incidence and prevalence studies of CTS in the general population focussing on disease severity among housewives and female manual workers have to be conducted and measures to halt further progression of the disease have to be undertaken expeditiously. This may include the use of proper electrical and other home appliances, periodic work breaks and early surgical intervention, if necessary. However, practical issues and financial constraints will be a problem in a resource poor society like ours. Obesity, which is rampant in all occupational groups, needs special attention as combined work and obesity markedly increase the risk.[25] Future researchers may also analyse the possible interplay of the other major personal risk factor of CTS, abnormal wrist ratio, in different occupational groups.

There are some limitations to this study. Occupational categorisation in this study was done purely based on patients' description of their tasks. However, patients' jobs included in this study were generally common in this part of the country and the nature of individual tasks was familiar to the person who collected the data. One of the major confounding risk factors, BMI was considered; however, we did not analyse wrist anthropometry, which is proposed as a prominent personal risk factor for CTS.[26] Further, many previous studies have pointed out that reported CTS symptoms may not correlate with electrophysiological severity.[27] This may occur in a subgroup of patients with selective small fibre (A-delta and C fibres) involvement, as conventional NCS do not assess these fibres.[28] However, many other researchers have found a positive correlation between symptoms and electrophysiological severity except in those with advanced extremely severe CTS.[29,30]

Conclusion

This study found that the more intense symptoms of CTS in women are often work-related and are associated with a corresponding increase in clinical as well as neurophysiological severity. Moreover, women engaged in hand-intensive work are inherently more vulnerable to develop severe median nerve damage at wrist. Therefore, strategies for preventing and/or halting the progression of this common disabling problem should primarily address this group of people.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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