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# Carpal Tunnel Syndrome: Under-recognition of Occupational Risk Factors by Clinicians

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**Abstract: This study was performed in order to demonstrate that non-occupational physicians are often unaware of the possible role of occupational risk factors in the multifactorial etiology of carpal tunnel syndrome (CTS). Study participants consisted of 229 individuals, 127 cases of CTS matched with 102 controls. In only 41% of the cases did family or attending physicians in the hospital asked the concerned patients about their occupation or specific job tasks, and less than 10% of the cases were referred for further evaluation to an occupational physician. Occupational risk factors that were identified were: work with repeated movements of the wrist (OR=2.15, 95% CI=1.14–4.07) and work in a cold environment (OR=3.52, 95% CI=1.08–11.47). By improving the awareness of clinicians (and patients) to the possible role of work-related factors in the etiology of CTS, appropriate preventive measures can be introduced in order to reduce the burden of this syndrome.**

**Key words:** Carpal tunnel syndrome, Occupational risk factors, Under-recognition

Carpal tunnel syndrome (CTS) is a common medical condition that is a part of the broader group of cumulative trauma disorders (CTD). It is associated with a marked symptomatology resulting from entrapment of the median nerve at the wrist, and can have serious occupational and economic implications. Works involving repetitive wrist and arm movements and jobs requiring strong grip, use of vibrating tools, and working in a cold environment are all known risk factors for CTS[1–3]. The burden of occupation-related CTS is substantial[4, 5], in particular among those employed in high-risk occupations such as the food industry, postal workers, and health care personnel. In the U.S., cumulative trauma injuries and repeated trauma, of which CTS makes up a substantial fraction, represent about 65% of occupational injuries[5].

Studies have repeatedly demonstrated that under-recognition and under-reporting of work-related CTS are quite common[2, 5–7], despite extensive description of the syndrome in the occupational and general medical literature[7–9]. Not infrequently, non-occupational physicians do not address the possible role of occupational risk-factors in the etiology of the syndrome during the evaluation of a particular patient. This situation is quite unfortunate as after the relationship between specific occupational factors and the occurrence of CTS is established, appropriate preventive measures can be taken to alleviate suffering and prevent further damage to the afflicted individual, as well as preventing fellow workers from developing similar symptoms.

The purpose of this study is to evaluate the level of awareness of non-occupational physicians to the possible role of occupational risk factors in the development of CTS in individual patients. The study was carried out in a large regional outpatient service that provides care for approximately 10% of the population of Israel and it was approved by the ethics committee of the regional hospital. The study group was consisted of 229 individuals aged 25–65, who were operated at the outpatient surgical units of the regional health care service during a three-year period (1st January 1999 to 31st December 2001). All CTS cases were diagnosed based on clinical symptoms and nerve conduction velocity (NCV) studies. Only patients with first operation for CTS were included. Controls were subjects matched by gender and age (± 2

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yr) to the cases and included patients from the same ambulatory service that were treated for other conditions, such as lower limb problems and skin diseases. Information concerning diagnoses, complaints and presence of work-related factors were extracted from the notes of clinicians in the medical files of the concerned patients in the relevant out-patient clinics. Additional data form cases and controls were collected by a dedicated questionnaire, regarding their occupational history, work conditions and tasks, and whether they were referred to the regional occupational health service by the clinician who diagnosed their condition.

Statistical analyses were done by using student t tests for continuous variables, $\chi^2$ tests and multiple logistic regression analyses (to adjust for potentially associated variables) using the SPSS, version 11.0 software.

About 77% of both groups were women (see Table 1). The mean age of the patients was 52.1 ± 8.2 yr and that of controls 49.8 ± 9.9 yr ($p$=0.054, by student's $t$ test). Almost three quarters of the patients were employed in blue-collar jobs, compared with 63.7% of controls ($p$=0.093, by $\chi^2$ test). This difference is also reflected in the higher level of education of controls, which is statistically significant ($p$=0.004). Patients also had higher body mass index (BMI) values than did controls ($p$<0.001).

Only 40.9% (52/127) of the medical records of the CTS patients contained specific indications that the attending physicians inquired about the patients' occupation (see Table 2). None of these records showed that any further inquiry was made in order to evaluate specific tasks or work conditions of the concerned individuals (to identify occupational risk-factors for CTS) and only less than 10% of patients (12/127) were referred to an occupational physician for further evaluation. In contrast, 48.0% (61/127) of the CTS patients indicated that they considered their illness to be related to their occupation. Among these patients, 90.0% (54/61) were employed in physical demanding jobs.

After recovering from the operation, 52.0% of patients (66/127) resumed their original positions and only about 6% (7/127) changed their job, as a result of this injury.

Multivariate analyses (Table 3) showed that repetitive motion of the wrist (OR=2.15, 95%, CI=1.14–4.07) and work in cold environments (OR=3.52, 95%, CI=1.08–11.47) are significant occupational risk factors associated with the development of CTS. High BMI was shown to be a non-occupational risk factor, and high level of education was shown to have a "protective" effect ($p$=0.001).

CTS is a common syndrome that could be quite often causally related to particular working conditions. It is relatively easy to recognize and diagnose clinically and by electrophysiological studies (NCV). As a rule, most patients are seen initially by general practitioners, neurologists, or orthopedic surgeons rather than by occupational physicians. In this study, in almost 60% of the cases, the physician in charge of the patient did not

**Table 1. Characteristics of the study participants**

| | Cases (n=127) | | Controls (n=102) | | Sig. and Test |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Women | 98 | 77.2% | 77 | 75.5% | 0.924 ($\chi^2$) |
| Blue-collar workers | 94 | 74.0% | 65 | 63.7% | 0.093 ($\chi^2$) |
| | Mean ± Standard Deviation | | Mean ± Standard Deviation | | |
| Age (yr) | 52.1 ± 8.2 | | 49.8 ± 9.9 | | 0.054 (t) |
| Years of education | 11.6 ± 2.7 | | 14.0 ± 8.4 | | 0.004 (t) |
| BMI | 28.8 ± 5.1 | | 26.5 ± 3.9 | | <0.001 (t) |

**Table 2. Awareness of physicians and patients to the possible role of occupational risk factors in the development of CTS**

| Characteristics | No. | % |
|---|---|---|
| Number of physicians asking patients about there job | 52 | 40.9 |
| Number of patients referred by physician to occupational health services | 12 | 9.4 |
| Number of patients suspecting their condition to be a work-related injury | 61 | 48.0 |

**Table 3. Adjusted Odds ratios (OR) (multivariable logistic model) of various risk factors associated with the development of CTS**

| Variable | OR* | 95% CI** | Significance |
|---|---|---|---|
| Repeated movements of the wrist | 2.15 | 1.14–4.07 | 0.018 |
| Work in a cold environment | 3.52 | 1.08–11.47 | 0.037 |
| BMI (kg/m$^2$) | 1.14 | 1.06–1.23 | 0.001 |
| Level of education (yr) | 0.82 | 0.74–0.92 | 0.001 |

* OR = Odds Ratio, ** CI = 95% Confidence Interval.

inquire about the patient's occupation and even when the title of the occupation was specified, no further evaluation of the tasks that this individual was performed at work, was made. Similarly, only less than 10% of the patients were referred for further evaluation to the regional occupational health clinic.

Lack of awareness among non-occupational clinicians regarding the role of occupational risk factors in the multifactorial etiology of CTS is not uncommon[2, 6]. This is unfortunate because it denies the afflicted workers (and their fellow workers) the benefit of interventions that will improve work conditions or introduction of preventive measures, as well as, of having the injury being recognized as a work-related injury that is subject to compensation.

It is of interest to note that even in this non-selected group of patients certain occupational risk factors are more prevalent in CTS patients than in other patients. Thus, our findings point to the need of improving clinicians' awareness to the possible role of occupational risk factors in the etiology of CTS, when evaluating a particular individual. This can be accomplished by exposing them to relevant literature and improving communication among various medical disciplines. Awareness to the possible role of work-related risk factors in the multifactorial etiology of the CTS among health care professionals, as well as employees and employers, could lead to changes in working conditions of many and reduction the burden of this syndrome.

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