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# Is working with colleagues in flexible employment a risk factor for carpal tunnel syndrome?



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## AIMS:

Carpal Tunnel Syndrome (CTS) represents one of the most significant and costly health problems occurring in the worldwide working population. Prevalence rates of CTS vary between 2.7% and 5.8% in the general population and reach 10% or more in specific occupations.

Epidemiological studies have identified several combinations of personal and work-related risk factors for CTS, but few have reported associations between the work organization and CTS.

The aim of this study was to determine if working with colleagues in flexible employment was a risk factor of CTS.



## METHODS:

This cross-sectional study was based on epidemiological surveillance data collected by a network of 83 occupational physicians (OP) in the working population of the Loire Valley region (West-Central France).

**Subjects** were randomly selected by OP from workers undergoing a mandatory regularly-scheduled annual health examination between April, 2002 and April, 2005. All OP were trained by the investigators to perform a standardized physical examination. A self-administered questionnaire including personal and work-related characteristics was filled out by workers.

**Outcomes:** two definitions of CTS were used:

- Clinically-diagnosed cases of CTS were defined (i) the presence of symptoms of CTS on the day of the examination or for at least 4 days during the preceding 7 days *WITH* (ii) positive results for at least one of the tests during the physical examination.
- Symptomatic CTS cases were defined by (i) the presence of symptoms *WITHOUT* (ii) positive test results during the physical examination.

**Statistical methods:** Analyses were performed separately for men and women.

Relationships between CTS and potential risk factors were studied by binary logistic regression modeling according to a 3-stage process: univariate models (stage 1), group multivariate models (stage 2) and final multivariate model (stage 3). Bilateral cases of CTS counted as only one disorder.

## RESULTS:

The population comprised 3,710 workers [2,161 men (58%) and 1,549 women (42%), mean age of 38.7 years,  $\pm$  10.3 years] representing about 3.4% of the regional workforce. The distribution of occupations was close to that of the regional workforce, except for the rare occupations not surveyed by OP.

156 cases of CTS were diagnosed, including 113 clinically-diagnosed cases of CTS and 43 symptomatic cases. CTS was bilateral in 65 cases (41.7%).

The prevalence of CTS in the male and female working populations were 3.1% [95% IC 2.4-3.9] and 5.7% [95% IC 4.6-7.0] respectively.

Working with temporary workers was associated with CTS for women (OR=1.99 [95% CI 1.23-3.25]), but not for men.

**Table 1 : Multivariate model of risk factors for CTS in women.**

	Women (N=1,456, N <sub>CTS</sub> =82)				
	N <sub>sample</sub>	N <sub>CTS</sub>	OR	95% IC	p-value
<b>Personal factors and medical history</b>					
Age (1-year increment)			1.07	1.05-1.10	<0.0001
Body max index (1-kg/m <sup>2</sup> increment)			1.04	0.99-1.09	0.1082
<b>Factors related to the work organization (yes/no)</b>					
Too little recovery time (<10 minute break possible) and high repetitiveness ( $\geq$ 4 hours/day)	106	14	1.73	0.88-3.42	0.1144
Work with temporary workers	444	39	1.99	1.23-3.25	0.0055
<b>Working postures and biomechanic constraints (yes/no)</b>					
Use of vibrating handtools ( $\geq$ 2 hours / day)	61	10	2.44	1.11-5.38	0.0264
Extreme wrist bending posture ( $\geq$ 2 hours/day) and high physical demand					
No factors	840	32	1.00		0.1617
One factors	442	33	1.64	0.97-2.78	
Both factors	174	17	1.57	0.79-3.12	
<b>Psychosocial factors at work (yes/no)</b>					
High psychological demand	728	54	1.90	1.17-3.09	0.0093

\* Rating Perceived Exertion Borg scale  $\geq$  14 for women

## DISCUSSION:

The factors related to work organization differed between genders. This might reflected not only psycho-physiological factors but also differences in exposure to constraints at work related to the gender division of work [1,2].

Working with temporary workers was associated with CTS in women. This has never, to our knowledge, been reported in the literature. It could be hypothesized that the work load of such experienced women was increased because they may have had to spend part of their working time training their less qualified temporary colleagues. Association between working with temporary workers and CTS was no significant in men. That could be explain by the weak statistical power in the male subgroup linked by the smaller prevalence of CTS in men.

**In conclusion**, this study showed that factors related to work organization are associated with clinically-diagnosed and symptomatic CTS, as well as personal and biomechanical factors, but the results should be interpreted with caution because of the cross-sectional design of the study that precludes any judgement of causality.

[1] Silverstein B, Fan ZJ, Smith CK, Bao S, Howard N, Spielholz P, et al. Gender adjustment or stratification in discerning upper extremity musculoskeletal disorder risk? *Scand J Work Environ Health*. 2009;35(2):113–26.  
 [2] Van Rijn RM, Huisstede BMA, Koes BW, Burdorf A. Associations between work-related factors and the carpal tunnel syndrome—a systematic review. *Scand J Work Environ Health*. 2009;35(1):19–36.