

Predictive risk factors for chronic regional and multisite musculoskeletal pain: A 5-year prospective study in a working population



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ABSTRACT

The role of psychosocial and physical factors in the development of musculoskeletal pain (MSP) has now been clearly demonstrated. However, it is unclear whether these factors contribute to specific regional MSP or to multisite pain. The main goal of this study was to assess the impact of work-related factors according to gender on the development of regional and multisite MSP. A total of 12,591 subjects (65% men and 35% women) who were born in 1938, 1943, 1948, and 1953 and were participating in a French longitudinal prospective epidemiological survey (ESTEV) in 1990 to 1995 were eligible. Personal factors and work exposure were assessed by self-administered questionnaires. Statistical associations between chronic MSP (regional body site or multisite), personal factors, and occupational factors were analyzed using logistic regression modeling. The incidence of regional MSP and multisite pain in 1995 were, respectively, 17% and 25.6%. For women, highly repetitive movements predicted neck/shoulder pain; posture and vibrations predicted arm and low back pain; and effort with tools predicted arm pain. For men, forceful effort and vibrations predicted neck/shoulder pain; posture and forceful effort predicted lower limb and low back pain; and forceful effort and effort with tools predicted arm pain. Physical constraints (ie, forceful effort or vibrations) were associated with multisite pain in both genders. Only for women, psychological factors were risk factors predictive of upper limb pain and in 3 or 4 painful anatomical sites. These results support the hypothesis that some physical and psychological work-related factors are predictive of regional or multisite MSP but differ according to gender. Gender differences and risk factors for work-related musculoskeletal pain should be also taken into account to more effectively target preventive measures.

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1. Introduction

Regional musculoskeletal pain (MSP) is common in the working population [13]. However, most studies have focused on a single

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occupation and a single body site. Most previous studies on MSP have concerned single-site pain and considered risk factors as distinct and specific to each pain site or disorder [12]. More epidemiological research has been recently devoted to pain in simultaneous sites, especially after the finding that multisite MSP is extremely common in the working population [7,19]. Moreover, multisite MSP could be considered as an independent risk factor per se for work disability or sickness absence [17,26,27,38–41].

Several risk factors related to different physical exposures at work (eg, static postures, repetitive tasks, heavy loads, vibrations) and also psychosocial conditions related to job characteristics (eg, little influence on one's work situation, high quantitative job

demands, limited support from co-workers or supervisors) have been identified as potential causes for MS. There is growing evidence that these work-related mechanical and psychological factors increase the risk of musculoskeletal disorders (MSDs) and are related to the course of MSDs [4,9]. Psychosocial and physical risk factors appear at least equally important [5,22]. However, it is unclear whether these factors contribute to specific regional MSP or to multisite pain.

Several studies have reported many male–female differences in the prevalence of certain symptoms of work-related musculoskeletal disorders [31,40]. Work-related risk factors may also differ according to gender. Several recent studies have paid particular attention to differences in exposure by gender [1,5,36,37]. Moreover, Messing et al. reported that stratifying analyses by gender is necessary to detect and understand associations between exposures and MSDs [37].

In this context, the objective of the large-scale French longitudinal ESTEV study (Health Work and Ageing Investigation) was to evaluate the “predictive” value at 5 years of work-related psychological and mechanical factors according to gender. The present study examined the outcome of pain in 4 regions (the neck/shoulder; the elbow, forearm, and hand; the low back; the hip, knee, and foot) as well as multisite pain (2, 3, and 4 anatomical sites) as confirmed by clinical examination.

2. Methods

The aim of the ESTEV study was to investigate the relationships between work conditions and health status. Details on the general and more specific aspects of this study have previously been published [8,21].

2.1. Study population

Briefly, the study population in 1990 was randomly selected from exhaustive lists of subjects under the supervision of 400 volunteer occupational physicians in 7 French regions. For each physician, sample selection was stratified by gender and the 4 years of birth considered (1938, 1943, 1948, and 1953), and by the main occupational status according to national rates of national employment statistics, resulting in a representative sample of French subjects. All participants filled in a self-administered questionnaire on work conditions and health status. Medical history and various conditions were then completed by the occupational physicians during clinical examination. In particular, symptoms of musculoskeletal disorders were systematically recorded with standardized examination of the main anatomical sites (shoulder, elbow, wrist, neck, low back, knee, and ankle). A follow-up examination comprising the same procedures was performed in 1995. A total of 21,378 subjects were included in the ESTEV study in 1990, and 18,695 subjects (87%) were examined twice.

2.2. Chronic regional body site and multisite pain status

Musculoskeletal pain status was based on the presence of self-reported symptoms combined with clinical examination [8]. In the present study, case subjects with chronic MSP were defined as subjects who, on the day of the medical examination, declared neck, shoulder, elbow, wrist, hand, low back, hip, knee, or foot pain present for at least 6 months (duration of current episode or intermittent complaints over the last 6 months) and who presented with positive clinical signs (eg, active or passive functional limitations, stiffness, tenderness). Regional pain status was assessed for each of the 4 regions (neck/shoulder, upper limb, low back, and lower limb). Three binary variables were created to evaluate MSP in multiple sites (MSP-2: 2 regions painful vs 1 region painful);

MSP-3: 3 regions painful vs 2 regions painful; MSP-4: 4 regions painful vs 3 regions painful). Each regional pain and 3 types of multisite pain were used as outcome measures in multiple logistic regression models.

2.3. Determinants of MSP

Exposures were assessed using a checklist of work conditions filled in by the subjects and supervised by the physician. The questionnaire included 30 questions about various kinds of physical activities at work and the psychosocial work environment [21].

2.3.1. Physical activities

According to the literature on physical risk factors for shoulder disorders and factorial analyses in ESTEV data [21], we defined 9 physical constraints that were grouped into 6 binary dimensions as follows: (1) “forceful effort” dimension: exposure to considerable physical effort; (2) “effort with tools” dimension: exposure to physical effort with tools; (3) “heavy loads” dimension: exposure to carrying heavy loads; (4) “posture” dimension: exposure to long, difficult working positions and/or awkward posture; (5) “movements” dimension: exposure to precise movements and/or repetitive work; and (6) “vibration” dimension: exposure to considerable vibrations and/or exposure to jolts.

2.3.2. Psychological work environment

According to Vezina et al. [48], 6 items from the self-administered ESTEV questionnaire were used together with a proxy measure of the 2 fundamental psychosocial factors of the Karasek model [28], namely, decision latitude or decision control and psychological demand or job demand. Decision latitude was defined as low when the subject answered “no” to at least 2 of the following 3 items: “there is room for learning in my work; my work varies; I can choose how to do my work.” Similarly, psychological demand was defined as high when the subject answered “yes” to at least 2 of the following 3 items: “I have to work fast; I have to do several things at once at work; I’m often interrupted at work.”

2.4. Covariates

The following covariates were included in this study according to the literature: sociodemographic factors (gender, age, social class) and individual risk factors (body mass index (BMI), smoking status, and participation in sporting activities). The role of these covariates as potential confounders and effect modifiers was investigated.

2.5. Statistical analysis

Statistical analysis was conducted among workers who had no pain at baseline. The analysis was performed for each of the 4 regions as well as for the 3 types of multisite pain (MSP-2, MSP-3, and MSP-4).

Possible determinants, including psychological or physical dimensions, were analyzed in various adjusted models. Initial interaction analysis demonstrated effect measure modification by gender not only for the association between exposure variables and each regional pain but also for multisite pain. All subsequent analyses were therefore stratified by gender. First, a cross-sectional approach was used to test associations between psychological or physical dimensions in 1990 and each of 4 regional MS prevalence and each of 3 types of multisite pain prevalence. Second, and corresponding to a longitudinal design, model 1 tested associations between psychological or physical dimensions in 1990 on the onset of each of 4 regional MSs, and, finally, model 2 tested associations between psychological or physical dimensions in 1990 on

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