Forms of work organization and associations with shoulder disorders: Results from a French working population

Julie Bodin a, *, Ronan Garlantézec b, c, Nathalie Costet b, Alexis Descatha d, e, Natacha Fouquet a, f, Sandrine Caroly g, Yves Roquelaure a, h

a University of Angers, Laboratory of Ergonomics and Epidemiology in Occupational Health (LEEST), Angers, France
b IRSET INSERM U1085, University Rennes I, Rennes, France
c EHESP, School of Public Health, Rennes, France
d INSERM, UMS 011, ‘Population-Based Epidemiological Cohorts’ Research Unit, Villejuif, France
e Univ Versailles St-Quentin, Versailles, France
f Santé Publique France, French National Public Health Agency, Direction of Occupational Health, Saint-Maurice, France
g Laboratory PACTE, University of Grenoble, Grenoble, Alpes, France
h CHU Angers, Angers, France

Article history:
Received 30 July 2015
Received in revised form 29 July 2016
Accepted 30 July 2016

Keywords:
Work organization
Classification
Shoulder disorders

1. Introduction

Several models of work systems coexist in industrial and service sectors, such as the Japanese lean production (or Toyotism), the American human resource model, the Swedish sociotechnical systems, the Italian flexible specialization and the German diversified quality production (Coutrot, 1998; Drago, 1995). They differ according to the target market (mass consumption, niche market, upscale, etc.), the work organization (defined by Hagberg et al. as the more “objective aspects of how the work is organized, supervised and carried out” (Hagberg et al., 1995), such as for example the application of an ISO quality standard, teamwork, job rotation, autonomy), human resource management (modality of payment, training, etc.) and professional relations (trade union, participation, etc.). For example, lean production aims to eliminate waste and is based on several principles including Total Quality Management (TQM) and just-in-time (JIT) (Brännmark and Håkansson, 2012; Coutrot, 1998; Koulouki, 2014; Landsbergis et al., 1999). However, all production systems tend to offer more flexibility and reactivity to the market and customer demands and can, according to some studies, lead to work intensification (Westgaard and Winkel, 2011; European Foundation for the Improvement of Living and Working Conditions, 2003).

Musculoskeletal disorders (MSDs) are the most commonly occurring occupational diseases in France, representing 87% of occupational diseases (45079 cases) in 2014 (Assurance maladie – Risques professionnels, 2015). Shoulder disorders represented 29% of all MSDs. The shoulder is the second most frequent location of MSDs, after the wrist/hand locations (40%) but it causes longer periods of absence from work, loss of productivity and higher economic costs for employers (Hopman et al., 2013; Kuijpers et al., 2014).
classically de
tion) determining the mechanical load applied to soft tissues. Some
2004; van der Windt et al., 2000; van Rijn et al., 2010).

Most studies of the risk factors for shoulder disorders have
focused on direct biomechanical risk factors (e.g. postures, vibra-
tion) determining the mechanical load applied to soft tissues. Some
studies have taken psychosocial risk factors into consideration,
classically defined by Hagberg et al. as “the subjective perceptions
of work organizational factors” and how they are perceived by
workers (Hagberg et al., 1995). Most epidemiological studies in
the literature refer to the models of stress at work such as the Job
Demand Control (JDC) model and the Effort-Reward Imbalance
(ERI) model. However, few have studied the influence of factors
related to the work organization. Factors related to the work or-
ganization correspond to many dimensions (e.g. processes, rota-
tion, links with hierarchy, training) and can be evaluated by
consulting the company’s internal documents and by interview or
self-administered questionnaire for the management (Amoss and
Coutrot, 2008; Amoss et al., 2014; Harenstam et al., 2004) or
workers (Carayon, 1994; Engkvist et al., 2001; European Foundation

Hagberg et al. indicated that “organizational and psychosocial
factors may be the same (e.g. career structuring in an organization),
but psychosocial factors carry ‘emotional’ value for the worker”.
Several conceptual models linking work organization and psychosocial
factors have been developed (Bellemare et al., 2003; Carayon et al., 1999;
Karsh, 2006; Sauter and Swanson, 1996). Our research group has
proposed a multidimensional conceptual model of MSDs for the
purpose of epidemiological studies (Roquelaure, 2016). According
to these models, the work organization is a major determinant of
biomechanical and psychosocial constraints. For example, the
temporal (cycle time, work/rest period, etc.) and physical (work-
station dimensions, loads and force level required, etc.) character-
istics of the work situation determine exposure to biomechanical
factors (Askenazy et al., 2002; Askenazy and Caroli, 2010; Brännmark
and Häkansson, 2012; Koukolaki, 2014; Landsbergis et al., 1999;
St-Vincent et al., 2014; Westgaard and Winkel, 2011).

Similarly, work organization and management practices influence
work-related psychosocial factors by determining the human re-
sources allocated to the production activity, and also the quality of
work relationships and social support. Factors related to work or-
ganization therefore determine the main risk factors for MSDs (i.e.
biomechanical and psychosocial factors) and can be considered as
indirect risk factors for MSDs. For example, the pace of work pro-
duction determines the repetitiveness of arm movement, and
consequently it is important to act on the pace of work in order to
reduce the repetitiveness and thus reduce the risk of MSDs. Work
organization and management practices influence not only work-
related constraints, but also individual resources to interact with
their work environment and to cope with these constraints
(Lazarus, 1991; St-Vincent et al., 2014). Indeed, as suggested by
Sauter & Swanson (Sauter and Swanson, 1996), the development of
musculoskeletal symptoms is mediated not only by physiological
strain of the soft tissues, but also by a complex of cognitive pro-
cesses involving the detection and labelling/attribution of somatic
information as symptoms of MSDs. The latter psychological
mechanisms have a major role in the appearance and prognosis of
MSDs (Bongers et al., 2006), but are difficult to evaluate by epide-
miological studies.

There is conflicting evidence regarding the relationships be-
tween organizational practices (e.g. application of an ISO quality
standard, teamwork, quality circles, job rotation) and the risk of
MSDs (Askenazy and Caroli, 2010; Askenazy et al., 2002; Brännmark
and Häkansson, 2012; Ferreira Júnior et al., 1997; Landsbergis et al., 1999; Marklund et al., 2008; Westgaard and
Winkel, 2011). Using the data of the epidemiological MSD surveil-
lance system in the Pays de la Loire region (Loire Valley district,
west-central France) (Ha et al., 2009), we studied the role of
biomechanical, psychological and organizational factors in MSDs.
We showed no or moderate associations between organizational
(e.g. work pace dependent on automatic rate, work with temporary
workers) and psychological factors (e.g. high psychosocial demand,
low decision authority, low social support) and shoulder disorders,
biomechanical factors being predominant (Bodin et al., 2012a;
2012b, 2012c; Roquelaure et al., 2011).

Nevertheless work organization cannot be summarized in a
single variable which could wrongly express several embedded
dimensions, such as teamwork, job rotation and autonomy (Caroly
et al., 2010). A few studies have identified forms of work organi-
sation based on several organizational and psychosocial variables
using classification methods (Amoss and Coutrot, 2008; Amoss
et al., 2014; Carayon, 1994; Daubas-Letourneux and Thebaud-
Mony, 2002; Engkvist et al., 2001; Harenstam et al., 2004; Leijon
et al., 2006; Lorenz and Valeyre, 2005; Valeyre, 2006; Valeyre et al.,
2009), but none has focused on the risk of shoulder pain.

We hypothesize that some forms of work organization with high
organizational constraints carry more risk for shoulder disorders
than others. Identifying such forms of work organization more
accurately could be useful to improve understanding of the re-
lationships between work organization and MSDs, in particular
shoulder disorders. From a practical point of view, organizational
factors might be levers for action for ergonomists to reduce expo-
sure to biomechanical and psychosocial factors and thus reduce
the prevalence of shoulder disorders. This could help ergonomists
to implement preventive actions for workers exposed to these dele-
terious forms of work organization (Roquelaure, 2015).

The aim of the present epidemiological study was first to identify
different forms of work organization characterized by patterns of
organizational and psychosocial variables in a sample of French
workers, and secondly to compare symptomatic and clinically-
diagnosed shoulder disorders according to these different forms
of work organization.

2. Methods

2.1. Participants

This cross-sectional study was based on a large sample of
workers of the Loire Valley region (West Central France, French
Public Health Agency). All salaried workers in France, including
temporary and part-time workers, undergo a mandatory health
examination by an occupational physician (OP) in charge of the
medical surveillance of a group of companies. All OPs practicing
in this region between 2002 and 2005 were invited to participate, and
83 of them (18%) volunteered to take part in the study. Workers
were selected at random, following a two-stage sampling proced-
ure: first, 15 to 30 half-days of scheduled examinations for each OP
were chosen for sampling by the investigators. Next, each OP was
asked to randomly select one from the scheduled ten workers on
the selected half-days of worker examinations (Roquelaure et al.,
2006). The selected workers were then examined by the OPs. A
total of 3710 workers were included (2.0% of workers surveyed by
the 83 OPs). Comparison of their socio-economic status with the
French census (1999) (http://www.insee.fr) showed no major
differences for either gender. Overall, the distribution of occupations
was close to that of the regional workforce, except for the few oc-
cupations not surveyed by OPs (e.g., shopkeepers and independent
workers) (Roquelaure et al., 2006).

Craftsmen, salesmen and managers who are mainly self-
employed workers can decide for themselves about their work
organization, and thus they were not comparable to salaried
workers. Moreover, there were very few (n = 16) and thus were not
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات