

Dissatisfaction with work as a risk factor of musculoskeletal complaints among foresters in Poland

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Abstract

Introduction. Researchers indicate an important relationship between the level of job satisfaction and the state of health of the employees. Some elements of work related with its character, organization, and interpersonal relationships may evoke strong stress, manifested by, among others, an increased musculoskeletal tension which, in turn, may lead to permanent dysfunction of this system.

Objective. The objective of the study was analysis of the relationship between the level of job satisfaction and occurrence of musculoskeletal disorders among employees of the State Forests.

Materials and method. The research material was collected using two instruments: the modified Nordic Questionnaire for assessment of musculoskeletal disorders, and a questionnaire concerning job satisfaction. The study was conducted in a group of 396 employees of the State Forests from 8 regions of Poland.

Results. The results of analysis confirmed a significant relationship between job satisfaction and the occurrence of musculoskeletal disorders. The lower the level of job satisfaction, the more frequent the experiencing of musculoskeletal disorders.

Conclusion. Low level of job satisfaction is a risk factor for the occurrence of musculoskeletal disorders. Shaping of work conditions, which are the source of job satisfaction, should be considered as one of the main elements of prevention of musculoskeletal complaints.

Key words

work, job satisfaction, forestry employees (foresters), musculoskeletal disorders

INTRODUCTION

People at productivity age devote a considerable part of their life to the performance of occupational activity. Studies published by the Fourth European Working Conditions Survey show that a typical European spends 38.6 hours weekly at work, on average. Poles work for a considerably longer amount of time, and their weekly working time is by 5.3 hours longer [1]. In the work environment there occur a number of factors which may directly or indirectly threaten the health, or even the life of those occupationally active. The effect of these factors leads to deterioration of the state of health of the employee and the occurrence of various work-related health complaints. The study conducted by the Main Statistical Agency on a sample of 15,498 currently occupationally active persons indicated factors which may exert an unfavourable effect on the general wellbeing or physical health [2]. The study confirmed that apart from physical factors (chemical substances, dust, vapours, smoke, gas, noise, vibration, excessive load, forced body position), psychosocial factors, such as: time pressure, excess of duties,

ineffective organization, improper social relations (violation, bullying, isolation) are significantly related with health. As many as 37.1% of those occupationally active indicated psychological factors as a source of hazards at the workplace. The total number of hazards (so-called person-hazards) at the workplace was 6,693,000.

International studies conducted in the countries of the European Union also show a significant relationship between the occupation performed and health. More than 1/3 of Europeans (35%) believe that the work performed influences their health [3]. This relationship between work and health is confirmed by 2/3 of Greeks, Poles, Lithuanians and Slovenians. A slightly lower percentage of occupationally active population admit that work has a negative effect on their health (28.6% of Europeans, 47.3% of Poles). Among the negative consequences of work, the examined Europeans most often reported musculoskeletal disorders (spinal pain, muscle pain) – 47% of those occupationally active. At the same time, it should be emphasized that motor system disorders are also a great social and economic problem. In the last decade, complaints related with diseases of this system have been considered as one of the main causes of temporary incapability for work (14.4% of the total number of days of sick absenteeism in 2014), following pregnancy – 19.2%, injuries and poisonings – 14.4%, as the cause of work absenteeism [4].

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In the relevant literature, attention is paid to the important role of psychosocial factors in the development of various health disorders, including, among others, the development of musculoskeletal disorders [5, 6]. Studies concerning psychosocial sources of musculoskeletal disorders originated in the 1970s, and were intensively developed in the 1980s. The basic assumption of these studies is the belief that certain characteristics of work, such as type of control or lack of social support in the organization, cause stress in employees, which is manifested, among others, by increased musculoskeletal tension. In turn, long-lasting musculoskeletal disorders may lead to the permanent disturbance of the function of this system [6]. A similar relationship was confirmed by studies by Theorell et al. which showed that high requirements at work are significantly associated with higher muscular tension, which, in turn, is positively correlated with complaints concerning the lumbar spine, neck and shoulders [6].

A model of possible connections between the psychosocial characteristic of work and stress and symptoms of musculoskeletal disorders was proposed by Bongers et al. [7]. In the model, it is assumed that psychosocial characteristic of work (e.g. requirements, control and social support) exert an effect on the mechanical work load. In the situation when, as a result of inefficient management, an insufficient amount of time has been allocated to the performance of a given job, the employee must expend more physical energy within a time unit, which may cause an excessive work load. In addition, such a situation is the cause of the occurrence of psychological stress which, in turn, causes other consequences, including: 1) an increase in muscle tone, 2) weakening of the capabilities for coping with mechanical load and the occurrence of musculoskeletal disorders, 3) development of behavioural changes and other health complaints. The model by Bongers assumes that stress at work favours the occurrence of musculoskeletal disorders in the lumbar spine region, the neck, shoulders, and other parts of the body. With specified individual predispositions such symptoms may take a chronic form, or even be the cause of incapacity.

Stress related with the performance of occupational activity is related not only with the character and organization of work, but also with interpersonal relationships. Studies conducted in Japanese factories confirmed that disorders in relations with the superiors or co-workers negatively affect the psychological health of employees [8]. The studies showed that improper relationships at the workplace, manifested as interpersonal conflicts, are significantly related with frequent occurrence of depression. The relationship between interpersonal conflict and depression was significantly higher among males with a high education level who were not physical workers, compared to those who had a low occupational status (physical workers with a low level of education).

A number of elements of the work environment, such as its character, salaries, work conditions, interpersonal relations (relations with the superiors and co-workers), as well as the style of management, contribute to the overall level of job satisfaction, as an indicator of satisfaction of the current expectations of an employee with respect to the work performed [9]. A low level of satisfaction with work is due, among other things, to overloading with work, stress, disturbance of social relations which, in the context of the presented results of studies, may result in disorders in the state of health, including experiencing musculoskeletal

disorders. The objective of the presented study is evaluation of the relationship between the level of job satisfaction and occurrence of musculoskeletal disorders among employees of the State Forests. The hypothesis was adopted that a low level of job satisfaction favours this type of complaint.

METHODS AND STUDY GROUP

The research material, which is a basis for the presented analyses, was collected within the research project finances by the State Forests entitled: 'Selected health hazards in the work environment of foresters in Poland, with particular consideration of occupational diseases'. In order to study the presented scope of problems, the results of investigations were analyzed using two research instruments: a questionnaire concerning musculoskeletal disorders, and a questionnaire for examining job satisfaction. The first questionnaire concerned complaints occurring in nine musculoskeletal systems, and was developed based on the modified Nordic questionnaire for assessment of musculoskeletal disorders [10]. The Nordic questionnaire was developed by Kuorinka I. and Jonsson B. The primary goal of the questionnaire was to obtain an answer to the question: 'Do musculoskeletal troubles occur in a given population, and if so, in what parts of the body are they localised?' The questionnaire contained questions pertaining to the assessment of the frequency of occurrence of pain concerning the musculoskeletal system.

The major part of the questionnaire concerning job satisfaction included an evaluation of relations with co-workers and superiors, evaluation of work and conditions of performing this work, evaluation of organization of the workplace, possibilities of development in the workplace and payment. In addition, the questionnaire contained a block of items pertaining to the assessment of the respondent's life situation and a list of stressful life events [11], as well as the respondent's particulars. The analysis covered the results of studies conducted during 2014–2015 in 16 forestry inspectorates located in nine regions (Białystok, Gdańsk, Bydgoszcz, Olsztyn, Warsaw, Zielona Góra, Wrocław, Katowice, Opole). The study group was selected by two-stage sampling. At the first stage, forestry inspectorates were selected in individual regions of Poland by the Directors of the Regional Directorates of State Forests. The criterion for selection of forestry inspectorates was an assessment of the exposure of employees to occupational diseases. In each of the selected forestry inspectorates, 25 persons were chosen for the study from four occupational groups: forester, deputy forester, supervision employee, and administration employee. The study included 399 employees, and 7 service workers were excluded from the analysis whose character of work (physical work) did not allow their inclusion in the above-mentioned groups of employees. The study did not cover the occupational group of lumberjacks who work in forestry and are especially exposed to musculoskeletal disorders. The omitting of this occupational group resulted from the character of their employment. They are not full-time employees of the State Forests, but work within outsourcing companies or are self-employed, whereas the project concerned full-time employees of the State Forests.

Analysis of the collected material was performed using the software SPSS (version 23). Statistical analysis included: numbers and percentages, arithmetic mean

values, correlations (Pearson's r) between the number of complaints and evaluation of job satisfaction, and models of the conditioning of musculoskeletal complaints based on step-wise multiple regression analysis.

In the study group, males prevailed (86%), females constituted only 14% of the respondents in the study. The majority of respondents had a long period of employment in State Forests – longer than 15 years, while a half of the total number of respondents had been employed in forestry for longer than 25 years. Only 1/5 of the examined workers had a period of employment not exceeding 15 years. In the examined sample, the mean period of employment was 25.1 years. The respondents' mean age was also high (47.8 years). Nearly a half of them had reached the age of 50, and 13.3% of the total number of respondents were aged 60 and over. Every fifth respondent (21.4%) was aged under 40. According to the education level, the respondents were divided into two, nearly equally numerous subgroups: those who had completed secondary school (49.5%) and those with university education (50.5%). The respondents were employed at four groups of work positions. The largest group were foresters (37.5%), a slightly smaller group – sub-foresters (27.6%) and administration employees (27.6%), whereas the smallest group were supervisors (forest rangers and supervision engineers) – 7.4%. A half of the State Forests employees lived in rural areas, ¼ were urban inhabitants, whereas the remainder (21.4%) live in forester's lodges.

RESULTS

The study showed that the majority of employees of the State Forests experienced musculoskeletal disorders. Only approximately 15% of respondents did not experience this type of complaints at all (Tab. 1). The complaint most frequently reported by forestry employees was low back pain, which was reported by nearly ¾ of respondents (71.7% of the total number of workers in the study). A frequent complaint reported by foresters was knee pain (51.3%), followed by pain in the region of the shoulders (37.1%) and the neck (31.6%). Approximately 1/5 of respondents experienced pain also in the upper back, and in the regions of the ankles, elbows, and hips.

Table 1. Musculoskeletal disorders within the last 12 months

Type of complaints	Total		Not caused by injury	
	N	% of the total (N=396)	N	% of the total (N=396)
Lack of any complaints	42	10.5	58	14.6
Complaints concerning neck	125	31.6	106	26.8
Complaints concerning shoulders	147	37.1	105	26.5
Complaints concerning elbows	83	21.0	74	18.7
Complaints concerning hands, wrists	100	25.3	90	22.7
Complaints concerning upper back	84	21.2	84	21.3
Complaints concerning low back	284	71.7	229	57.8
Complaints concerning hips	75	18.9	68	17.2
Complaints concerning knees	203	51.3	143	36.1
Complaints concerning ankles	91	23.0	51	12.9
Mean number of complaints per 1 person		3.12		2.91

Verification of the hypothesis concerning the relationship between musculoskeletal pain and job satisfaction required the exclusion of complaints which occurred as a result of injury. After the exclusion of these cases, the percentage of employees who had not experienced any complaints during the previous year increased by approximately 5%, up to 14.6%. The remainder, despite not experiencing any injury, experienced musculoskeletal pain. The most often mentioned complaints were: low back pain (57.8%), and knee pain (36.1%). More than ¼ of respondents experienced pain in the region of the neck and shoulders which was not caused by an injury. The percentage of the employees who experienced pain concerning the hips and ankles was the lowest. The majority of the examined workers experienced musculoskeletal pain in various regions of the body. On average, one examined person who experienced pain had pain concerning three different systems ($x=3.12$). The mean indicator of the complaints experienced which were not due to injury was somewhat lower ($x=2.91$).

The hypothesis was adopted indicating the relationship between musculoskeletal complaints in employees of the State Forests and their job satisfaction. The evaluation included the level of satisfaction in four dimensions: satisfaction with interpersonal relations (relations with co-workers and superiors), satisfaction with the character of work (type of work performed, work conditions, work organization), satisfaction with payment, and satisfaction with possibilities of personal development. Each of the dimensions of satisfaction was assessed according to a 7-degree scale, where 1 was very dissatisfied, while 7 very satisfied. For individual dimensions of work, mean satisfaction coefficients were calculated (Fig. 1). The analysis showed that the overall level of satisfaction with work among forestry workers was rather high – $x=5.8$ (acc. to 7-degree scale). The employees of the State Forests were most satisfied with the character of their work ($x=5.96$), followed by relations with their co-workers (5.81), and work conditions (5.74). A slightly lower indicator of satisfaction was found with respect to the organization of management in the workplace (5.56), and concerning the possibilities of personal development (5.5). At the same time, it should be emphasized that forestry workers are generally satisfied with their life situation. The mean indicator of satisfaction with life was slightly higher, compared to the indicator of job satisfaction (6.12 and 5.80, respectively).

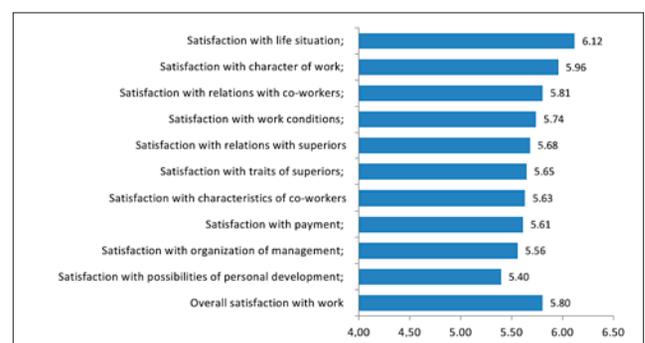


Figure 1. Mean evaluation of satisfaction with individual dimensions of occupational activity

In order to verify the hypothesis concerning the relationship between the level of job satisfaction and occurrence of musculoskeletal complaints, analysis of the correlation

Table 2. Correlations between mean indicator of musculoskeletal complaints and indicators of satisfaction with work and life (overall evaluations according to 7-degree scale)

Indicators	Pearson's correlation	Significance (bilateral)	N
Satisfaction with personal traits of co-workers	-.104	.038	396
Satisfaction with personal traits of superiors	-.093	.066	395
Satisfaction with character of work	-.123	.014	396
Satisfaction with work conditions	-.133	.008	396
Satisfaction with organization of management	-.051	.311	395
Satisfaction with possibilities of personal development	-.001	.986	393
Satisfaction with payment	-.135	.007	396
Overall satisfaction with work	-.133	.008	395
Satisfaction with relations with co-workers	-.089	.076	396
Satisfaction with relations with superiors	-.111	.029	390
Satisfaction with life situation	-.131	.009	392

between these variables was performed. The results showed that the experienced musculoskeletal complaints were negatively correlated with overall satisfaction with work

– the lower the job satisfaction, the more the complaints experienced (a statistically significant relationship on the level of $p < 0.01$). This relationship was also confirmed by correlations between experiencing complaints and satisfaction with detailed aspects of work. Among the examined forestry workers, complaints occurred the more frequently the lower the level of satisfaction with the traits of their co-workers and relations with the superiors, and the character of work (statistical significance on the level of $p = 0.05$). Complaints were also more frequent when the employees of the State Forests were less satisfied with work conditions and payment, as well as with their life situation in general. Despite the fact that the presented correlations were statistically significant, the strength of the relationship between the analyzed variables was very weak (correlation coefficient $r < 0.15$). Simultaneously, it should be emphasized that the number of complaints was not significantly correlated with such dimensions of satisfaction as satisfaction with the traits of the superiors, satisfaction with organization and management at the workplace, satisfaction with possibilities for personal development, and relations with co-workers.

Based on the results obtained, it should be presumed that a low level of job satisfaction is the factor which favours

Table 3. Models of conditioning of musculoskeletal disorders (results of multiple step-wise analysis)

Occurrence of complaints	Predictors	ANOVA		Coefficients β		t	p	R^2
		F	p	non-standardized	standardized			
Complaints concerning neck region	(constant)			.813		3.625	.000	
	Satisfaction with life situation	7.075	0.000	-.083	-.135	-2.474	.014	0.053
	Age			.005	.109	2.161	.031	
Complaints concerning shoulders	(constant)			.673		3.564	.000	
	Satisfaction with life situation	4.981	0.026	-.068	-.114	-2.232	.026	0.013
	Satisfaction with payment			-.049	-.110	-2.009	.045	
Complaints concerning elbows	(constant)			.321		1.862	.063	
	Satisfaction with character of work	5.677	0.004	-.061	-.126	-2.483	.013	0.029
	Age			.005	.122	2.413	.016	
Complaints concerning upper back	(constant)			.781		5.023	.000	
	Satisfaction with traits of co-workers	8.478	0.000	-.122	-.238	-4.309	.000	0.063
	Period of employment			-.005	-.123	-2.419	.016	
Complaints concerning low back	(constant)			.044	.113	2.029	.043	
	Overall satisfaction with work	5.707	0.004	-.089	-.144	-2.829	.005	0.028
	Age			.005	.102	2.002	.046	
Complaints concerning hips	(constant)			.132		.965	.335	
	Age	5.378	0.005	.005	.129	2.541	.011	0.028
	Satisfaction with traits of superiors			-.035	-.102	-2.014	.045	
Indicator of musculoskeletal complaints	(constant)			.495		4.710	.000	
	Overall satisfaction with work	6.961	0.000	-.039	-.147	-2.925	.004	0.052
	Age			.003	.152	3.018	.003	
	Gender*			-.062	-.102	-2.027	.043	

ANOVA – analysis of variance

F – Levene's test

p – significance

t – Student's test

 R^2 – coefficient of determination

*Codes for gender: '1' female, '2' male

the development of musculoskeletal pain. However, being aware that many factors exert an effect on the development of this type of complaints, a multiple analysis was performed using the method of step-wise linear regression. In the group of explanatory variables, not only an overall indicator of complaints was considered, but also the occurrence of complaints concerning various parts of the body (in the region of the neck, shoulders, upper and low back, elbows, wrists, knees and ankles). The group of explanatory variables (predictors) included the indicators of job satisfaction, level of satisfaction with life, and socio-demographic characteristics of the forestry workers examined (gender, age, education, place of residence, work position).

Analysis of step-wise regression showed that in the models of conditioning of musculoskeletal complaints there occur some indicators of job satisfaction, such as: pain in the region of the upper and low back and hips (Tab. 3). Nearly all relationships between the occurrence of complaints concerning various parts of the body and job satisfaction assume a negative value, i.e. the higher the job satisfaction, the less the complaints, and vice versa, the higher the dissatisfaction with the job, the higher the probability of the occurrence of complaints. Such a character of relationships was observed with respect to complaints in the region of the neck (a significant relationship with satisfaction with payment), complaints concerning the elbows (relationship with satisfaction with the character of work), complaints experienced in the low back (relationship with overall job satisfaction), and complaints concerning the hips (relationship with satisfaction with the traits of the superior). Complaints concerning the upper back are affected by satisfaction with the traits of the co-workers, and satisfaction with the possibilities of personal development; however, the relationship of both aspects of satisfaction has an opposite direction. A higher level of satisfaction with the traits of the co-workers co-occurs with a lower indicator of this type of complaints, whereas a high level of satisfaction with personal development is associated with a higher indicator of complaints.

DISCUSSION

Many studies confirm that psychosocial factors at the workplace exert an effect on the state of health of the employees, both from the aspect of self-reported health [12, 13], and from the aspect of the complaints experienced [14, 15]. Among the risk factors of the occurrence of musculoskeletal disorders (MSD) are mentioned: a high pace of work and monotony of work, insufficient freedom in making decisions concerning the work activities performed, insufficient social support, or work-related stress and low level of satisfaction with the performance of work [16]. While seeking causes for the development of musculoskeletal disorders other factors of psychosocial nature are also indicated, including those directly related with experiencing stress. One of the sources of stress was the work performed. Unpleasant experiences associated with work concern not only the severity of its performance, safety, adequate payment, but also the quality of interpersonal relationships, which may exert an effect on the psychophysical health of employees. This presumption is confirmed by studies conducted on a wide scale in Japanese enterprises, which covered 17,390 males and 2,923 females employed in nine factories [8].

Based on the results of the study conducted among employees of the State Forests, it should be presumed that there is a relationship between the selected aspects of job satisfaction and experiencing musculoskeletal complaints. The study showed that the majority of forestry workers experience musculoskeletal complaints, most frequently low back pain, pain concerning the knees, and the regions of the neck and shoulders. A similar scale of the phenomenon of the occurrence of musculoskeletal complaints was found in studies conducted among private farmers [17, 18]. A high level of occurrence of musculoskeletal disorders among the examined foresters is certainly associated with a large number of employees at an older age, with a long period of employment, or working under difficult conditions. Two-way analyses showed that these variables are related with the occurrence of musculoskeletal disorders; therefore, they were included in multi-factor analyses, aimed at the determination of the relationship between the level of job satisfaction and the scale of complaints.

Despite the fact that forestry workers are generally satisfied with various aspects of the work performed, a relationship is observed between the level of satisfaction experienced and the occurrence of complaints. The multivariate analyses performed showed that the experienced musculoskeletal complaints were negatively related with overall assessment of job satisfaction, the lower the job satisfaction, the more the complaints experienced. In the analysis of conditioning of the occurrence of musculoskeletal disorders, demographic data were also considered, as well as data associated with the character of work (age, gender, place of residence, or the position held), assuming that these variables may be related with musculoskeletal complaints. Such a relationship was observed concerning the age of the foresters examined (the older they were the more the complaints), and their gender (complaints were more frequent in females than males). Despite the fact that these variables are important risk factors for the occurrence of musculoskeletal complaints, the model of conditioning of complaints included also variables determining the level of job satisfaction, which confirmed the correctness of the hypothesis concerning the relationship between the level of job satisfaction and the occurrence of complaints of this type.

The cause of back pain while performing work may be not only overloading with physical work, but also muscle tone caused by psychological stress, the source of which is lack of social support or limitation of control [19]. This observation is partly confirmed by the results of studies among forestry workers. Pain reported by them in the upper back was significantly related with the way of perception of the traits of co-workers. The intensification of complaints was higher, the less the respondents were satisfied with their co-workers. Improper relations with co-workers and the lack of support on their part were the cause of psychological stress. Such a stress may also be caused by disturbed relations with the superiors. Evaluation of the traits of the superiors significantly affected the complaints concerning the hip region reported by forestry workers. These complaints occurred more frequently when the employees evaluated their superiors in more negative terms.

The relationships observed between job satisfaction and the occurrence of musculoskeletal complaints indicated that one of the methods of prevention of this type of disorders is the employers' concern about the creation of work conditions

which would provide satisfaction for the employees. Such activities of the employer are not only the manifestation of a humanistic approach to an employee, but also the manifestation of concern about an efficient functioning of the enterprise and the profits obtained. Success in this area, to a high extent, is provided by physically healthy and satisfied employees. The data by the Main Statistical Agency indicate that musculoskeletal disorders are among the three most frequent causes of incapability for work [20]. These disorders affect not only the general state of health and the quality of life of the employees, but also the productivity of their work and, in consequence, the economic situation of the enterprise [21].

The presented results of the study confirm the presence of a significant relationship between job satisfaction and the occurrence of musculoskeletal disorders; however, a low value of the coefficient of determination (R^2) proves that the factors considered in the modelling of conditioning of musculoskeletal complaints to a low degree explain the complexity of predictors of this phenomenon. A further stage of research will be the consideration of other factors, including personality traits of employees.

Based on the results of the analysis performed, it should be presumed that job satisfaction is one of the factors which exert an effect on the occurrence of musculoskeletal disorders. This relationship is confirmed by studies on the consequences of stress for somatic health. Work-related stress, including stress caused by violence and discrimination at the workplace, may result not only in a decrease in productivity, but also cause musculoskeletal disorders due to strong tension or overload [22]. A relationship was also found between an increased probability of occurrence of pain symptoms of high intensity, and insufficient social support, low level of 'social anchor', and low level of social activity. Therefore, it is extremely important to have a 'good job' which is the source of satisfaction, and brings benefits not only to the employee, but also to the employer.

The conducted analyses also indicate the need for studies concerning the conditioning of the occurrence of musculoskeletal disorders in other occupational groups related with forestry, especially lumberjacks who are especially exposed to disorders of the musculoskeletal system. Moreover, the current forms of their employment do not always guarantee proper work conditions.

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