



Work-related musculoskeletal disorders among Slovenian physiotherapists

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ABSTRACT

Introduction: Work-related musculoskeletal disorders (WMSDs) represent a major problem for society, employers, and employees. These kinds of problems can cause discomfort, pain, and poor work performance. Among physiotherapists, the 1-year prevalence of WMSD ranges from 28 to 96%. Most problems occur in the lower back, with a 1-year prevalence of up to 83%. This study aimed to determine the prevalence of WMSD on a sample of physiotherapists from Slovenia and to identify associations between demographic/anthropometric variables, job satisfaction, and physical activity with WRMD aiming to contribute to the development of effective prevention and control strategies.

Methods: The extended Nordic musculoskeletal questionnaire was used to obtain data from a sample of 102 physiotherapists. Data were presented with descriptive statistics and processing was performed with the Spearman's rank correlation coefficient for non-parametric variables. The level of statistical significance was set as $p \leq 0.05$.

Results: The 1-year prevalence of WMSD was 92.2%. One-year prevalence of WMSD was highest for the neck (64%) and lower back (63%). Higher age and more years of practice were correlated with WMSD for shoulders and ankles/feet areas. Several patients treated by a physiotherapist were a risk factor for difficulties in the neck and multiple body areas. The level of physical activity was not correlated with WMSD in different body areas.

Conclusion: The prevalence of WMSD found in our study sample was among the highest compared to other countries, despite probably having similar working conditions as elsewhere in Europe. The first WMSD of Slovenian physiotherapists mostly did not occur in the first 5 years of practice as other studies reported, which could be explained as a result of a good educational training of young physiotherapists. Possible reasons for the high prevalence of WMSD could be that our study sample represented only secondary and tertiary levels of health care; another reason could also be non-ergonomic and hard working conditions during their careers. Physiotherapists are mostly adequately physically active, however, that did not turn out to be effective WMSD prevention in our sample. The relatively high prevalence is indicating the need for better interventions and prevention of WMSD in Slovenian physiotherapists.

Keywords: Musculoskeletal disorder; physical therapist; prevalence

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Submitted: 22 January 2020/Accepted: 27 March 2020

DOI: <https://doi.org/10.17532/jhsci.2020.880>

INTRODUCTION

Work-related musculoskeletal disorder (WMSD) represents a major public health problem for our society, causing large costs for employers, workers, and health insurance systems due to absenteeism,



lost productivity, disability, and increased health care that ultimately has an impact on the quality of life (1-3). Gauthy et al. (3) defined WMSD as “any musculoskeletal system problem that occurs at work and causes discomfort, difficulty, or pain while performing work.” The percentage of EU workers reporting different MSDs in the past 12 months was 58% in the year 2015 (4) and 53.9% in the USA in the year 2012 (5). The prevalence of MSDs in the general population varies considerably between countries, occupational sectors, and sociodemographic factors (4,6). The prevalence of MSD in Slovenia in the EU survey was a little higher than average (62%) (4). The economic burden from MSD represents from 2.6 to 3.8% of GDP in European states (3) and 5.7% of GDP in the USA (5).

WMSD is pathological injuries of bones, ligaments, cartilage, joints, muscles, nerves, vertebral column, and vascular system. They include a wide range of inflammatory or degenerative diseases (6). According to the statement of the World Health organization, WMSD is acute or chronic and can be caused by many different (combinations of) factors (7). Oakman et al. (8) divided risk factors into individual factors (gender, age, the body mass index [BMI], etc.), within-person effects (psychological distress), and factors related to the workplace. Factors associated with the workplace are further divided into physical (biomechanical) workloads, organizational, and psychosocial risk factors (8).

WMSD among health-care professionals

Health-care professionals are exposed to a higher risk of developing WMSD and experience more work-related health problems than any other professional group (8,9). The incidence of WMSD is particularly high in those healthcare workers who work manually or are involved in patient handlings such as nurses, dentists, occupational therapists, physiotherapists, sonographers, and intervention radiologists (10). This is especially true for acute care and rehabilitation centers where is a lot of physical (biomechanical) loads such as working in overstrained and awkward body positions, bending and twisting, prolonged static body position, transferring patients, lifting, vibrations, performing repetitive movements, and performing tasks monotonously;

psychological stress due to large numbers of patients, long working time (10 hours and more), and lack of rest breaks (8,11). WMSD most commonly affects the lower back, neck, upper back, wrist/hands, shoulders, and knees (12). Previous research has also reported that healthcare workers are reluctant to report WMSD, and therefore data are likely to under-represent the actual injury rates (13).

WMSD among physiotherapists

Although physiotherapists have a lot of knowledge about musculoskeletal injuries and prevention strategies, research indicates that there is a high prevalence of WMSD among this group of workers (14,15). The nature of the work of physiotherapists is physically demanding, as it involves repetitive tasks, various manual techniques, and awkward positioning of joints during certain prolonged constrained postures (16,17). Higher exposure of physiotherapists to WMSD is associated with large physical loads and also psychosocial dangers such as time pressure or low job control (13,16,18). Physiotherapists are exposed to the overloading of the musculoskeletal system associated with the non-ergonomic position (19). Modern methods also require the strength of the whole body and using the force of the hands to get the proper function of the patient (19,20). One-year prevalence of WMSD among physiotherapists ranges from 28 to 96% (13). Low back pain is the most common problem of physiotherapists (11,13-15,17,20-30). For the lower back area, the 1-year prevalence is 6.6-83%, mostly due to repeated lifting and transferring, twisting, and bending or standing for a long time (13,23). Physiotherapists who use manual and orthopedic techniques are particularly susceptible for the neck, wrist/palm, and thumb pain (24,25). Bork et al. (26) reported a 3.5-fold increased chance of developing WMSD in the wrists and palms of those who regularly used manual techniques at work.

A possible individual risk factor for developing WMSD is the age, where younger people are more susceptible to developing WMSD (13,24,27,28), although Rugelj (29) reports a higher prevalence of low back pain in older groups, especially in women, due to the cumulative effect, also reported by Cromie et al. (24). Glover et al. (28) and Anyfantis and Biska (21) on the other hand reported that the worst injuries at work appear in the first 5 years

after graduation in 32% of physiotherapists, mostly due to lack of experience of right positions during treatment and reluctance to get help from an assistant (15). Most physiotherapists experience the first symptoms of musculoskeletal pain before the age of 30 (15). Cromie et al. (24) found that those physiotherapists who treat more patients per day are more likely to develop WMSD.

Insufficient physical activity was also identified as a risk factor, as reported by 12.9% of subjects (30) and poor physical fitness by 14% of subjects (28). Alrowayeh et al. (27) found that WMSD prevalence and physical activity were not significantly correlated, although they found a slightly higher percentage of WMSD in those who were physically active. On the other hand, Landry et al. (31) found that general medical staff with low back pain was less physically active. The correlation between physical activity of physiotherapists and WMSD is poorly investigated.

It is concerning that according to the literature because of WMSD, 30% of physiotherapists reported they want to change their career (21), 14.5% wanted to change their specialty area of practice, and 3.2% would leave their profession (24). A large number (84.2%) of physiotherapists who developed WMSD continued to work with discomfort and pain (24).

To date, there is a lack of information regarding the prevalence of WMSD among physiotherapists in Slovenia. Therefore, this study was conducted to determine the prevalence of WMSD for different body areas, identify associations between demographic/anthropometric variables and physical activity with the WMSD among Slovenian physiotherapists aiming to contribute to the development of effective prevention and control strategies.

METHODS

The cross-sectional prospective study included physiotherapists from two prominent governmental rehabilitation institutions, the Institute of Medical Rehabilitation (IMR) University Medical Centre Ljubljana and the University Rehabilitation Institute (URI), Republic of Slovenia. The Slovenian version of the extended Nordic musculoskeletal questionnaire (NMQe) (32) was used to obtain the data (33).

NMQe was translated and adapted to the Slovenian language following the guidelines of Beaton et al. (34). The unpublished study confirmed the reliability and validity of the questionnaire, as in other studies (35,36). It is self-administered and easy to fulfill without a need for supervision.

NMQe inquires about “trouble” defined as “ache, pain, or discomfort” in nine body regions. It is comprised of 11 questions asked about nine body regions, equating to 99 data items generated by the tool. Except for the age data, all response options are dichotomous (yes/no) (32).

The physical activity of the subjects was assessed by the questionnaire physical fitness assessment of adults, National Institute of Public Health, based on the European physical activity guidelines. It consists of four questions about physical activity in a typical week (37). There are given ordinal options from “never” to “seven times per week or more” for aerobic physical activity (moderately and highly intensive physical activity) and from “never” to “two times per week or more” for strengthening and proprioceptive/stretching exercises. Total physical activity is calculated according to Jakovljević et al. (37), where total physical activity is equal to the sum of the number of moderately intensive physical activity and twice as much of highly intensive physical activity. We also obtained anthropometric and demographic data of the subjects.

From 111 subjects who fulfilled a questionnaire, 102 subjects were included in the statistical analysis. The criteria for inclusion in the study were working as a physiotherapist for at least half a year and fulfilled informed consent to participate in the study. The criteria for exclusion were working as a physiotherapist for less than half a year, incorrectly fulfilled questionnaire, and lack of informed consent.

Data collection

Questionnaires were presented at both institutions and were personally distributed to heads of departments. Each study subject completed the questionnaire by himself (self-administered) and returned it to the researcher after 1 week in June 2019.

Statistical analysis

The results were presented with descriptive statistics (mean value, standard deviation, and range). The correlations between variables and WMSD were calculated using Spearman's coefficient of correlation for non-parametric variables with the MedCalc Statistical Software version 14.12.0 (MedCalc Software Bvba, Ostend, Belgium; <http://www.medcalc.org>; 2014). The level of statistical significance was determined as $p \leq 0.05$.

RESULTS

The study sample consisted of 102 physiotherapists, of whom 84 were women (81%) and 20 were men (19%). The mean age of participants was 38.4 (10.3) years, ranging from 23 to 60 years. The mean age (standard deviation [SD]) of men was 36.5 (8.3) years and women 39.2 (10.6) years ($p = 0.224$). The BMI of this sample ranged from 17.7 kg/m² to 44.9 kg/m², with the mean (SD) of 22.8 (4.0) kg/m². The mean (SD) years of practice in our sample were 14.2 (11.1) years, with a range of 0.5-40 years. Fifty-four percent of the participants were employees at the URI, 46% at the IMR. Of these, three physiotherapists (2.9%) performed additional work in private practice.

TABLE 1. Physical activity of the respondents

Total physical activity	Number	Percentage
Insufficient (1-3)	11	10.8
Borderline (4-5)	23	22.5
Sufficient (6-21)	68	66.7
Total	102	100

TABLE 2. Prevalence of WMSD for different body areas

Body area	Lifetime prevalence		One-year prevalence	
	Number	Percentage	Number	Percentage
Neck	81	79	64	63
Shoulders	59	58	34	33
Upper back	59	58	44	43
Elbows	18	18	8	8
Wrists/hands	47	46	29	28
Lower back	88	86	63	62
Hips/thighs	37	36	24	24
Knees	45	44	25	25
Ankles/feet	37	36	15	15

WMSD: Work-related musculoskeletal disorder

Prevalence of WMSD

The 1-year prevalence of pain in any body part in this sample was 92.2%, meaning that 94 subjects had pain or discomfort in at least one body part in the past year. One-year prevalence of pain in individual body parts in this sample was the highest for the neck (64%) and lower back (63%). The body parts with the least symptoms were the elbows (8%) and ankles/feet (15%) (Table 2). The lifetime prevalence was 99%, meaning that only one respondent has not yet experienced pain or discomfort in any-body area.

Consequences of WMSD

As a result of WMSD, 53.9% of the respondents had difficulty in performing usual daily activities. Most had problems with low back pain or discomfort (26%). As a result of WMSD, 41.2% of the study sample visited a doctor, chiropractic, physiotherapist, or another specialist, mostly due to lower back problems (21%). In the past year, 26.5% of all subjects used medications and 8.8% were absent from work or study. Most of the respondents (83.3%) continued to work, not reporting an injury or taking sick leave, despite having pain or discomfort.

Physical activity

The calculated range of physical activity was from 0 to 21 (38). Table 1 shows that 10.8% of respondents were insufficient, 22.5% were borderline, and 66.7% were sufficiently physically active.

Correlation between WMSD and variables

We found a correlation in our study sample between WMSD and age for shoulders and ankles/feet areas (Table 3). For years of practice, we found

correlations for the same body areas. There was a significant correlation between the number of patients who had therapy and pain or discomfort for the neck area and multiple body areas (Table 3).

TABLE 3. Spearman correlation coefficient between variables and WMSD

Variable	Body area									
	Neck	Shoulders	Upper back	Elbows	Wrists/hands	Lower back	Hips/thighs	Knees	Ankles/feet	Multiple body areas
Gender										
Spearman's rho	-0.103	-0.042	-0.080	0.055	-0.060	0.037	0.078	0.121	0.020	-0.076
p-value	0.358	0.752	0.549	0.827	0.690	0.733	0.646	0.430	0.908	0.447
n	81	59	59	18	47	88	37	45	37	102
Age										
Spearman's rho	0.058	0.365	-0.015	0.184	-0.221	0.102	0.210	0.241	0.444	0.169
p-value	0.605	0.005*	0.911	0.466	0.135	0.343	0.213	0.111	0.006*	0.089
n	81	59	59	18	47	88	37	45	37	102
Years of practice										
Spearman's rho	0.106	0.334	0.008	0.195	-0.275	0.112	0.151	0.283	0.421	0.191
p-value	0.347	0.010*	0.952	0.439	0.062	0.298	0.371	0.060	0.010*	0.054
n	81	59	59	18	47	88	37	45	37	102
Body mass index										
Spearman's rho	-0.161	0.084	0.117	-0.086	0.037	0.019	0.239	-0.091	0.256	0.126
p-value	0.152	0.529	0.379	0.734	0.804	0.862	0.155	0.551	0.127	0.207
n	81	59	59	18	47	88	37	45	37	102
Workplace										
Spearman's rho	-0.070	-0.249	-0.068	0.125	-0.037	-0.047	-0.031	0.190	-0.264	0.013
p-value	0.536	0.057	0.611	0.621	0.803	0.664	0.855	0.211	0.115	0.898
n	81	59	59	18	47	88	37	45	37	102
Number of patients being treated										
Spearman's rho	-0.327	-0.206	-0.127	-0.125	0.268	-0.061	0.037	-0.040	-0.090	-0.294
p-value	0.003*	0.117	0.339	0.621	0.069	0.571	0.829	0.793	0.595	0.003*
n	81	59	59	18	47	88	37	45	37	102
Job satisfaction										
Spearman's rho	-0.169	-0.105	-0.172	-0.082	0.066	-0.058	0.019	-0.146	-0.016	-0.193
p-value	0.131	0.429	0.192	0.746	0.659	0.590	0.914	0.337	0.924	0.052
n	81	59	59	18	47	88	37	45	37	102
Total physical activity										
Spearman's rho	0.007	-0.032	0.133	-0.304	-0.034	0.065	0.005	-0.286	0.102	-0.147
p-value	0.954	0.808	0.315	0.220	0.821	0.549	0.975	0.057	0.547	0.142
n	81	59	59	18	47	88	37	45	37	102
Moderate-intensity physical activity										

(Contd...)

TABLE 3. (Continued)

Variable	Body area									
	Neck	Shoulders	Upper back	Elbows	Wrists/hands	Lower back	Hips/thighs	Knees	Ankles/feet	Multiple body areas
Spearman's rho	-0.007	0.077	0.149	-0.133	-0.059	0.050	-0.032	-0.245	0.180	-0.111
p-value	0.949	0.563	0.261	0.600	0.693	0.645	0.849	0.105	0.285	0.269
n	81	59	59	18	47	88	37	45	37	102
High-intensity physical activity										
Spearman's rho	0.007	-0.110	0.040	-0.321	-0.017	0.054	0.014	-0.231	0.040	-0.093
p	0.952	0.409	0.763	0.193	0.912	0.619	0.936	0.126	0.813	0.350
n	81	59	59	18	47	88	37	45	37	102
Performing strengthening exercises										
Spearman's rho	0.034	-0.231	-0.092	-0.328	-0.089	-0.065	-0.186	-0.333	-0.091	-0.182
p-value	0.761	0.078	0.487	0.185	0.552	0.550	0.270	0.025*	0.593	0.067
n	81	59	59	18	47	88	37	45	37	102
Performing exercises to improve balance and agility										
Spearman's rho	-0.060	0.040	-0.036	-0.194	-0.091	0.092	0.011	-0.281	0.145	-0.129
p-value	0.592	0.766	0.786	0.441	0.542	0.392	0.948	0.062	0.391	0.195
n	81	59	59	18	47	88	37	45	37	102

*p<0.05. WMSD: Work-related musculoskeletal disorder

Performing strengthening exercises showed a correlation between exercise performance and the lower incidence of knee problems in the past year. There were no correlations found between WMSD and gender, BMI, workplace, job satisfaction, and the degree of physical activity (Table 3).

In identifying the first problems of physiotherapists, we found that the first injuries most often occurred after 5 years of working as a physiotherapist. Only in the ankles/feet area, the most injuries occurred before starting the work as a physiotherapist (Table 4). Because of performing the work as a physiotherapist, our study sample showed degenerative loads on elbows, wrists/hands, and shoulders, which appear after several years of practice.

DISCUSSION

The purpose of our study was to report the prevalence of WMSD among physiotherapists working in Slovenia. To the best of our knowledge, this was the first study to describe the presence of WMSD among physiotherapists with NMQe at secondary and tertiary levels of health care. All of them were employees in rehabilitation medicine, which was,

according to Anderson and Oakman (13), a risk factor for WMSD. Almost all physiotherapists included in the analysis had a high 1-year prevalence and lifetime prevalence of WMSD. Compared to other studies, where the 1-year prevalence ranges from 28 to 96% (13), the prevalence found in our study was among the highest. There could be numerous possible reasons for the high prevalence of WMSD in our study sample.

According to the NMQe, difficulty in understanding the term “discomfort” may be the cause of the high prevalence of WMSD. The latter can be understood subjectively broadly, even though users found the questionnaire comprehensible and useful (32). This is not only a difficulty in Slovenia but also in other European countries.

Working conditions in Slovenia are similar to other countries in Europe; therefore, it is hard to believe that the difference in the prevalence is due to the health system organization. Slovenians like to work hard and do not mind working long hours. They are taking their jobs seriously and professionally. The Slovenian health-care system is financed through a mandatory insurance program called the Health

TABLE 4. First problems occurrence

Body area	Before working as a physiotherapist (%)	Less than 5 years of practice (%)	More than 5 years of practice (%)
Neck	32.5	33.8	33.8
Shoulders	22.4	27.6	50.0
Upper back	26.7	36.7	36.7
Elbows	22.2	11.1	66.7
Wrists/hands	23.4	21.3	55.3
Lower back	38.6	19.3	42.1
Hips/thighs	24.3	32.4	43.2
Knees	32.6	19.6	47.8
Ankles/feet	48.7	24.3	27.0

Insurance Institute of Slovenia, with contributions paid by both employers and employees. Almost all Slovenes pay voluntary insurance fees for additional coverage that provides additional funds for the health-care system. Absenteeism due to health issues is relatively high, but employees are well protected by favorable pay compensation levels. WMSD is the main reason for health-related absenteeism among Slovenian employees (39). Act on Health Care and Health Insurance in Slovenia gives a high level of security to a worker once they get sick and take sick leave (40). Namely paid sick leave duration has practically no time limit if the disease requires sickness absence. On the other hand, the Occupational Health and Safety Act (41) applies to every employer, to every person that is present in the work process, to the private sector, and the public services. The major characteristic of the legislation in the Act is the emphasis on prevention, reduction, and better management of health and safety at work risks.

Age was an important risk factor for WMSD in our sample, as those with higher age had problems in several body areas in the past year. There was a higher prevalence of pain or discomfort in those with higher age in the shoulders and ankles/feet. This could be explained by studies that indicate age-related changes in functional capabilities of adults (42-44) and biological changes related to the aging process that contributes to the pathogenesis of MSDs (45). Authors of several studies found a higher prevalence of WMSD problems in younger physiotherapists during the first 5 years of employment (13,24,28,46). Younger age and fewer years of

experience had an increased prevalence of WMSD as they might be a victim of WMSDs due to their inappropriate handling and treatment technique (17,18). This was not identified in our study sample. Namely, Slovenian physiotherapists must complete a 6-month internship to obtain a license and start working independently. During this period, they seem to learn to protect their body well while performing physiotherapy procedures.

Findings of an association between WMSD and gender are inconclusive. Some studies showed that women are more susceptible to WMSD in some body areas (13,14,26,27,47), while others indicate that men are more susceptible (24) or did not show an association (13,48) like we found out in our study.

Too many patients treated daily by one physiotherapist were identified as a risk factor in the literature (13,15,19,24) and also proved to be a risk factor in our study sample. There was also a correlation between the number of patients treated and WMSD in the past year in the neck area and multiple body areas.

Most of the participants (66.7%) were physically active regularly, and this probably contributed to the fact that age had a greater impact on the prevalence of WMSD than years of employment (49,50). Review studies on the dose-response relationship between physical activity and health have revealed that several health factors are likely to be associated with the amount of graded physical activity (51,52).

The evidence of the impact of regular physical activity on WMSD is sparse, especially in physiotherapists. Regular exercise activities seem to have

a preventive role in affecting the neck and shoulder discomforts (53). Nevertheless, physical training and exercise activities are sometimes the origins of MSDs (54). On the other hand, many musculoskeletal injuries with an origin of a sports activity of a person might be included among self-reported WMSD (55). In our study sample, no statistically significant correlations were found between physical activities consisted of moderate- or high-intensity exercises and the prevalence of WMSD.

In our sample, 53.9% of physiotherapists were not able to perform daily and leisure activities due to WMSD, most commonly presented as ankles/feet and knees problems. Many choose to seek help from fellow physiotherapists (13,26,28,56). Poor reporting and continuing to work with discomfort or pain were also present in our study. Anderson and Oakman (13) point to possible reasons for poor reporting of pain or discomfort by physiotherapists to their supervisors. Many physiotherapists do not report WMSD, as the perception of injury is such that due to WMSD, they could not meet the expected demands. At the same time, physiotherapists can underestimate the severity of the injury and think that they will resolve the problem themselves before consulting a doctor or supervisor.

CONCLUSION

This study concluded that the prevalence of WMSD among physiotherapists in Slovenia is higher than those reported in other countries. The high prevalence of WMSD found in our study sample indicates the need for more effective interventions to reduce musculoskeletal problems such as education, improvement of ergonomic techniques, the introduction of "No-Lift Policy," and an individual's self-care for their health. For further research, it would be good to investigate preventive programs to reduce WMSD in physiotherapists. When considering the entire population of Slovenian physiotherapists, it is necessary to obtain data on the study sample of physiotherapists employed at all levels of health care.

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