

Associations between work-related musculoskeletal disorders, quality of life, and workplace stress in physical therapists

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Abstract: This study was performed to determine the associations between work-related musculoskeletal disorders (WMSDs), quality of life (QoL), and workplace stress among physical therapists (PTs) in South Korea. Self-reporting questionnaires were given to 855 PTs. Variables examined included general characteristics, WMSDs, QoL, and workplace stress. Of the 788 PTs who responded, 745 (94.5%) reported WMSDs affecting at least one body site. The most affected WMSDs site was the shoulder (23.3%), and the most reported number of body sites affected by WMSDs was one (50.9%). QoL was significantly improved ($p < 0.05$) among PTs over 39 years old, who had 10–15 years of professional experience, worked in general/university hospitals, and had only one site affected by WMSDs. Factors influencing QoL included number of body sites affected by WMSDs, presence/absence of WMSDs, working venues, workplace stress, and age. Factors affecting workplace stress included number of body sites affected by WMSDs, QoL, work hours, and gender. The results showed a high prevalence of WMSDs among PTs in South Korea, and this negatively affected both QoL and workplace stress.

Key words: Physical therapist, Workplace stress, Quality of life, Work-related musculoskeletal disorders

Introduction

Work-related musculoskeletal disorders (WMSDs) comprised 33.7% of all work-related disorders in 2002¹, but have increased by 148.1%, and currently account for 49.6% of all work-related disorders². In the USA, according to the U.S. Bureau of Labor Statistics, WMSDs resulted in 600,000 lost work hours. In addition, one-third of total compensation related to industrial accidents and diseases was due to WMSDs². In the European Union, WMSDs account for a high percentage of low back pain (25%) and

muscle pain (23%). WMSDs are the main reasons for work absences, and 40% of industrial accident compensation is related to WMSDs in some member countries³.

Holder *et al.* (1999) reported that among 667 American physical therapists (PTs) and physical therapist assistants, 33.5% had WMSDs⁴. In a follow-up study, Campo *et al.* (2008) reported that among 8,882 American PTs, 57.5% had WMSDs⁵. In addition, 58% of 2,688 British PTs and 55.5% of 217 Australian PTs were reported to have WMSDs^{6–8}. Moreover, Cromie *et al.* (2000) reported that 82.8% of 536 Australian PTs had WMSDs affecting at least one body site⁹. In South Korea, one study reported that 94.2% of 105 PTs had WMSDs, and another reported that of 125 PTs, 47% of males and 45.2% of females had experienced WMSDs during work or daily life¹⁰. More-

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over, PTs with WMSDs spend more time treating patients than healthy PTs^{10–12}).

Workplace stress occurs in the workplace or work-related organization, and is defined as “a harmful mental and physical reaction coming from discordance between employee’s ability, resources, and willingness and work requirement”¹³). Medical expenses increased by 800% and economic loss exceeded 10% of the Gross National Product due to workplace stress in the USA¹⁴). The important part of that study was related to workplace stress, the resulting health effects, and their subsequent assessment. A previous study reported that high-level workplace stress harms the body and mind and consequently results in laziness, leaves of absence, job transfers, and exhaustion¹⁵).

According to previous studies, medical employees have more workplace stress than nonmedical employees^{14, 15}). In particular, PTs have experienced an increasing incidence of WMSDs and workplace stress due to excessive amounts of work. This has a negative effect on the practice of physical therapy, resulting in lack of professional physical therapy services for patients, loss of professionally trained PTs, and diminished quality of treatment^{14, 15}). Therefore, management of WMSDs and resolution of workplace stress are required to effectively implement the task of an organization and may enhance the quality of life (QoL) of employees.

Little is known about the association between WMSDs, QoL, and workplace stress in PTs. Therefore, this study aimed to investigate the prevalence of WMSDs, and their association with QoL and workplace stress in PTs in South Korea.

Methods

Subjects and procedures

The subjects in this study were PTs registered with the Korean Physical Therapy Association, and included PTs working at rehabilitation centers, general/university hospitals, and secondary hospitals in Gyeong-gi do and Seoul, South Korea. The study was conducted from January to May 2014. Purposive sampling was used for subject selection. A total of 855 questionnaires entitled “Associations between work-related musculoskeletal disorders, quality of life, and workplace stress in physical therapists” were distributed for self-administration; 825 were returned (96.49%), and 788 were finally analyzed, with the exception of 37 not essential for the analysis. All subjects were PTs who treat patients directly, without limitations on job position or working years. There were also no limitations

regarding intensity and duration of pain, or PT specialization. Sahmyook University Ethics Committee provided approval. All subjects signed an informed consent form, and the present study was approved by Sahmyook University Ethics Committee.

Study design

This was a cross-sectional study to evaluate WMSDs, QoL, and workplace stress among Korean PTs, and to determine the associations between these variables.

Outcome variables/instruments

The outcome variables included subject characteristics, WMSDs, QoL, and workplace stress as described below:

1) General characteristics

The general characteristics evaluated included gender, age, clinical experience, working pattern, hospital type, working venue, working hours, and number of patients managed.

2) WMSDs

Questions on WMSDs consisted of 34 questions from the Korea Occupational Safety and Health Agency (KOSHA) CODE H-30-2002, and evaluated the location, frequency, duration, and intensity of pain, in addition to treatment of symptomatic areas in the neck, shoulder, arm-elbow, wrist-finger, waist, and leg-foot¹⁰).

3) QoL

The Korean version of the World Health Organization QoL assessment instrument was used and consisted of 26 questions, including 24 derived from four subdomains (physical health, social relationship, environment, and psychological) and two that dealt with general QoL and health¹⁶).

4) Workplace stress

The workplace stress questionnaire used the Workplace Stress Scale created by the American Institute of Stress. The 10 questions evaluate how much job stress is present and how workers handle it. Participants were asked to rate their workplace stress on a 10-point scale ranging from “strongly disagree” to “strongly agree.” Each question was scored from 1 to 10. A total score of 10 to 30 indicated well-handled job stress, 40 to 60 indicated moderately well-handled job stress, and 70 to 100 indicated that an employee was encountering problems that needed to be addressed and resolved¹³).

Data analysis

The mean and standard deviation for general characteristics and frequency (%) of WMSDs in PTs were calculated. Analysis of variance and an independent t-test were performed to assess the average difference in QoL and workplace stress for each PT, based on his or her general characteristics and WMSDs. All variables were included in a stepwise regression test to evaluate their influence on QoL and workplace stress. We used SPSS version 21.0 (SPSS, Inc., Chicago, IL, USA) to perform the statistical analyses at $p < 0.05$.

Results

1. General characteristics and WMSDs in PTs

Of the participating subjects, 51.8% were female and 48.2% were male; 59.1% were 20–29 years old, 37.1%

were 30–39, 3.4% were 40–49, and 0.4% were over 49. In addition, 87.4% of subjects had 1–5 years, 11.3% had 5–10 years, 0.8% had 10–15 years, and 0.5% had 15–20 years of work experience as PTs. Most participants (68.9%) worked 8 hours a day, while 23.7% worked for 9 hours, and only 7.4% worked for more than 9 hours a day. Working venues included: 29.8% in general/university hospitals, 8.4% in secondary hospitals, and 61.8% in rehabilitation centers (Table 1).

Of 788 (94.5%) subjects, 745 had WMSDs. Among the subjects with WMSDs ($n = 745$), 401 (53.8%) had one body site involved, 203 (27.2%) had two sites, 66 (8.9%) had three sites, 40 (5.4%) had four sites, 25 (3.4%) had five sites, and 10 (1.3%) had six sites. Duplicate responses for the site of WMSDs ($n = 1,350$) involved 23.3% for shoulder, 22.7% for hand and wrist, 22.7% for back, 14.0% for neck, 9.3% for arm, and 8.0% for hip, knee, or ankle

Table 1. General characteristics of physical therapist (N=788)

Variable	n (%) or Mean±SD	Workplace stress Mean±SD	z	QoL Mean±SD	z
Gender			-3.360*		-1.644
Male	380 (48.2)	57.40± 9.15		79.15±12.49	
Female	408 (51.8)	55.67± 8.72		80.86±13.57	
Age (years)			1.904		11.406*
20–29	466 (59.1)	56.69± 9.07		78.92±12.33	
30–39	292 (37.1)	56.11± 8.81		82.06±14.12	
40–49	27 (3.4)	56.96± 9.17		76.48±11.92	
49<	3 (0.4)	63.00± 0.00		86.00± 0.00	
Professional experience (years)			19.473*		9.512*
1–<5	689 (87.4)	56.18± 9.06		80.10±13.29	
5–<10	89 (11.3)	59.44± 7.59		79.55±11.48	
10–<15	6 (0.8)	57.50± 8.22		89.00± 6.57	
15–<20	4 (0.5)	45.00± 0.00		66.00± 0.00	
Working hour (per a day)			4.889*		1.463
8	543 (68.9)	55.98± 8.75		80.01±13.54	
9	187 (23.7)	57.49± 9.62		80.93±12.23	
9<	58 (7.4)	58.28± 8.43		77.34±11.03	
Working venues			2.337		71.590*
General or university hospital	235 (29.8)	56.03±10.06		85.09±13.62	
Second hospital	66 (8.4)	55.17± 7.05		73.12± 9.70	
Rehabilitation center	487 (61.8)	56.91± 8.62		78.53±12.41	
WMSDs			-3.308*		-0.072
Yes	745 (94.5)	60.58± 9.00		80.09±12.13	
No	43 (5.5)	57.26± 7.20		79.09±12.33	
Number of pain site			10.924*		392.696*
1	401 (53.8)	56.94± 8.88		87.87±11.22	
2	203 (27.2)	56.00± 9.67		74.68± 7.16	
3	66 (8.9)	55.38± 8.86		68.48± 6.64	
4	40 (5.4)	52.88± 5.40		63.80± 8.51	
5	25 (3.4)	56.32± 9.58		64.84± 6.90	
6	10 (1.3)	54.40± 8.68		57.60± 3.69	

Table 2. Characteristics of work-related musculoskeletal disorders in the physical therapist (N=1,350)

Variable	Site of Pain (n/%)	Duration of Pain (n)	Intensity of pain (n)		Frequency of pain (n)		Symptom of pain in the last week (n)		Management for pain in the last year (n)		
Neck	189/14.0	< 1 day-10	18	Mild	45	Once per 6 months	9	Yes	45	Hospital care	9
		1 day~1 week	81	Moderate	135	Once per 2~3 months	54	No	144	Pharmacy	9
		1 week~1 month	45	Severe	9	Once per a month	18			Sick leave	0
		1 month~6 months	0	Very severe	0	Once per a week	90			Conversion of business	9
		>6 months	45			Every day	18			None	162
Shoulder	315/23.3	< 1 day	27	Mild	72	Once per 6 months	54	Yes	99	Hospital care	36
		1 day~1 week	117	Moderate	144	Once per 2~3 months	72	No	216	Pharmacy	27
		1 week~1 month	72	Severe	99	Once per a month	36			Sick leave	0
		1 month~6 months	27	Very severe	0	Once per a week	54			Conversion of business	0
		>6 months	72			Every day	99			None	252
Arm	126/9.3	< 1 day	45	Mild	72	Once per 6 months	63	Yes	81	Hospital care	0
		1 day~1 week	63	Moderate	45	Once per 2~3 months	18	No	45	Pharmacy	0
		1 week~1 month	18	Severe	9	Once per a month	9			Sick leave	0
		1 month~6 months	0	Very severe	0	Once per a week	36			Conversion of business	0
		>6 months	0			Every day	0			None	126
Hand	306/22.7	< 1 day	9	Mild	117	Once per 6 months	117	Yes	99	Hospital care	9
		1 day~1 week	153	Moderate	144	Once per 2~3 months	63	No	207	Pharmacy	18
		1 week~1 month	90	Severe	36	Once per a month	63			Sick leave	0
		1 month~6 months	27	Very severe	9	Once per a week	45			Conversion of business	0
		>6 months	27			Every day	18			None	279
Back	306/22.7	< 1 day	36	Mild	81	Once per 6 months	54	Yes	90	Hospital care	63
		1 day~1 week	108	Moderate	144	Once per 2~3 months	81	No	216	Pharmacy	9
		1 week~1 month	99	Severe	63	Once per a month	36			Sick leave	0
		1 month~6 months	45	Very severe	18	Once per a week	90			Conversion of business	0
		>6 months	18			Every day	45			None	234
Hip or knee or ankle	108/8.0	< 1 day	27	Mild	27	Once per 6 months	9	Yes	36	Hospital care	9
		1 day~1 week	45	Moderate	81	Once per 2~3 months	45	No	72	Pharmacy	9
		1 week~1 month	27	Severe	0	Once per a month	9			Sick leave	0
		1 month~6 months	0	Very severe	0	Once per a week	27			Conversion of business	0
		>6 months	9			Every day	18			None	90

(Table 2).

2. Association between general characteristics/WMSDs and workplace stress/QoL

Among general characteristics, workplace stress was highest in males, those who had 5–10 years of working experience, those who worked over 9 hours daily, those who were over 49 years old, and those working at rehabilitation centers. QoL was highest in female participants over age 49, those with 10–15 years of clinical experience, those working in general or university hospitals, and those working 9 hours daily. Workplace stress and QoL were highest in the WMSDs group with one involved body site (Table 1).

3. Factors affecting QoL and workplace stress

Stepwise multiple regression analysis was performed for variables affecting QoL and workplace stress. The num-

Table 3. The influencing factors of the QoL

Variables	B	Partial R ²	Model R ²	F	p*
QoL					
(Constant)	116.265				
Number of Site of Pain	-7.305	0.340	0.340	405.056	0.001
WMSDs or not	-13.988	0.054	0.394	255.607	0.001
Working venues	-1.682	0.019	0.413	183.555	0.001
Workplace stress	-0.136	0.008	0.421	142.277	0.001
Age	1.799	0.006	0.427	116.608	0.001

Table 4. The influencing factors of the workplace stress

Variables	B	Partial R ²	Model R ²	F	p*
Workplace stress					
(Constant)	67.643				
Number of Site of Pain	-1.619	0.014	0.014	10.966	0.001
QoL	-0.114	0.020	0.034	13.905	0.001
Working hour	1.278	0.008	0.042	11.474	0.001
Gender	-1.529	0.007	0.049	10.147	0.001

ber of pain sites appeared to be the most predictive variable influencing QoL, followed by presence or absence of WMSDs, working venues, workplace stress, and age (Table 3). The number of pain sites also appeared to be the most predictive variable influencing workplace stress, followed by QoL, working hours, and gender (Table 4).

Discussion

This study aimed to investigate the prevalence of WMSDs, and to determine the association between WMSDs, QoL, and workplace stress among PTs in South Korea.

Most of the subjects were females aged 20–29 years, with 1–5 years of work experience, who worked for less than 8 hours per day, and worked in a rehabilitation center; 94.5% of the subjects had WMSDs involving at least one body site, which is higher than the results of a previous study¹⁰.

In our study, the body sites most involved in cases of WMSDs were the shoulders, hands, and back. This may be because PTs usually adopt a standing position and rely mainly on their upper limbs to treat patients. Babatunde *et al.* (2008) reported an incidence rate of 69.8% for lumbar, 31.1% for neck, 22.2% for shoulder, and 20.6% for hand-wrist involvement among PTs in Ghana¹⁷. Yesim (2004) reported a rate of 26% for lumbar and 18.2% for hand-wrist involvement, but also reported that the intensity of WMSDs increased in the lumbar region due to work related to moving patients¹⁸. However, in other studies, rates of hand and wrist pain were highest, and were associated with repetitive use, as with manual therapy, which can cause an overuse syndrome^{3, 5, 19, 20}. Bork *et al.* (1996) reported that 45.0% of WMSDs affect the waist, 29.6% the hand and wrist, 28.7% the back, and 24.7% the neck in the USA²⁰; Cromie *et al.* (2000) reported 62.5% affect the waist, 47.6% the neck, 41.0% the back, and 33.6% the thumb in the USA⁹. These studies showed comparatively lower rates of WMSDs of the shoulder at 18.9% and 22.9%, respectively. WMSDs of the shoulder occur when mundane tasks are repeated, as when the hand is raised and outstretched often while moving, or when heavy lifting is necessary^{9, 20}. This is thought to be due to comparatively different heights of treatment tables, repetitive upper extremity motion required for treatment, and treatment performed in a bent position^{21–23}. A previous study indicated that WMSDs are possibly caused by repetitive motion; WMSDs in physical therapists are strongly correlated with repetitive motion patterns, long-term mainte-

nance of the same posture, and working with a high number of patients²⁴. Therefore, the higher rate of incidence of WMSDs of the shoulder may be due to the fact that most of the subjects were rehabilitation center employees, and it is a Korean PT's responsibility to lift patients.

Differences in QoL were highest for those over 49 years of age, who had 10–15 years of clinical experience, and worked at general or university hospitals. The QoL showed significant differences according to the number of pain sites. The presence of WMSDs, working venues, workplace stress, and age also affected QOL.

Patients with low back pain and those absent from work at least once had lower satisfaction with life than healthy persons²⁵. Moreover, Morken *et al.* (2002) reported that QoL in patients with WMSDs was significantly lower than in healthy persons²⁶. In particular, those with physical role limitations and observable symptoms had a significantly lower average QoL compared to the group that did not²⁶. The margin of change in grade was higher than the change due to age, marriage, health, and working conditions. Average weekly working hours were 41.9 for all subjects, but 42.0 hours for the WMSDs group, which indicates a generally high burden of work. Previous studies showed a lower average QoL in relation to site of pain and physical condition among shift workers, but also proved that when weekly average work duration exceeds 40 hours, QoL can be lowered by length of work shift and duration of labor^{25, 26}.

Workplace stress can be greatly affected by job specifications, role conflicts, personal relations, and employment instability, and can induce mental and physiological disability. Moreover, it can negatively affect the organization's goal and cause economic losses due to lack of productivity²². In this study, workplace stress was significantly high for males, those with 5–10 years of working experience, and those who worked less than 9 hours per day. On the other hand, the difference in QoL was based on the existence of WMSDs and the number of pain sites. The predictive variable most influencing workplace stress was the number of pain sites, followed by QoL, work hours, and gender. In previous studies, male PTs had high workplace stress, and younger physical therapists under the age of 30 with less than 5 years of work experience tended to have WMSDs, causing them to leave the profession^{9, 27}. A study by Prochaska *et al.* (2001) supports the results of our research, showing that the hours of work lost during ill health are too few to be considered as work stress, but the hours lost increase with the number of health issues, consequently resulting in increased workplace stress and

leaves of absence²⁸).

Conclusion

This study confirms the associations between WMSDs, QoL, and workplace stress among physical therapists in South Korea. The results show that physical therapists appear to be at a high risk for WMSDs in South Korea and that an increase in the number of WMSDs affects QoL and workplace stress.

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Competing Interests

None.

Ethics Approval

Sahmyook University Ethics Committee provided approval.

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