

Musculoskeletal disorder symptoms in nurses and etiological factors: A cross-sectional research

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Abstract

Aim: The aim of this study was to describe musculoskeletal disorder (MSD) symptoms in nurses and etiological factors.

Material and Methods: This cross-sectional study was conducted in a government hospital in the West of Turkey between March and June 2018. The population was composed of the 608 nurses working in the hospital. All of the population were invited to participate, and the research sample was formed from the 498 nurses who met the research inclusion criteria (participation rate 82%). Data were collected by researchers with technique of face-to-face interviews, using a nurse descriptive form and the Nordic Musculoskeletal Questionnaire. The data were analyzed using SPSS (Statistical Package for Social Sciences for Windows 16.0). Numbers, percentages, means and chi-squared tests were used in data analysis. The level of significance was set at 0.05.

Result: The nurses' mean age was 34.78±8.60 years (min: 18, max: 58) and most of them (75.5%) were females. The results showed that 87.3% of the nurses had reported MSDs symptoms in at least one body region during the past 12 months. The greatest prevalence of MSDs symptoms by body regions were in the lower back (78.5%), the back (74.9%), the knees (63.1%), the neck (61.2%) and the shoulders (59.6%). The study was found that MSDs symptoms were more frequently seen in those aged over 40, those who stated that their health was poor or very poor, those who had been working as nurses for more than 20 years, those with chronic illnesses, those who slept little, and those who worked more than eight hours a day or 40 hours a week ($p<0.05$).

Conclusion: This study showed that MSDs symptoms were common in nurses, the most frequent being discomfort of the back and lower back.

Keywords: Musculoskeletal disorder; Musculoskeletal system; Nurse; Pain; Symptom.

INTRODUCTION

Musculoskeletal disorder (MSD) is defined as an inflammatory and degenerative disease affecting the muscles, bones, nerves, tendons, ligaments and joints (1,2). It has an adverse effect on the quality of life of individuals in both developed and developing countries, and is one of the commonest causes of disability, long term sick leave and occupational diseases (2-6).

MSDs have become one of the most commonly seen health problems in society (1), and they are particularly common among health care workers (2,3,7). They are very common in nurses, where they are seen at a frequency of 40 to 90% (6-8), which is three or four times that of the general population (5). This high frequency of MSDs among nurses is not surprising (7), as nurses frequently perform such activities as lifting heavy weights, working in unsuitable positions, moving patients from a bed or other place, carrying patients, or pushing, pulling, bending or

turning excessively (2,4,5,9). As a result of these actions, which are necessitated by work, acute or chronic MSDs can easily develop (2,9,10,11). There are many factors affecting MSDs, including those which are work-related and those which are not, such as individual characteristics, habits or psycho-social factors (4,6,8). Such factors as long working hours, daily workload, working during breaks, lack of job satisfaction, establishing communication with patients' families, frequently seeing death, lack of control over work, interpersonal relations, an inflexible work schedule, shift work and low pay may be counted among the causes of MSDs (5,9,11). Also, acute or chronic MSDs may develop in connection with a person's age, profession, activity level, social support level and lifestyle (4,12).

Examining studies which investigated the correlation between nurses' working conditions and MSDs, it was found that in one study performed with 520 nurses in Iran that 88% had experienced MSDs in the previous 12

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months in at least one part of the body, most frequently in the back, the knees and the neck, and that physical and psycho-social factors and a lack of control over work increased MSDs (5). In a study in India conducted with 212 nurses, it was reported that 89.1% of the nurses had experienced MS-related pain or discomfort in their working lives, in the greatest proportion in the lower back and also in the shoulders, neck and knees. Standing in the same position for a long time, bending, turning, lifting and helping with patient treatment an excessive number of times were found to be correlated to MSDs (2). In another study, conducted in Saudi Arabia with 200 nurses, 85% of the nurses were found to have had at least one symptom relating to MSDs, of which the commonest were in the back, followed by the ankles, feet, and shoulders. Long working hours, working in the surgery department and having low weight were found to be correlated to the development of these symptoms (7).

Only a limited number of studies were found in Turkey which included only nurses in the sample. In a study by Sezgin and Esin (2014) conducted in Istanbul with 323 intensive care nurses, the prevalence of MSDs was found to be 95.9% (9). These were most frequently reported to be in the legs, lower back, back and shoulders. These were found to be related to frequent changes of work program, shift work, and the hospital where the nurse worked, rather than to personal characteristics. In a study by Pinar (2010) performed with 2400 nurses working in hospitals in Istanbul, the prevalence of MSDs was found to be 79.5%, most frequently in the back, shoulders and neck (10). Among the most frequent causes were lifting heavy weights, remaining standing for long periods and bending. In a study by Gül et al. (2014), 92.6% out of 217 nurses reported MSD-related pain in at least one part of the body, most frequently in the back, lower back and neck (13). In a study conducted with 1174 intensive care nurses working in a teaching and research hospital in Aydın, Turkey, Asgar Pour et al. (2016) reported that 88.2% had pain of the lower back, the cause of which was to a medium level nursing care procedures such as making beds, lifting and positioning patients, giving passive exercises, the procedures of admitting and discharging patients, taking vital signs and performing aspiration (14).

The aim of this study was to describe MSDs symptoms in nurses and etiological factors.

MATERIAL and METHODS

Study design

This cross-sectional study was conducted in a government hospital in the west of Turkey between March and June 2018.

Research population and sample

The population was composed of the 608 nurses working in the hospital. The criteria for inclusion in the research were having worked as a nurse for at least one year in this hospital, not having reported a non-work related injury/accident for up to three months before the onset of symptoms, and volunteering to participate in the study.

All of the population were invited to participate, and the research sample was formed from the 498 nurses who met the research inclusion criteria (participation rate 82%).

Data Collection and Method

Data were collected by researchers with technique of face-to-face interviews, using a Nurse Descriptive Form and the Nordic Musculoskeletal Questionnaire, based on the self-reporting of the nurses participating in the research.

The nurse descriptive form was developed by the investigators, based on the literature (1,2,5,7,9,10). The form was divided into four different parts and consisted of 21 questions. The first section included six questions on demographic characteristics, including age, gender, economic situation, marital status, number of children and education level. The second section consisted of six questions about health history such as general health perception, presence of chronic disease, diagnosed MSDs, smoking, frequency of exercise and sleeping time. The third section contained five questions relating to working life such as duration of employment in the current hospital, total years in nursing, daily/weekly working time and type of shift work. The last section asked four questions about the factors related to work that increased the risk of MSDs, ergonomic training in work life, coping strategies towards reducing the risk of development of MSDs and practices of who have the pain related to MSDs.

The Nordic Musculoskeletal Questionnaire was used to evaluate pain and discomfort experienced in nine body regions (shoulders, elbows, wrists/hands, hips/thighs, knees, ankles/feet, neck, mid back, and lower back) during the previous 12 months and during the previous week. The validity and reliability of the questionnaire had been investigated and approved in the Turkish version (15).

Data Analysis

The data were analyzed using SPSS (Statistical Package for Social Sciences for Windows 16.0). Numbers, percentages, means and chi-squared tests were used in data analysis. The level of significance was set at 0.05. The prevalence rate of MSDs was the occurrence of pain/discomfort in nine body regions during the previous 12 months.

Ethical Consideration

Before conducting the research, ethical approval was obtained from the ethics committee of the university medical faculty (Approval date-no: 15/03/2018-E.24297). The director of the Provincial Health Administration consented in writing to this research. The nurses were informed about aim of the study before they gave their consent.

RESULTS

Nurses' Sociodemographic Characteristics

The nurses' mean age was 34.78±8.60 years (min: 18, max: 58) and most of them (75.5%) were females; 64.3% of the nurses were income-expense equal, 68.3% were married, 48.6% had two or more children, and 42.2% had a bachelor's degree.

Nurses' Health History

It was found that 60.6% of the nurses defined their health as very good and good, 27% has a chronic illness, of which the most frequent were hypertension at 4.2% and diabetes mellitus at 4%. A past diagnosis of MSDs was present in 18.9% of the nurses. The most frequent MSDs were defined as spinal (14.9%) and neck (4.8%) disease. It was found that 43.2% of the nurse smoked, 50.6% did not play sports and 67.6% of them slept less than seven hours per day.

Nurses' Working Life Characteristics

The nurses' mean number of years of employment in the current hospital was 7.30 ± 7.53 and their mean number of years in nursing was 13.40 ± 9.04 . The proportion of nurses working nine hours a day or more was 22.1%; 41.6% worked 41 hours or more per week and 72.7% of the participants had shift work, while 89.8% of the nurses were working as clinical nurses.

Nurses' Work Risk Factors for MSD Symptoms and Coping Strategies

Table 1 shows nurses' work risk factors for MSDs. Working in the same positions for long periods (84.3%), treating an excessive number of patients in one day (74.3%), working in leaning or uncomfortable positions (73.3%), not having enough rest breaks or pauses during working hours (67.5%) and lifting or moving dependent patients (64.5%) were the work risk factors most encountered in the nurses.

73.7% of the nurses had participated an ergonomic training in their working life. The nurses' coping strategies against MSDs were asking for help in handling heavy patients (77.9%) and modification of patients' or their own position (55.8%). Less common strategies were modifying nursing procedures in the working area (39.6%) and stopping regularly to stretch the body and to change posture (28.1%). It was found that 67.9% of the nurses with MSDs had visited a doctor, 57% of them had been prescribed medicine, 21.7% had taken sick-day medical leave, 9.8% of them had been recommended to receive

physical therapy, 6% had been treated by hospitalization and 4.6% had changed their work area.

Nurses' MSD Symptoms

The results showed that 87.3% of the nurses had reported MSDs in at least one body region during the last 12 months. The greatest prevalence of MSDs by body regions were in the lower back (78.5%), the back (74.9%), the knees (63.1%), the neck (61.2%) and the shoulders (59.6%). Nurses' daily functions had been affected in the last 12 months due to pain in the neck (33.3%), the lower back (32.7%), the back (29.5%), the shoulders (28.3%) and the knees (22.9%). The body regions which had pain in the previous week were the lower back (63.3%), the back (59.8%), the knees (50.6%), the neck (48.6%) and the shoulders (47%) (Table 2).

Etiological Factors of Nurses' MSDs symptoms

Tables 3 and 4 show the etiological factors of nurses' MSDs. The prevalence of symptoms in the shoulders, elbow, wrist, knee and ankle were higher in nurses aged 40 years or above than in the others ($p < 0.05$). Shoulder, hand and ankle symptoms were more common in nurses with high school and pregraduate ($p < 0.05$) qualifications than in the others. The prevalence of symptoms in both upper and lower MSDs were higher in those who defined their general health as bad and very bad and those who had worked as a nurse for 21 years or more ($p < 0.05$). Elbow and ankle symptoms were more common in nurses who had chronic diseases ($p < 0.05$) than in others. Nurses who slept seven hours or less reported shoulder and ankle symptoms more frequently than the others ($p < 0.05$). Those who worked for nine hours or more reported only neck symptoms. The prevalence of musculoskeletal symptoms in the neck and ankle region was significantly higher in nurses who worked 41 hours and above than the others ($p < 0.05$). There were no significant differences between marital status, number of children, smoking, frequency of exercise, duration of employment in the current hospital and ergonomic training in work life and MSDs ($p > 0.05$).

Table 1. Nurses' work risk factors for MSDs

Risk factors*	n (%)
Working in the same positions for long periods	420 (84.3)
Treating an excessive number of patients in one day	370 (74.3)
Working in leaning or uncomfortable positions	365 (73.3)
Not having enough rest breaks or pauses during working hours	336 (67.5)
Lifting or moving dependent patients	321 (64.5)
Lifting or moving heavy materials	289 (58.0)
Giving care to mental / mentally ill patients	288 (57.8)
Working hours problems (overtime shift, irregular shift, length of daily working hours)	283 (56.8)
Continuing work even if there is injury	271 (54.4)
Lack of motivation	267 (53.6)
Insufficiency of job satisfaction	233 (46.8)
Non ergonomic of the equipment and materials in the work environment (nurse desk, patient ped, treatment table, chairs, etc.)	189 (38.0)
Inadequate training to prevent injuries	182 (36.5)
Lack of rest room	166 (33.3)

*One than more answers were given.

Table 2. Nurses' MSDs symptoms according to "The Nordic Musculoskeletal Questionnaire"

Body Regions	Prevalence of MSDs (pain, suffering, discomfort) by body region during the last 12 months		The pain regions that prevent daily functioning of nurses (at home or outside home) in the last 12 months		The body regions which had pain in the previous week	
	n	%	n	%	n	%
Neck	305	61.2	166	33.3	239	48.6
Shoulder (s)	297	59.6	141	28.3	234	47.0
Elbow	106	21.3	42	8.4	81	16.3
Wrist/Hand (s)	190	38.2	89	17.9	135	27.1
Back	373	74.9	147	29.5	298	59.8
Lower back	391	78.5	163	32.7	315	63.3
Hip/Thigh	253	50.8	92	18.5	206	41.4
Knee	314	63.1	114	22.9	252	50.6
Ankle/Foot	218	43.8	74	14.9	160	32.1

Table 3. The etiological factors of nurses' MSDs symptoms (upper extremities)

Factors	N	%	Neck n (%) 305 (61.2)	Shoulders n (%) 297 (59.6)	Elbow n (%) 106 (21.3)	Wrist n (%) 190 (38.2)
Age						
<30	186	37.4	104 (55.9)	100 (53.8)	27 (14.5)	56 (30.1)
30-39	129	25.9	77 (59.7)	74 (57.4)	22 (17.1)	41 (31.8)
≥40	183	36.7	124 (67.8)	123 (67.2)	57 (31.1)	93 (50.8)
Test (x ² , p)			x ² =5.631 p= 0.06	x ² =7.306 p=0.030*	x ² =17.089 p= 0.000***	x ² =19.764 p= 0.000***
Gender						
Female	376	75.5	232 (61.7)	223 (59.3)	79 (21.0)	149 (39.6)
Man	122	24.5	73 (59.8)	74 (60.7)	27 (22.1)	41 (33.6)
Test (x ² , p)			x ² =0.135 p= 0.713	x ² =0.069 p=0.792	x ² =0.069 p=0.793	x ² =1.415 p=0.234
Education						
High school	82	16.5	46 (56.1)	52 (63.4)	18 (22.0)	32 (39.0)
Pregraduate	170	34.1	115 (67.6)	115 (67.6)	43 (25.3)	76 (44.7)
Bachelor' degree	210	42.2	125 (59.5)	109 (36.7)	39 (18.6)	75 (35.7)
Master or Doctoral	36	7.2	19 (52.8)	21 (51.9)	6 (16.7)	7 (19.4)
Test (x ² , p)			x ² =5.200 p= 0.158	x ² =10.259 p= 0.016*	x ² =3.034 p= 0.386	x ² =8.989 p= 0.029*
Perception of general health						
Very good and good	302	60.7	163 (54.0)	162 (53.6)	51 (16.9)	102 (33.8)
Middle	179	35.9	129 (72.1)	121 (67.6)	46 (25.7)	76 (42.5)
Bad and very bad	17	3.4	13 (76.5)	14 (82.4)	9 (52.9)	12 (70.6)
Test (x ² , p)			x ² =17.220 p= 0.000***	x ² =12.866 p= 0.002**	x ² =15.735 p= 0.000***	x ² = 11.439 p=0.003**
Chronic disease						
Yes	135	27.1	94 (69.6)	89 (65.9)	42 (31.1)	60 (44.4)
No	363	72.9	211 (58.1)	208 (57.3)	64 (17.6)	130 (35.8)
Test (x ² , p)			x ² =5.486 p= 0.019*	x ² =3.042 p= 0.081	x ² =10.673 p= 0.001**	x ² =3.107 p= 0.078
Sleep time (hours)						
≤ 7	336	67.5	214 (63.7)	212 (63.1)	68 (20.2)	135 (40.2)
≥ 8	162	32.5	91 (56.2)	85 (52.5)	38 (23.5)	55 (34.0)
Test (x ² , p)			x ² =2.602 p= 0.107	x ² =5.127 p= 0.024*	x ² =0.676 p= 0.411	x ² =1.797 p= 0.180
Working time (years)						
1-10	231	46.4	128 (55.4)	124 (53.7)	36 (15.6)	70 (30.3)
11-20	131	26.3	77 (58.8)	75 (57.3)	24 (18.3)	47 (35.9)
≥21	136	27.3	100 (73.5)	98 (72.1)	46 (33.8)	73 (53.7)
Test (x ² , p)			x ² =12.295 p= 0.002**	x ² =12.433 p= 0.002**	x ² =17.929 p= 0.000***	x ² =20.209 p= 0.000***
Daily working time (hours)						
≤ 8	388	77.9	228 (58.8)	226 (58.2)	82 (21.1)	146 (37.6)
≥ 9	110	22.1	77 (70.0)	71 (64.5)	24 (21.8)	44 (40.0)
Test (x ² , p)			x ² =4.559 p= 0.033*	x ² =1.412 p= 0.235	x ² =0.024 p= 0.877	x ² =0.204 p= 0.651
Weekly working time (hours)						
≤ 40	291	58.4	164 (56.4)	163 (56.0)	54 (18.6)	99 (34.0)
≥ 41	207	41.6	141 (68.1)	134 (64.7)	52 (25.1)	91 (44.0)
Test (x ² , p)			x ² =7.046 p= 0.008**	x ² =3.821 p= 0.051	x ² = 3.111 p= 0.078	x ² =5.066 p= 0.024*

*p<0.05 **p<0.01 ***p<0.001

Table 4. The etiological factors of nurses' MSDs symptoms (lower extremities)

Factors	n	%	Back n (%) 373 (74.9)	Lower Back n (%) 391 (78.5)	Hip n (%) 253 (50.8)	Knee n (%) 314 (63.1)	Ankle n (%) 218 (43.8)
Age							
<30	186	37.4	139 (74.7)	145 (78.0)	90 (48.4)	112 (60.2)	65 (34.9)
30-39	129	25.9	91 (70.5)	97 (75.2)	64 (49.6)	68 (52.7)	58 (45.0)
≥40	183	36.7	143 (78.1)	149 (81.4)	99 (54.1)	134 (73.2)	95 (51.9)
Test (x ² , p)			x ² = 2.329 p= 0.312	x ² = 1.794 p= 0.408	x ² = 1.303 p= 0.521	x ² = 14.689 p= 0.001**	x ² = 10.888 p= 0.004**
Sex							
Female	376	75.5	286 (76.1)	298 (79.3)	192 (51.1)	236 (62.8)	172 (45.7)
Man	122	24.5	87 (71.3)	93 (76.2)	61 (50.0)	78 (63.9)	46 (37.7)
Test (x ² , p)			x ² =1.107 p=0.293	x ² =0.500 p=0.480	x ² =0.042 p=0.838	x ² =0.054 p=0.816	x ² =2.419 p=0.120
Education							
High school	82	16.5	65 (79.3)	66 (80.5)	43 (52.4)	54 (65.9)	36 (43.9)
Pregraduate	170	34.1	129 (75.9)	135 (79.4)	97 (57.1)	115 (67.6)	88 (51.8)
Graduate	210	42.2	148 (70.5)	159 (75.7)	93 (44.3)	125 (59.5)	83 (39.5)
Postgraduate	36	7.2	31 (86.1)	31 (86.1)	20 (55.6)	20 (55.6)	11 (30.6)
Test (x ² , p)			x ² =5.512 p=0.138	x ² =2.478 p=0.479	x ² =6.644 p=0.084	x ² =3.808 p=0.283	x ² =8.508 p=0.037*
Perception of general health							
Very good and good	302	60.7	215 (71.2)	219 (72.5)	139 (46.0)	171 (56.6)	114 (37.7)
Middle	179	35.9	143 (79.9)	157 (87.7)	104 (58.1)	126 (70.4)	91 (50.8)
Bad and very bad	17	3.4	15 (88.2)	15 (88.2)	10 (58.8)	17 (100.0)	13 (76.5)
Test (x ² , p)			x ² =6.186 p=0.045*	x ² =16.364 p=0.000***	x ² =7.008 p=0.030*	x ² =19.459 p=0.000***	x ² =15.468 p=0.000***
Chronic disease							
Yes	135	27.1	103 (76.3)	111 (82.2)	66 (48.9)	93 (68.9)	69 (51.1)
No	363	72.9	270 (74.4)	280 (77.1)	187 (51.5)	221 (60.9)	149 (41.0)
Test (x ² , p)			x ² =0.192 p=0.661	x ² =1.510 p=0.219	x ² =5.512 p=0.138	x ² =2.708 p=0.100	x ² =4.050 p=0.044*
Sleep time (hours)							
≤ 7	336	67.5	258 (76.8)	267 (79.5)	175 (52.1)	216 (64.3)	163 (48.5)
≥ 8	162	32.5	115 (71.0)	124 (76.5)	78 (48.1)	98 (60.5)	55 (34.0)
Test (x ² , p)			x ² =1.954 p=0.162	x ² =0.553 p=0.457	x ² =0.677 p=0.411	x ² =0.675 p=0.411	x ² =9.416 p=0.002**
Working time (years)							
1-10	231	46.4	176 (76.2)	179 (77.5)	111 (48.1)	139 (60.2)	85 (36.8)
11-20	131	26.3	94 (71.8)	103 (78.6)	66 (50.4)	67 (51.1)	56 (42.7)
≥21	136	27.3	103 (75.7)	109 (80.1)	76 (55.9)	108 (79.4)	77 (56.6)
Test (x ² , p)			x ² =0.944 p=0.624	x ² =0.360 p=0.835	x ² =2.113 p=0.348	x ² =24.419 p=0.000***	x ² =13.740 p=0.001**
Daily working time (hours)							
≤ 8	388	77.9	292 (75.3)	298 (76.8)	193 (49.7)	245 (63.1)	169 (43.6)
≥ 9	110	22.1	81 (73.6)	93 (84.5)	60 (54.5)	69 (62.7)	49 (44.5)
Test (x ² , p)			x ² =0.120 p=0.729	x ² =3.045 p=0.081	x ² =0.791 p=0.374	x ² =0.006 p=0.936	x ² =0.034 p=0.854
Weekly working time (hours)							
≤ 40	291	58.4	212 (72.9)	220 (75.6)	149 (51.2)	185 (63.6)	116 (39.9)
≥ 41	207	41.6	161 (77.8)	171 (82.6)	104 (50.2)	129 (62.3)	102 (49.3)
Test (x ² , p)			x ² =1.561 p=0.212	x ² =3.521 p=0.061	x ² =0.045 p=0.833	x ² =0.082 p=0.775	x ² =4.354 p=0.037*

*p<0.05 **p<0.01 ***p<0.001

DISCUSSION

This study has important results with regard to MSDs in nurses and their etiological factors. Approximately one in five nurses have been diagnosed with MSDs, and the largest number of these diagnoses are of herniated disk. In a study conducted with intensive care nurses, Sezgin and Esin (2014) similarly found a proportion of 18.3%, most with a diagnosis of herniated disk (9).

The most frequently encountered risk factors for MSDs in nurses have been reported as working for long periods in the same position, treating many patients during the course of the day, working bent over or in an uncomfortable position, not getting enough breaks while working, and lifting, carrying or transferring dependent patients. Similar results were obtained by Anap et al., 2013 (2), but different results were obtained in a study in Turkey, in which the commonest risk factors for MSDs were found to be lifting heavy weights and remaining standing for long periods (10). It has been stated in the literature that activities relating to working life such as working in the same position for a long time, a heavy work load, working in an uncomfortable position and especially lifting patients on to the bed or from the bed to another place are related to nurses' experiences of lower back pain (2,5,16), and neck pain (5), that standing in the same position for a long time is related to pain in the knees (5), and that bending, turning, turning patients over and actions requiring strength are important risk factors for MSDs (9,17). Seen from this perspective, it is of great importance to educate nurses in ergonomics, in order for them to be able to perform the daily actions of their work environment without causing MSDs. It was found in the present study that approximately three out of four nurses had received training on this topic, a higher proportion than reported in other studies (9). However, it is reported in the literature that the training on ergonomics given in hospitals in the standard approach to work safety is ineffective in reducing the risk of MSDs (16); this training developed ergonomic patient lifting and manual skills, but this has not been effective in reducing MSD-related pain or accidents deriving from this (16). It is emphasized that a single approach is not enough to reduce the risk of MSDs, and that a multi-factorial approach such as arranging exercise programs for the home and workplace and providing motivation for these exercises to be regularly performed will have greater success in reducing the incidence of MSDs (16,18).

It is reported that nurses with MSD-related pain frequently visit a doctor and take medication, and that one nurse in five has taken sick leave. Studies have shown that the rate of taking sick leave in nurses varies from 25% to 51% (6,8,10). It is also reported in the literature that MS-related complaints have a negative effect on nurses' ability to pursue their daily lives and to work, and that they cause absenteeism.

It was found in this study that 87.3% of nurses had experienced an MSDs (aching, pain, discomfort). In related studies in this country, this proportion has been found to

be 95.9% in intensive care nurses (9), 92.6% in nurses working in a teaching and research hospital in Istanbul (13), and 79.5% in 2400 nurses working in various hospitals in Istanbul (10). Similar to the present study, high rates of MSDs have been reported in nurses in studies carried out in other countries: 89% in a study in Portugal (8), 88% (5) and 85.7% in Iran (6), 85% in Saudi Arabia (7), 80% in Italy (4), and 76% in Taiwan (19).

The most frequently experienced MSDs in nurses were found to be in the lower back, back, neck and shoulders. Similarly, Pınar (2010) (10) and D'Agostin and Negro (2016) (4) in a study of nurses found that the commonest areas where discomfort was experienced were the back, shoulders and neck, while Gül et al. (2014) (13) found the back, the lower back, and the neck. Similar to the finding of the present study (78.5%), it was seen in many studies that the most frequent location of MSDs was the lower back region (3,6,8,20). In a study performed in this country with intensive care nurses, a rate of lower back pain of 88.2% was found (21), and in other studies in this country it varied between 66% and 50% (9,10,13). Similar proportions of between 45% and 65% have been found in studies performed in other countries (2-8,20). In the present study, back pain was the second most common MS problem, at 74.9%. In studies performed with nurses, back problems were seen at a rate of between 19% and 56% (6,9,10,13). In the present study, knee problems were seen at a rate of 63%, which is high compared with other studies (2,5-7,13). Shoulder and neck pain in nurses was found to derive from pushing or pulling a patient's bed, stretcher or wheelchair as part of nursing care activities (4). In the present study, a rate of 61% was found for discomfort in the neck; a higher rate of 73.5% was found by Carneiro et al. (2017) (3), while lower rates varying from 20% to 52% were seen in other studies (2,4-10,13). Another area where nurses experienced discomfort was the shoulders, at 59.6%. This is lower than reported in other studies in the literature. A rate of 51.7% was found by Choobineh et al. (2010) (6) in operating theater nurses and 49% by Carneiro et al. (2017) (3) in home care nurses, while in other studies it was found to vary between 29% and 42% (2,4,7,9,10,13,20).

It was reported in the study that nurses aged 40 and over experienced more discomfort in the shoulders, elbows, wrists, knees and ankles than other groups. D'Agostin and Negro (2016) (4) found that the rate of lower back pain was greater in nurses over the age of 35, and Carugno et al. (2012) (20) found that lower back pain in nurses increased with increasing age. On the other hand, Gül et al. (2014) (13) reported that age was not a risk factor. The rate of discomfort in the shoulders, wrists and ankles was found to be greater in nurses who were high school or associate degree graduates than in others. However, Sezgin and Esin (2014) (9) found that in intensive care nurses, MSDs were more frequent in nurses who were educated to degree level or higher. It was reported that this could be because their education was still continuing or because nurses in this group were working at more difficult jobs. It

was thought in our study that considering the educational level of nurses with high school and associate degree qualifications, they worked harder in the clinics. In those diagnosed with bad and very bad health, the rate of discomfort in both the upper and lower extremities was found to be greater. Sezgin and Esin (2014) (9) found that MSDs were more frequent in nurses diagnosed with very bad general health, while Horcombe et al. (2010) (22), in a study in New Zealand with 280 nurses, found a significant difference between the nurses' general health and discomfort in the shoulder region. In those who had worked as nurses for more than 20 years, the rate of discomfort in both the upper and lower extremities was greater. This is in accordance with the findings of other studies, that occupational diseases appear and increase with advancing age (4,9).

In the present study, the rates of MSDs in different parts of the body were found to be greater in those who had a chronic illness and in those who slept for less than eight hours. This appeared to us to be an expected result of the study. It is reported in the literature that long working hours cause both physical and psycho-social problems, and increase MSDs (7,23). It was found in the present study that nurses who worked more than eight hours a day experienced discomfort in the neck region. Attar (2014) (7) reported that working for more than 10 hours a day was the most important risk factor for MS discomfort, and increased the risk of MSDs, while Sezgin and Esin (2014) (9) found that MSD was greater in those with a very large daily workload. In an examination of the literature, Bae and Fabry (2014) found that in seven studies out of nine, there was a correlation between MSDs and nurses working for more than 40 hours a week (23). In the present study, more problems in the neck and ankles were seen in those who worked for more than 40 hours a week than in others. In studies in the literature, there was an increase in lower back pain in those who worked more than 38 hours a week (20), and in neck pain in those who worked more than 44 hours a week (5). It was known that for various reasons, nurses today had an excessive work load. It was thought that suitable strategies should be determined by hospital administrations, particularly for nurses at risk of MSDs.

CONCLUSION

In conclusion, this study showed that MSDs were common in nurses, the most frequent being discomfort of the back and lower back. In addition, MSDs were more frequently seen in those aged over 40, those who stated that their health was poor or very poor, those who had been working as nurses for more than 20 years, those with chronic illnesses, those who slept little, and those who worked more than eight hours a day or 40 hours a week.

A safe and healthy working environment is an important need. A single approach to reducing the risk of MSDs is not sufficient, and it is recommended that risks arising from the work environment should be assessed and that programs should be arranged to address these risks. It may

be further recommended that nurses' health problems be assessed not annually but more frequently, that preventive measures be applied such as the practicality of using and lifting portable equipment, and planned training with physical exercise to strengthen muscles, and that the work environment be arranged in accordance with ergonomic principles. It is particularly important that nurses who are at risk from MSDs should have priority.

The strengths and limitations of the study

This study had a number of strong points. The first was that many studies only focus on one region of the MS in nurses (21, 24), whereas in this study disorders of nine regions of the body were examined. Another strong aspect was that the study focused not only on pain as an MSD symptom but other symptoms also, and a valid and reliable instrument was used in making these measurements. Also, the size of the research sample was greater than in studies conducted in this country (13, 24, 25) and internationally (2-4,6,7,22).

Because the research sample was formed from nurses working at only one health institution, the findings obtained cannot be generalized to all nurses in the country. Further limitations of the study were that the research findings were based on the nurses' self-reporting, and the study was conducted with the small number of nurses who could be reached.

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