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ORIGINAL PAPER

WORKING CONDITIONS, HEALTH STATUS, AND MUSCULOSKELETAL DISORDERS AMONG HOSPITAL CLEANING WORKERS: A CROSS-SECTIONAL STUDY IN TURKEY

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Abstract

Background: Cleaning workers face many workplace risk factors and may experience many health problems. In this context, this study aimed to evaluate the musculoskeletal disorders, the health status of hospital cleaning workers, and the working conditions and risk factors affecting the workplace environment. **Material and Methods:** This cross-sectional study was conducted in a university hospital of Turkey. All the cleaning workers who have been working for ≥1 year were participants. The participants' socio-demographic and occupational characteristics, health complaints, workplace risk factors, occupational accidents, and ergonomic nonconformities were observed and questioned. **Results:** Four hundred thirty-eight cleaning employees participated in the study. In the past year, 19.6% of participants had an occupational accident. Of those, 24.4% did not report it, and 30.2% were absent from work. No pre-employment examination was reported by 36.8% of the participants, and periodic medical examinations were never undergone by 98.4%. Low back pain was experienced by 42.0% of the participants, while 29.5% reported shoulder pain and 28.8% knee pain. While working, 83.1% of the participants bent frequently, 82.2% repeated the same movement, and 73.2% stood for a long time. Chemical substances were the most common workplace risk factors. There were significant differences according to age and gender in almost all musculoskeletal disorders. Gender differences were observed also in various health outcomes and occupational complaints. Repeated bending and prolonged standing were associated with hip/leg and foot/ankle pains; heavy lifting with low back, back, wrist/hand, and ankle/foot pains; and failure to the breaks with shoulder, knee and hip/leg pains. **Conclusions:** This research investigated the health issues and occupational safety challenges faced by hospital cleaning personnel. Specifically, it examined musculoskeletal disorders and work-related accidents, emphasizing gaps in regular health screenings for these workers. The findings underscore gender variations in these challenges and propose strategies to mitigate ergonomic risks encountered by cleaning staff. Med Pr Work Health Saf. 2024;75(5)

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INTRODUCTION

Hazards encountered in the workplace directly or indirectly cause the premature death of millions of workers worldwide and lead to the health deterioration or disability of hundreds of millions of people every year [1]. Cleaning works are one of the main components of the service sector needed in all business lines, indoor or outdoor spaces, and public or private enterprises [2]. These jobs are in different environments, such as homes, offices, workplaces, schools, stores, or hospitals. The risks cleaning workers face are not limited to their work but also vary according to their sector and workplaces [3].

Hospital cleaning is much more complex than office or school cleaning [4]. Hospital cleaning workers routinely clean patient rooms, care units, surgical areas, administrative offices, laboratories, waiting areas, and toilets [5]. While performing their work, they face many physical, chemical, ergonomic, psychosocial, and biological risk factors in their working environment [6]. Hospital cleaning workers are among the occupational groups most frequently exposed to needle stick and sharps injuries [7]. In addition, while performing tasks such as lifting, carrying, sweeping, and mopping, these workers usually work in postures that disrupt normal body posture in dynamic and static muscle activities [8].

Cleaning workers must cope with severe mental and physical problems due to their different work environments. Working in cleaning jobs is associated with an increased risk of musculoskeletal system problems,

respiratory system disorders, and skin diseases [9]. As expected, some studies have revealed a high prevalence of musculoskeletal system problems in the back, neck, and extremities in cleaning workers, and musculoskeletal system disorders constitute an essential part of work-related diseases in these workers [10]. The jobs performed by cleaning workers are labor intensive, the stress levels of cleaners are high since they primarily work under time constraints, and there is a higher frequency of occupational accidents than others [11].

Lack of a positive health status and safe working environment for the hospital cleaning workers can carry the risk of disrupting workflow in hospitals. In this context, studies examining the health status of hospital cleaning workers and the risk factors affecting the workplace environment are critical. In this study, which is targeting to shed light on efforts to improve the working conditions, it is aimed to examine the health status and working conditions of cleaning workers in a university hospital, considering the occupational exposures.

MATERIAL AND METHODS

Researchers conducted the cross-sectional study in a university hospital in the capital city of Turkey. In Turkey, there is a three-tier structure in terms of health service delivery. The study occurred at Gazi University Faculty of Medicine Hospital, a tertiary health service provider capable of offering advanced educational and research services for diseases requiring specialized examination and treatment due to its high-tech infrastructure. The population of the research was the cleaning employees who had been working at the university hospital for ≥1 year. No sample selection was made, and all 438 people were aimed to be reached. All cleaners participated in the study and the response rate was 100%. Gazi University Ethics Committee has decided on February 22, 2022 that the research is ethically appropriate. Participants provided informed consent. The survey was available in a paper version at the workplace and conducted using face-to-face interviews by one of the researchers, an occupational medicine specialist. Data were collected in April, May and June 2022 during periodic health examinations.

The data collection form used in the study consisted of 4 parts and included 57 questions. In the first 2 parts, there were questions about the socio-demographic characteristics and occupational health and safety profiles of participants. In the third part, the health problems that the participants had were examined. In the last part, unfavourable work environment conditions and workplace risk factors were questioned.

In the data collection phase, age, gender, education level, working department, working time, shift system, smoking and alcohol consumption, presence of chronic diseases, hand washing, and occupational accidents were obtained based on the participants' statements. There were 3 types of shift systems. Day shift referred to the workday between the early morning and early evening. Combined shift referred to a work schedule where the employee works overlapping hours from 2 different shifts. Rotated shift was a work schedule where employees regularly rotate through different shifts. This rotation occurs bi-weekly in this hospital. People who smoke ≥1 cigarette per day were considered smokers. Those who drank ≥1 glass of any alcohol kind in the past month were considered alcohol users.

The question "How is your health in general"? was asked to obtain information about the perceived health status. Although this question is subjective, it is accepted that the data it reveals about perceived health status is a good indicator of health service utilization and mortality rates. The responses as "moderate," "bad," and "very bad" were considered as negative, and "good" and "very good" responses were considered as positive perceived health status.

The data related to occupational health and safety training, pre-employment and periodic health examinations were collected by analysing the medical records of the employees. The use of personal protective equipment and physical and chemical risks encountered in the workplace were evaluated by the researchers by examining the working environment and considering the risk assessment reports. Chemicals, dust, inadequate ventilation, inappropriate lighting, noise, radiation, and thermal comfort were identified as risk factors in the working environment of cleaning workers. The participants were questioned about these factors. Musculoskeletal problems, respiratory symptoms, and skin findings were questioned during the health examination participants' step counts were assessed utilizing a smartphone application.

Ergonomic risks such as frequent bending, repetitive tasks, prolonged standing, long-distance walking, heavy lifting, climbing stairs, and inability to take breaks were noted by the researchers by observing the employees while performing their work and using checklists. Cleaning workers performing tasks such as emptying bins, cleaning floors, toilets and furnitures >20 times a day were regarded as repetitive bending. Performing

tasks such as cleaning surfaces, stocking materials, cleaning medical equipment and changing beds >20 times a day were accepted as repetitive tasks. Standing for >1 h without a break is considered prolonged standing. Taking >10 000 steps at the workplace is counted as long distance walking. Heavy lifting means frequent lifting of loads >20 kg and/or carrying objects >10 kg frequently. Climbing stairs applies to cleaning workers who work on different floors and do not use lifts. Cleaning workers who had failure to take breaks included those who cannot take a rest break of 15 min for work of 4 h or less.

The statistical analyses were performed using the SPSS 23.0 (Statistical Package for Social Science) for Windows (IBM Corporation, United States of America – USA, New York). Categorical variables were presented as numbers and percentages, while numerical variables were displayed as means (M) and standard deviations (SD). The Pearson's χ^2 test, Fisher's exact test, and Yates correction were employed to compare categorical variables. The risk factors were evaluated using a logistic regression analysis. In the multivariate analysis, variables with a p value of <0.20 were included in the logistic regression model. The logistic regression analysis was then applied to determine the effective risk on musculoskeletal disorders among participants. The Hosmer-Lemeshow test was used to assess model fit. A p value of <0.05 was considered statistically significant.

RESULTS

Four hundred thirty-eight cleaning employees participated in the study. The age of the participants was M±SD 40.14±8.58 years (females: 41.82±8.06 years, males: 37.97±8.78 years). Their average total working time in the hospital was M±SD 7.67±5.24 years (females: 7.70±4.97 years, males: 7.62±5.59 years). During working hours, 83.3% (N = 365) washed their hands >10 times, 8.9% (N = 39) washed 6–10 times, 6.6% (N = 29) washed 3–5 times, and 1.1% (N = 5) washed 1–2 times. The protective equipment they used during work included gloves (94.1%, N = 412), aprons (80.8%, N = 354), caps (23.5%, N = 103), overshoes (13.2%, N = 58), visors (8.4%, N = 37), and goggles (7.5%, N = 33). Additionally, 5.7% of the participants (N = 25) reported assisting in patient care besides their cleaning duties.

Of the participants, 56.4% were female, 35.6% were aged 31–40 years, and 37.4% were aged 41–50 years. Educationally, 31.7% had completed primary school, 32.6% had completed secondary school, and 30.1% had completed high school. Employment settings varied, with 35.4% working in clinics, 13.0% in intensive care units, and 12.6% in outpatient clinics. Of the participants, 37.4% had been in their current job for 1–5 years, and 55.0% worked day shifts. Regarding lifestyle, 51.4% smoked cigarettes, and 33.3% had chronic diseases. Perceived health status was reported as good by 45.7% and average by 37.4%. Additionally, 46.6% believed their job negatively affected their health. Among women, 40.1% were smokers, compared to 66.0% of men. Alcohol use prevalence was 8.5% for women and 25.7% for men. Significant gender differences were found in all parameters except for total working time.

Among the participants, 49.3% had received occupational health and safety training within the last year, while 13.0% had never received such training. In the past year, 19.6% had experienced an occupational accident. Of those who had an occupational accident, 75.6% reported it, and 30.2% were absent from work. Furthermore, 45.7% of the participants had been absent from work due to a health problem in the past year. Pre-employment health examinations were not conducted for 36.8% of participants, and 50.5% had never undergone periodic health examinations. The prevalence of these parameters did not differ significantly between men and women, with no statistically significant gender differences observed (Table 1).

Regarding health complaints, 42.0% of participants reported low back pain, 35.8% – fatigue, 29.5% – shoulder pain, 28.8% – knee pain, 28.3% – back pain, 28.1% – neck pain, 27.6% – headaches, 26.5% – hip/leg pain, 23.5% – arm/elbow pain, and 21.2% – hand/wrist pain. Respiratory symptoms such as dyspnoea and cough were less common, with frequencies of 13.2% and 9.4%, respectively. During work, 83.1% of participants bent repeatedly, 82.2% repeated the same movements, 73.2% stood for long periods, 49.8% walked long distances, and 46.8% faced heavy lifting situations. According to the participants, the top 3 occupational risks were exposure to chemicals (40.6%), noise (18.5%), and insufficient ventilation (17.1%). All musculoskeletal pains, fatigue, headaches, dyspnoea, repetitive tasks, prolonged standing, and exposure to chemicals, noise, and poor lighting were statistically significantly more common in women than in men at varying rates (Table 2).

There were statistically significant differences according to gender in all musculoskeletal disorders and according to age in all cases except ankle/foot pain. Total working time was associated with low back, shoulder,

Table 1. Descriptive characteristics of the study participants the cleaning employees, working at the university hospital for ≥1 year, 2022, Ankara, Turkey

Variable	Participants (N = 438)						p
	females (N = 247)		males (N = 191)		total		
	n	%	n	%	n	%	
Sociodemographic and lifestyle							
age							**<0.001**
21–30 years	16	6.5	47	24.6	63	14.4	
31–40 years	92	37.2	64	33.5	156	35.6	
41–50 years	102	41.3	62	32.5	164	37.4	
≥51 years	37	15.0	18	9.4	55	12.6	
graduation status							**0.020**
not finished any school	12	4.9	3	1.6	15	3.4	
primary school graduate	84	34.0	55	28.8	139	31.7	
secondary school graduate	66	26.7	77	40.3	143	32.6	
high school graduate	80	32.4	52	27.2	132	30.1	
college/university graduate	5	2.0	4	2.1	9	2.0	
department							**<0.001**
clinics	94	38.1	61	31.9	155	35.4	
intensive care units	43	17.4	14	7.3	57	13.0	
outpatient clinics	35	14.2	20	10.5	55	12.6	
housekeeping	20	8.1	25	13.1	45	10.3	
administrative units	17	6.9	20	10.5	37	8.4	
laboratory/imaging	15	6.1	12	6.3	27	6.1	
operating rooms	11	4.4	13	6.8	24	5.5	
emergency rooms	10	4.0	11	5.8	21	4.8	
other*	2	0.8	15	7.8	17	3.9	
total working time							0.080
1–5 years	85	34.4	79	41.4	164	37.4	
6–10 years	102	41.3	59	30.9	161	36.8	
≥11 years	60	24.3	53	27.7	113	25.8	
shift system							**<0.001**
day shift	178	72.1	63	33.0	241	55.0	
combined shift	42	17.0	59	30.9	101	23.1	
rotated shift	27	10.9	69	36.1	96	21.9	
cigarette smoking							**<0.001**
yes	99	40.1	126	66.0	225	51.4	
no	148	59.9	65	34.0	213	48.6	
alcohol use							**<0.001**
yes	21	8.5	48	25.1	69	15.8	
no	226	91.5	143	74.9	369	84.2	
Medical							
chronic disease presence							**<0.001**
yes	103	41.7	43	22.5	146	33.3	
no	144	58.3	148	77.5	292	66.7	

Table 1. Descriptive characteristics of the study participants the cleaning employees, working at the university hospital for ≥1 year, 2022, Ankara, Turkey – cont.

Variable	Participants (N = 438)						p
	females (N = 247)		males (N = 191)		total		
	n	%	n	%	n	%	
Medical – cont.							
perceived health status							**<0.001**
very good	18	7.3	36	18.8	54	12.3	
good	96	38.9	104	54.5	200	45.7	
average	120	48.6	44	23.0	164	37.4	
bad	13	5.2	7	3.7	30	4.6	
negative perception of work's impact on health							**<0.001**
yes	145	58.7	59	30.9	204	46.6	
no	102	41.3	132	69.1	234	53.4	
Occupational health and safety							
trainings							0.530
yes							
within 1 year	125	50.6	91	47.6	216	49.3	
within 2 years	65	26.3	62	32.5	127	29.0	
within 3 years or more ago	22	8.9	16	8.4	38	8.7	
no	35	14.2	22	11.5	57	13.0	
work accidents							0.615
occurrence in last year							
yes	51	20.6	35	18.3	86	19.6	
no	196	79.4	156	81.7	352	80.4	
reporting							0.701
reported	38	74.5	27	77.1	65	75.6	
not reported	13	25.5	8	22.9	21	24.4	
absence from work							
due to a work accident							0.841
yes	15	29.4	11	31.4	26	30.2	
no	36	70.6	24	68.6	60	69.8	
due to a health problem							0.415
yes	117	47.4	83	43.5	200	45.7	
no	130	52.6	108	56.5	238	54.3	
examination							
pre-employment							0.521
yes	153	61.9	124	64.9	277	63.2	
no	94	38.1	67	35.1	161	36.8	
periodic health							0.255
yes							
in last year	2	0.8	5	2.6	7	1.6	
in >1 year	123	49.8	87	45.6	210	47.9	
no	122	49.4	99	51.8	221	50.5	

Bolded are statistically significant values.
* Other: pharmacy, garden, car park, medical waste unit.

Table 2. Health complaints, negative work environment conditions, and uncomfortable ergonomic risk factors among the cleaning employees, working at the university hospital for ≥1 year, 2022, Ankara, Turkey

Variable	Participants (N = 438)		OR (95% CI)
	n	%	
Health complaint			
low back pain	184	42.0	1.802 (1.221–2.661)
shoulder pain	129	29.5	4.829 (2.957–7.887)
knee pain	126	28.8	4.063 (2.514–6.560)
back pain	124	28.3	3.117 (1.962–4.951)
neck pain	123	28.1	4.969 (3.001–8.229)
hip/leg pain	116	26.5	4.130 (2.506–6.807)
arm/elbow pain	103	23.5	3.748 (2.234–6.290)
hand/wrist pain	93	21.2	5.415 (2.997–9.784)
foot/ankle pain	83	18.9	2.519 (1.483–4.280)
weakness	157	35.8	4.135 (2.663–6.421)
headache	121	27.6	2.959 (1.861–4.704)
dyspnea	58	13.2	1.857 (1.028–3.356)
cough	41	9.4	0.885 (0.464–1.687)
itching	36	8.2	1.605 (0.781–3.299)
skin rash	26	5.9	1.495 (0.651–3.431)
other[a]	7	1.6	1.032 (0.228–4.665)
Negative work environment condition			
repeated bending	364	83.1	1.364 (0.826–2.250)
repetitive tasks	360	82.2	2.131 (1.296–3.507)
prolonged standing	320	73.2	2.077 (1.353–3.186)
long distance walking	218	49.8	0.966 (0.662–1.409)
heavy lifting	205	46.8	1.135 (0.777–1.658)
stair climbing	151	34.5	0.746 (0.502–1.109)
failure to take breaks	89	20.3	1.491 (0.921–2.413)
Uncomfortable ergonomic risk factor			
chemicals	178	40.6	3.785 (2.493–5.746)
noise	81	18.5	2.597 (1.516–4.451)
insufficient ventilation	75	17.1	1.571 (0.935–2.638)
dust	72	16.4	1.262 (0.753–2.115)
cold/hot	69	15.8	1.439 (0.845–2.450)
inappropriate lighting	27	6.2	3.637 (1.351–9.792)
radiation	9	2.1	0.966 (0.256–3.647)

[a] Other: tingling, numbness, heartburn, diarrhea.

knee, neck, arm/elbow pains, and hand/wrist pains; repeated bending and prolonged standing with hip/leg and foot/ankle pains; heavy lifting with low back, back, wrist/hand, and ankle/foot pains; and failure to the breaks with shoulder, knee and hip/leg pains (Table 3). There were significant differences in the frequency of fatigue accord-

Table 3. Musculoskeletal disorders according to some characteristics and workplace risk factors among the cleaning employees, working at the university hospital for ≥1 year, 2022, Ankara, Turkey

Variable	Participants (N = 438)																	
	low back pain		shoulder pain		knee pain		back pain		neck pain		hip/leg pain		arm/elbow pain		wrist/hand pain		ankle/foot pain	
	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Demographic																		
gender		**0.003**		**<0.001**		**<0.001**		**<0.001**		**<0.001**		**<0.001**		**<0.001**		**<0.001**		**<0.001**
female (N = 247)	119 (48.2)		104 (42.1)		99 (40.1)		93 (37.7)		100 (40.5)		92 (37.2)		81 (32.8)		78 (31.6)		61 (24.7)	
male (N = 191)	65 (34.0)		25 (13.1)		27 (14.1)		31 (16.2)		23 (12.0)		24 (12.6)		22 (11.5)		15 (7.9)		22 (11.5)	
age group		**0.002**		**<0.001**		**0.002**		**0.006**		**<0.001**		**0.001**		**<0.001**		**<0.001**		0.113
≤40 years (N = 219)	76 (34.7)		46 (21.0)		48 (21.9)		49 (22,4)		36 (16.4)		43 (19.6)		32 (14.6)		30 (13.7)		35 (16.0)	
>40 years (N = 219)	108 (49.3)		83 (37.9)		78 (35.6)		75 (34.2)		87 (39.7)		73 (33.3)		71 (32.4)		63 (28.8)		48 (21.9)	
total working time		**0.016**		**0.041**		**0.003**		0.625		**0.003**		0.108		**0.012**		**0.001**		0.564
<7 years (N = 213)	77 (36.2)		53 (24.9)		47 (22.1)		58 (27.2)		46 (21.6)		49 (23.0)		39 (18.3)		35 (16.4)		38 (17.8)	
≥7 years (N = 225)	107 (47.6)		76 (33.8)		79 (35.1)		66 (29.3)		77 (34.2)		67 (29.8)		64 (28.4)		58 (25.8)		45 (20.0)	
Working conditions																		
repeated bending		0.291		0.105		0.354		0.989		0.139		**0.028**		0.673		0.398		**0.001**
yes (N = 364)	157 (43.1)		113 (31.0)		108 (29.7)		103 (28.3)		97 (26.6)		104 (28.6)		87 (23.9)		80 (22.0)		79 (21.7)	
no (N = 74)	27 (36.5)		16 (21.6)		18 (24.3)		21 (28.4)		26 (35.1)		12 (16.2)		16 (21.6)		13 (17.6)		4 (5.4)	
repetitive tasks		0.484		0.056		0.221		0.393		0.802		**0.021**		0.116		0.434		0.128
yes (N = 360)	154 (42.8)		113 (31.4)		108 (30.0)		105 (29.2)		102 (28.3)		104 (28.6)		90 (25.0)		79 (21.9)		73 (20.3)	
no (N = 78)	30 (38.5)		16 (20.5)		18 (23.1)		19 (24.4)		21 (26.9)		12 (16.2)		13 (16.7)		14 (17.9)		10 (12.8)	
prolonged standing		0.319		0.375		0.348		0.126		0.321		**0.044**		0.341		0.286		**0.043**
yes (N = 320)	139 (43.4)		98 (30.6)		96 (30.0)		97 (30.3)		94 (29.4)		93 (29.1)		79 (24.7)		72 (22.5)		68 (21.3)	
no (N = 118)	45 (38.1)		31 (26.3)		30 (25.4)		27 (22.9)		29 (24.6)		23 (19.5)		24 (20.3)		21 (17.8)		15 (12.7)	

Table 3. Musculoskeletal disorders according to some characteristics and workplace risk factors among the cleaning employees, working at the university hospital for ≥1 year, 2022, Ankara, Turkey – cont.

Variable	Participants (N = 438)																	
	low back pain		shoulder pain		knee pain		back pain		neck pain		hip/leg pain		arm/elbow pain		wrist/hand pain		ankle/foot pain	
	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Working conditions – cont.																		
long distance walking		0.392		0.707		0.952		0.628		0.795		0.707		0.696		0.526		0.680
yes (N = 218)	96 (44.0)		66 (30.3)		63 (28.9)		64 (29.4)		60 (27.5)		56 (25.7)		53 (24.3)		49 (22.5)		43 (19.7)	
no (N = 220)	88 (40.0)		63 (28.6)		63 (28.6)		60 (27.3)		63 (28.6)		60 (27.3)		50 (22.7)		44 (20.0)		40 (18.2)	
heavy lifting		**0.035**		0.331		0.401		**0.034**		0.247		0.557		0.125		**0.027**		**0.046**
yes (N = 205)	97 (47.3)		65 (31.7)		55 (26.8)		68 (33.2)		63 (30.7)		57 (27.8)		55 (26.8)		53 (25.9)		47 (22.9)	
no (N = 233)	87 (37.3)		64 (27.5)		71 (30.5)		56 (24.0)		60 (25.8)		59 (25.3)		48 (20.6)		40 (17.2)		36 (15.5)	
stair climbing		0.051		0.223		0.901		0.780		0.098		0.821		0.408		0.988		0.385
yes (N = 151)	73 (48.3)		50 (33.1)		44 (29.1)		44 (29.1)		35 (23.2)		39 (25.8)		39 (25.8)		32 (21.2)		32 (21.2)	
no (N = 287)	111 (38.7)		79 (27.5)		82 (28.6)		80 (27.9)		88 (30.7)		77 (26.8)		64 (22.3)		61 (21.3)		51 (17.8)	
failure to take breaks		0.385		**0.042**		**0.014**		0.460		0.596		**0.046**		0.589		0.138		0.063
yes (N = 89)	41 (46.1)		34 (38.2)		35 (39.3)		28 (31.5)		27 (30.3)		31 (34.8)		19 (21.3)		24 (27.0)		23 (25.8)	
no (N = 349)	143 (41.0)		95 (27.2)		91 (26.1)		96 (27.5)		96 (27.5)		85 (24.4)		84 (24.1)		69 (19.8)		60 (17.2)	

Bolded are statistically significant values.

ing to gender, age, and total working time; headache according to gender; perceived health status according to gender, age, prolonged standing, long distance walking, and heavy lifting; work's negative impact on health according to gender, age, total working time, repeated bending, prolonged standing, long-distance walking, heavy lifting stair climbing, and failure to take breaks; and occupational accident in the last year according to not receiving occupational health and safety training in the last 3 years (Table 4).

Table 5 shows the multivariate logistic regression of participants' risk factors for musculoskeletal disorders. There were significant differences according to gender in all musculoskeletal disorders and age in all musculoskeletal disorders except low/back pain and ankle/foot pain. Working time was positively associated with knee pain (odds ratio [OR] = 1.78). Repeated bending increased hip/leg (OR = 3.39) and ankle/foot pains (OR = 4.79), and repetitive tasks increased just hip/leg pain (OR = 2.53). Heavy lifting was positively associated with low back pain (OR = 1.52), back pain (OR = 1.59), and wrist/hand pain (OR = 1.78). Stair climbing increased low back pain (OR = 1.57) and failure to take breaks in knee pain (OR = 1.80).

DISCUSSION

This cross-sectional study emphasizes the significance of focusing on the health problems of cleaning workers associated with working conditions and workplace environments. The results show that musculoskeletal disorders are related to many personal characteristics and workplace factors. In addition, it emphasizes the importance of receiving occupational health and safety training to prevent occupational accidents. The findings suggest that the working conditions of cleaning workers should be improved, ergonomic measures should be taken, regular health checks should be performed, and occupational health and safety training should be increased. Gender differences were notable, particularly with women reporting higher incidences of musculoskeletal disorders and fatigue.

Half of the cleaning workers who participated in this study were smokers. In a study conducted with cleaning workers in a public hospital in Brazil, the prevalence of smoking was 14.1% [12]. In another study conducted on cleaning workers in a university hospital in Turkey, more than half of the workers were smoking [13]. In the Turkish population, approx. two-fifths of the 25–55 age group, which constitutes the predominant age group in this study, were smokers. At the same time, this distribution was one-fifth among women in the same age group [14]. Although more than half of the cleaning workers were women, the prevalence of smoking in this study is higher than the average in Turkey. It is thought this high smoking prevalence may be due to working conditions, stress, and low socioeconomic status. Moreover, the higher smoking prevalence among men compared to women, along with gender-specific stressors in the workplace, indicates a need for targeted smoking cessation programs.

One out of every 5 employees in this study stated that they had an occupational accident, and approx. one-fourth of those said that they did not report it. Another study conducted in a university hospital in Turkey found that approx. one-fifth of the cleaning workers had an occupational accident, and one-third did not report it [15]. A study conducted in Brazil on cleaning workers in a university hospital observed that the annual prevalence of occupational accidents was 1 in 6, and the frequency of unreported occupational accidents was 1 in 7 [16]. According to a study conducted in Canada, approx. one-third of the cleaning workers in healthcare facilities had an occupational accident in the last year [17]. Differences between countries, institutions, and types of occupational accidents are among the reasons for the pervasiveness of occupational accidents experienced and reported. It is seen that occupational accident notifications are not at the desired level, and the frequency of occupational accidents is estimated to be higher. It is thought that employees prefer not to report occupational accidents due to intensity, fear of losing their jobs, and ignorance.

One-third of the respondents stated that they had undergone an initial inspection, and half stated that they had never undergone a periodic health examination. Almost all of them stated that the last examination was not in the last year. In Turkey, the pre-employment and health examinations of employees are mandatory and the employer's responsibility. Hospitals are very hazardous workplaces, and all employees must undergo periodic examinations ≥1 a year. The hospital management had recently established an occupational health and safety unit at the time the study was conducted. It is thought that this situation negatively affected the results related to health examinations.

Two-fifths of the cleaning workers in this study stated that they were most disturbed by chemical exposure. According to another study conducted among cleaning workers in Turkey, more than one-fifth of the workers

Table 4. Health complaints, perceived health status, negative perception of work's impact on health, and occupational accident cases according to some characteristics and workplace risk factors among the cleaning employees, working at the university hospital for ≥1 year, 2022, Ankara, Turkey

Variable	Participants (N = 438)									
	health complaints				work and health: perception, impact, and incidents					
	fatigue		headache		positive perceived health		work's negative impact on health		occupational accidents	
	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Demographic										
gender		**<0.001**		**<0.001**		**<0.001**		**<0.001**		0.615
female (N = 247)	121 (49.0)		90 (36.4)		114 (46.2)		145 (58.7)		50 (20.2)	
male (N = 191)	36 (18.8)		31 (16.2)		140 (73.3)		59 (30.9)		35 (18.3)	
age group		**<0.001**		0.336		**0.033**		**0.035**		0.717
≤40 years (N = 219)	57 (26.0)		56 (25.6)		138 (63.0)		91 (41.6)		44 (20.1)	
>40 years (N = 219)	100 (45.7)		65 (29.7)		116 (53.0)		113 (51.6)		41 (18.7)	
total working time		**0.004**		0.805		0.289		**0.032**		0.107
<7 years (N = 213)	62 (29.1)		60 (28.2)		129 (60.6)		88 (41.3)		48 (22.5)	
≥7 years (N = 225)	95 (42.2)		61 (27.1)		125 (55.6)		116 (51.6)		37 (16.4)	
Working conditions										
repeated bending		0.685		0.205		0.590		**0.001**		0.447
yes (N = 364)	132 (36.3)		105 (28.8)		209 (57.4)		182 (50.0)		73 (20.1)	
no (N = 74)	25 (33.8)		16 (21.6)		45 (60.8)		22 (29.7)		12 (16.2)	
repetitive tasks		0.991		**0.017**		0.953		**0.020**		0.191
yes (N = 360)	129 (35.8)		30 (8.3)		209 (58.1)		177 (49.2)		74 (20.6)	
no (N = 78)	28 (35.9)		13 (16.7)		45 (57.7)		27 (34.6)		11 (14.1)	
prolonged standing		0.234		0.386		**0.037**		**0.001**		0.764
yes (N = 320)	120 (37.5)		92 (28.7)		176 (55.0)		164 (51.2)		61 (19.1)	
no (N = 18)	37 (31.4)		29 (24.6)		78 (66.1)		40 (33.9)		24 (20.3)	
long distance walking		0.569		0.635		**0.009**		**0.002**		0.867
yes (N = 218)	81 (37.2)		58 (26.6)		113 (51.8)		118 (54.1)		43 (19.7)	
no (N = 220)	76 (34.5)		63 (28.6)		141 (64.1)		86 (39.1)		42 (19.1)	
heavy lifting		0.270		0.937		**0.021**		**<0.001**		0.958
yes (N = 205)	79 (38.5)		57 (27.8)		107 (52.2)		115 (56.1)		40 (19.5)	
no (N = 233)	78 (33.5)		64 (27.5)		147 (63.1)		89 (38.2)		45 (19.3)	
stair climbing		0.547		0.404		0.601		**0.032**		0.401
yes (N = 151)	57 (37.7)		38 (25.2)		85 (56.3)		81 (53.6)		26 (17.2)	
no (N = 287)	100 (34.8)		83 (28.9)		169 (58.9)		123 (42.9)		59 (20.6)	
failure to take breaks		0.131		0.365		0.067		**0.012**		0.413
yes (N = 89)	38 (42.7)		28 (31.5)		44 (49.4)		52 (58.4)		20 (22.5)	
no (N = 349)	119 (34.1)		93 (26.6)		210 (60.2)		152 (43.6)		65 (18.6)	
safety and health training		0.819		0.475		0.152		0.116		**0.027**
in the last 3 years (N = 343)	122 (35.6)		92 (26.8)		205 (59.8)		153 (44.6)		59 (17.2)	
not in the last 3 years (N = 95)	35 (36.8)		29 (30.5)		49 (51.6)		51 (53.7)		26 (27.4)	

Bolded are statistically significant values.

Table 5. Risk factors assessment for musculoskeletal disorders among the cleaning employees (working at the university hospital for ≥1 year) with multivariate logistic regression, 2022, Ankara, Turkey

Variable	Pain location								
	low back	shoulder	knee	back	neck	hip/leg	arm/elbow	wrist/hand	ankle/foot
Gender (female vs. male)									
OR	1.75	4.32	3.86	2.90	4.76	4.19	3.29	4.99	2.31
95% CI	(1.17–2.62)	(2.61–7.13)	(2.37–6.31)	(1.81–4.66)	(2.82–8.03)	(2.47–7.13)	(1.94–5.61)	(2.73–9.10)	(1.32–4.02)
p	**0.007**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.003**
Age (≤40 years vs. >40 years)									
OR	1.54	1.93	1.39	1.65	2.69	1.71	2.35	2.00	1.43
95% CI	(1.00–2.36)	(1.19–3.16)	(0.86–2.25)	(1.06–2.55)	(1.62–4.49)	(1.03–2.83)	(1.39–3.98)	(1.16–3.47)	(0.86–2.38)
p	0.050	**0.008**	0.184	**0.026**	**<0.001**	**0.037**	**0.002**	**0.013**	0.163
Working time (≥7 years vs. <7 years)									
OR	1.04	1.27	1.78	–	1.30	1.14	1.36	1.44	–
95% CI	(1.02–1.07)	(0.78–2.07)	(1.09–2.89)		(0.79–2.13)	(0.69–1.89)	(0.81–2.28)	(0.84–2.48)	
p	0.092	0.331	**0.020**		0.305	0.598	0.245	0.184	
Repeated bending (yes vs. no)									
OR	–	1.42	–	–	1.56	3.39	–	–	4.79
95% CI		(0.69–2.94)			(0.87–2.85)	(1.47–7.83)			(1.52–15.07)
p		0.345			0.135	**0.004**			0.007
Repetetive tasks (yes vs. no)									
OR	–	1.35	–	–	–	2.53	1.50	–	1.25
95% CI		(0.65–2.80)				(1.22–5.24)	(0.75–2.98)		(0.55–2.84)
p		0.424				**0.012**	0.248		0.594
Prolonged standing (yes vs. no)									
OR	–	–	–	1.08	–	1.08	–	–	1.09
95% CI				(0.64–1.83)		(0.61–1.91)			(0.56–2.10)
p				0.763		0.806			0.802
Long distance walk (yes vs. no)									
OR	–	–	–	–	–	–	–	–	–
95% CI									
p									
Heavy lifting (yes vs. no)									
OR	1.52	–	–	1.58	–	–	1.43	1.78	1.39
95% CI	(1.02–2.26)			(1.01–2.46)			(0.89–2.30)	(1.09–2.92)	(0.84–2.32)
p	**0.039**			**0.044**			0.138	**0.022**	0.204

Table 5. Risk factors assessment for musculoskeletal disorders among the cleaning employees (working at the university hospital for ≥1 year) with multivariate logistic regression, 2022, Ankara, Turkey – cont.

Variable	Pain location								
	low back	shoulder	knee	back	neck	hip/leg	arm/elbow	wrist/hand	ankle/foot
Stair climbing (yes vs. no)									
OR	1.57	–	–	–	1.31	–	–	–	–
95% CI	(1.04–2.38)				(0.80–2.14)				
p	**0.034**				0.288				
Failure to take breaks (yes vs. no)									
OR	–	1.52	1.80	–	–	1.47	–	1.36	1.44
95% CI		(0.90–2.57)	(1.07–3.03)			(0.86–2.52)		(0.76–2.42)	(0.81–2.55)
p		0.120	**0.026**			0.165		0.302	0.217

Bolded are statistically significant values.

were uncomfortable with chemical exposure [18]. In a study conducted among hospital cleaning workers in the USA, 2 out of 5 workers had symptoms of exposure to chemical products every month [19]. Cleaning workers working in hospitals may be constantly exposed to chemical substances in the working environment to ensure hygiene. It is expected that discomfort would be caused by these chemicals due to their health effects, odours, high frequency of exposure, and the necessity of using personal protective equipment. Women may be more susceptible to certain chemical exposures due to physiological variations and potential reproductive health issues. The increased incidence of chemical exposure complaints among female workers highlights the necessity for health and safety protocols that consider gender differences.

Most of the cleaning workers who participated in this study stated that they encountered ergonomic problems such as repeated bending, repeating the same strenuous movement, and standing for a long time in the working environment. In a study conducted on healthcare personnel in Turkey, most employees stated that they had to do the same job continuously and stand in the same position for a long time [20]. According to a study conducted in Nigeria among healthcare workers, standing for a long time and working in a bent position are the most common conditions [21]. In a study conducted in Tunisia among healthcare workers, prolonged standing was a risk factor for musculoskeletal disorders [22]. In a study conducted in Ethiopia among cleaners working at a university, almost 1 out of every 3 workers experienced musculoskeletal disorders, and the leading related risk factors were conditions such as repetition of movements, working long in the same position, bending and standing [23]. In a study conducted on healthcare workers in India, working in the same position for a long time, working in complex and cramped positions, and performing the same task were reported as the highest occupational risk factors among all participants [24]. When the literature is analysed, similar results are found to the findings obtained in this study. It is seen that many ergonomic risks faced by cleaning workers continue to be among the most critical occupational exposures, leading to health problems in the workplace.

In this study, the frequency of musculoskeletal disorders in all body regions was significantly higher in women than in men, and female gender is a risk factor for all body pains. Gender plays a role in the prevalence of upper limb pain in general, with shoulder symptoms being more common in women compared to men [25].

According to the results of the *Spanish National Health Survey*, women had a higher prevalence of chronic neck and low back pain than men [26]. According to the results of a population-based study in Iran, female gender was among the non-modifiable factors associated with wrist pain [27]. In a study conducted in the USA, significant differences existed between men and women regarding upper extremity, back, and lower extremity pain, and the prevalence of musculoskeletal disorders was higher in women [28]. According to a study conducted with hospital workers in Brazil, upper extremity pain was higher in women than men [29]. A review of musculoskeletal risk factors in the cleaning occupation showed that female cleaning workers had a high risk of musculoskeletal disorders and discomfort [30]. A study conducted in Sweden on workers exposed to repetitive movements showed that women had a higher risk of neck and upper extremity pain than men [31]. The findings in the literature are similar to those in this study. The frequency of musculoskeletal symptoms between genders is different, possibly due to the difference in task distribution and exposure to ergonomic risk factors between men and women. Physiological differences in muscles, tendons, and ligaments are also essential. Implementing gender-specific ergonomic interventions could be advantageous, as women report higher rates of musculoskeletal pain. This indicates they might face greater ergonomic strain or possess different ergonomic requirements compared to men.

In this study, almost all musculoskeletal disorders in all body regions was significantly higher in older participants. A study on healthcare workers in Turkey found a relationship between age and musculoskeletal disorders in different body regions [32]. In a study conducted on cleaning workers in Malaysia, upper extremity symptoms were higher in those aged >36 years [33]. In a study conducted in Ireland, widespread musculoskeletal disorders increased with age [34]. It is estimated that low back pain is more common in cleaning workers at older ages than in the general population due to the more frequent use of certain body parts. Due to age-related vulnerabilities and the physical demands of cleaning work, older workers could benefit from specific ergonomic adjustments and health interventions. These measures would help to alleviate strain and prevent additional musculoskeletal problems.

Approximately half of the participants in this study who were exposed to heavy lifting complained of low back pain, one-third complained of back pain, and one-quarter complained of wrist/hand pain. Heavy lifting was positively associated with low back, back, and wrist/hand pain. In a study conducted in Turkey, 7 out of 10 cleaning workers in a university hospital reported low back pain due to heavy lifting [35]. In another study at a hospital in Turkey, lifting, pulling, or pushing heavy materials caused significant pain in the wrists [36]. In a study conducted on healthcare workers in Kuwait, low back pain was significantly higher in those who performed tasks such as patient transfer and weight lifting [37]. A study conducted on hospital workers in Tunisia found that low back pain was associated with weight lifting [38]. A systematic review by Kuiper et al. [39] found a dose-response relationship between lifting exposure and the occurrence of back disorders. The findings in the literature and the results are similar. Weight lifting may cause pain in the back, lower back, wrists, and hands, mainly when performed with the wrong handling technique or due to overloading. The fact that these complaints are more common among women indicates that gender-specific training on proper lifting techniques and ergonomic adjustments could greatly benefit female cleaning workers. Due to physiological differences, women might be more vulnerable to these types of injuries.

In this study, repeated bending increased hip/leg and ankle/foot pains, and repetitive tasks increased just hip/leg pain. Failure to take breaks led to an increase in shoulder and knee pain. Repetitive bending can increase hip/leg and ankle/foot pain because it continually stresses the muscle groups in these areas and may overload the muscle and connective tissue in these areas [40]. The fact that repetitive tasks only increase hip/leg pain may indicate that these activities target specific muscle groups and may be the result of overuse in these areas [41]. Not taking any breaks can cause compression or tension on nerves, blood vessels, or supporting soft tissues, and affect circulation. Poor circulation can cause pain in joints such as shoulders [42]. Therefore, paying attention to correct posture techniques can play an important role in preventing work-related musculoskeletal disorders.

In this study, nearly half of women complained of fatigue, compared to one-fifth of men. According to Dutch national data, women reported fatigue more often than men: 37.8% vs. 24.3% [43]. In a study of 1309 patients diagnosed with chronic fatigue syndrome in a hospital in Spain, only 9.1% of patients were men [44]. In the USA, women are more likely to report work-related physical and emotional fatigue than men [45]. Females often take on more household responsibilities than males. This double burden may increase females' physi-

cal and emotional fatigue. Females are more open about expressing their fatigue. They may be more willing to report subjective symptoms such as fatigue, which may have increased the frequency of reporting for this gender. In addition, women may be more likely to complain of fatigue due to their hormonal cycles and being more prone to some chronic diseases than men.

This study observed that employees who did not receive occupational health and safety training in the last 3 years had more occupational accidents than those who did. A study conducted on hospital personnel in Turkey found that those who did not receive training on occupational accidents had more occupational accidents than those who received training [46]. A study conducted in Brazil among cleaning workers in a hospital found that employees who received vocational training only at the beginning of employment had more occupational accidents than those who received periodic vocational training [47]. In Turkey, employers must train employees in occupational health and safety. Employers must organize training programs to ensure that employees understand the potential risks in the workplace, learn safe working methods, and be prepared for emergencies. Workers who do not receive occupational health and safety training may be unable to recognize, prevent, and protect themselves from dangers. They may have difficulty adapting to occupational health and safety protocols and risky situations may arise. All these lead to an increase in the frequency of occupational accidents.

The frequency of respiratory complaints among the participants was found to be relatively low (dyspnoea: 13.2%, cough: 9.4%). In a Polish study among health centre cleaners, 1 out of 4 participants had cough and/or dyspnoea [48]. In a study among hospital cleaning staff with various exposures to chemicals in the USA, cough was 20.0% and shortness of breath was 6.0% as work related acute symptoms [49]. In a study among hospital cleaning staff in South Africa, cough was 14.4% and breathlessness was 18.4% [50]. The underlying reasons for the differences between studies may be due to differences in the workplace environment and cleaning materials and the impact of other factors to which employees are exposed. Additionally, the impact of cleaning staff's access to health and safety training and implementation of protective measures on these respiratory symptoms should be considered.

The results are not generalizable considering that employees in only 1 hospital were examined. The data collection took longer than expected due to the high number of participants and some of the data were obtained through observation may have led to variability in the results, and this can be a limitation. However, there is no significant decrease in the consistency and reliability of the results, at least thanks to the absence of a seasonal difference. Another limitation is that a small number of participants had an attitude of not disclosing their existing musculoskeletal disorders because they thought that it might affect their careers. This limitation was overcome by explaining to the participants that their fears were unfounded.

CONCLUSIONS

This study sheds light on the significant health challenges faced by hospital cleaning workers, particularly concerning musculoskeletal disorders and occupational safety. A notable finding was the underreporting of occupational accidents, highlighting the need for enhanced reporting mechanisms and worker awareness. Moreover, a concerning proportion of workers lacked regular health examinations, emphasizing the importance of institutional support for comprehensive employee health surveillance. Ergonomic risks, such as repetitive tasks and prolonged standing, were prevalent among cleaning staff and strongly associated with musculoskeletal complaints. Implementing measures to mitigate these risks, such as task rotation and technological aids, could potentially reduce workplace injuries and improve overall well-being. The role of occupational health and safety training emerged as pivotal, with workers lacking recent training showing higher rates of occupational accidents. Establishing and maintaining robust training programs are crucial steps toward fostering a culture of safety awareness among hospital cleaning personnel. Gender disparities were evident, with female workers reporting higher incidences of certain health issues compared to their male counterparts. Tailored interventions addressing these gender-specific challenges could lead to better health outcomes and improved workplace conditions for all cleaning staff.

The findings underscore the urgent need for hospital administrations to prioritize the health and safety of cleaning workers. By implementing targeted interventions, enhancing training programs, and promoting regular health assessments, hospitals can create safer and healthier environments for their essential cleaning staff.

Author contributions

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