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Orginal Article

The Relationship Between Absenteeism, Musculoskeletal Disorders, and Noise Annoyance Among Hospital Employees

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Abstract

Background: Musculoskeletal disorders are highly prevalent among working populations and constitute one of the leading causes of occupational absenteeism, resulting in substantial economic burdens worldwide. Moreover, noise annoyance caused by exposure to various persistent noise sources in healthcare environments represents a significant occupational factor contributing to employee absenteeism. This study aimed to investigate the relationship between absenteeism, musculoskeletal disorders, and noise annoyance among hospital staff.

Materials and Methods: This descriptive-analytical cross-sectional study was conducted on 260 hospital employees with at least one year of work experience. Data collection instruments were the Nordic Musculoskeletal Questionnaire, which comprises both general and specific sections on MSDs, the Absenteeism Questionnaire, and the 10-point ISO 15666 Noise Annoyance Scale.

Results: The mean number of sick leave days was 12.03 ± 9.52, entitlement leave days 29.7 ± 9.5, and unpaid leave days 0.69 ± 0.05. Mild pain was reported in the neck (52%), shoulders (39%), wrists (37%), and lower back (39%). Severe and very severe lower back pain was reported by 22% and 12% of the participants, respectively. Moreover, a statistically significant association was observed between absenteeism and job type ($P=0.011$), noise annoyance ($P=0.044$), and musculoskeletal disorders among physicians and technicians ($P<0.001$), as well as among nurses ($P=0.009$).

Conclusion: Considering the influence of musculoskeletal disorders and noise annoyance on occupational absenteeism, implementing targeted educational programs, making ergonomic improvements at workstations, optimizing physical activity, and redesigning equipment can effectively reduce the incidence of these disorders and thereby minimize absenteeism in healthcare settings.

Keywords: Absenteeism, Musculoskeletal disorders, Noise annoyance, Hospitals

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Introduction

Work constitutes one of the core elements of an individual's life, with people typically spending a substantial portion of their time in the workplace. Human resources are widely recognized as one of the most critical assets within any organization (1). Employees in healthcare settings, due to the inherent nature of their work, are frequently exposed to harmful workplace factors, including poor ergonomic design, biomechanical stresses, and adverse physical conditions. These factors can lead to a range of physical, cognitive, and psychological consequences (2). Among the most significant outcomes are musculoskeletal disorders (MSDs), which, following respiratory conditions, rank as the second leading cause of occupational absenteeism (3).

Epidemiological studies have identified MSDs as a major occupational health concern among hospital staff (4). MSDs involve injuries to muscles, peripheral nerves, tendons, bones, joints, ligaments, and blood vessels, often resulting from prolonged exposure to repetitive stress or acute trauma (5). A study conducted in Sweden revealed that MSDs represent the highest cost burden within the healthcare system (6). In the United States, MSDs account for approximately 70 million healthcare visits annually and impose an estimated economic burden ranging from $45 billion to $54 billion per year (7). The reported prevalence of MSDs among hospital employees is substantial, with

rates of 76% in the Netherlands, 67% in Greece, 70.9% in Kuwait, and 57.7% in Tunisia (8).

In Iran, MSDs are similarly among the most common occupational injuries, constituting roughly 7% of all diseases and 14% of physician visits within the general population. MSDs arise from a combination of biomechanical, environmental, psychological, and organizational factors and are often exacerbated by inadequate social support and disrupted work-rest cycles. MSDs contribute significantly to work-related disability and absenteeism (9, 10). For instance, a study among Polish midwives reported that 67% experienced spinal pain in at least one anatomical region (11). Furthermore, previous research has established a significant association between MSDs and job absenteeism (12). Given the considerable economic costs of MSDs and the increasing rates of work absences and medical leaves, these disorders are estimated to cost industrialized countries approximately 1% of their gross national product (GNP) annually (13, 14).

Studies have demonstrated that absenteeism can adversely affect the quality of nursing care, subsequently leading to a decline in community health (15, 16). Thus, beyond the financial implications, workplace absenteeism results in numerous non-financial consequences, including public dissatisfaction and erosion of trust in healthcare institutions, decreased motivation to achieve organizational objectives, reduced performance, as well as various personal, familial, psychological, and physical challenges faced by employees (17).

Evidence from multiple studies indicates that occupational hazards within the workplace significantly influence absenteeism and overall productivity. Shikdar and Sawaqed highlighted the impact of environmental factors—such as heat, lighting, humidity, and dust—on both productivity and absenteeism (18). In healthcare environments, a wide array of noisy medical equipment is routinely used during clinical procedures. Although each device serves a critical function, collectively they contribute to environmental noise pollution. Research has revealed a significant and direct association between noise exposure and noise-induced annoyance among hospital staff (19).

Several studies have highlighted the importance of human interaction with the physical work environment, a central tenet of ergonomics. Consequently, employee discomfort caused by disruptive noise, coupled with ergonomic challenges and musculoskeletal disorders, is likely to influence rates of job absenteeism. Noise-induced annoyance, as a subjective response, can lead to diminished performance and various workplace dysfunctions. For instance, Leblebici et al identified a significant relationship between the physical quality of the work environment and staff productivity (20). Similarly, a study by Golmohammadi and Aliabadi, investigating noise pollution and its annoyance effects in hospitals, reported that 45% of participants experienced severe noise-related annoyance (21). Employees exposed to adverse environmental conditions often struggle to maintain natural postures. In some cases, such exposure negatively impacts their morale and overall well-being, thereby increasing the risk of developing MSDs (22).

Thus, given that absenteeism resulting from avoidable and harmful workplace exposures may compromise employees' job performance relative to their roles and responsibilities (23), it is imperative to evaluate workplace conditions and occupational exposures, along with their effects on absenteeism. Such assessments are essential for the development and implementation of effective intervention strategies. Accordingly, the present study seeks to examine the relationship between absenteeism, musculoskeletal disorders, and noise annoyance among hospital staff.

Materials and Methods

This descriptive-analytical cross-sectional study was conducted in 2019 on 260 healthcare personnel in Birjand, Iran, recruited from two teaching hospitals. Given that the total number of medical staff in these hospitals was approximately 800, the sample size of 260 was determined based on the Morgan table. Stratified random sampling was employed to select the participants, with proportional representation across different hospital departments and wards according to the staff distribution in each unit.

To assess musculoskeletal disorders (MSDs), the Nordic Musculoskeletal Questionnaire (NMQ) was utilized. The questionnaire comprises two sections: a general section and a specific section. The general section assesses demographic information, including age, height, weight, work experience, and job type, along with a general question regarding the body regions most affected by MSDs. The specific section is organized according to nine anatomical regions—neck, shoulders, elbows, wrists, upper back, lower back, hips/thighs, knees, and ankles. For each region, participants were verbally asked whether they had experienced any discomfort or symptoms within the past 12 months and whether such issues had led to work absence or hindered their ability to perform job tasks. Moreover, the participants reported any pain or discomfort experienced in the affected areas over the preceding seven days. The NMQ has demonstrated reliability and validity in capturing MSD symptoms and is widely used for detailed assessments and informed decision-making about workplace interventions. The questionnaire consists of 27 binary (yes/no) items, with a "yes" response indicating the presence of discomfort (scored as 1), and a "no" response indicating the absence of symptoms (scored as 0). Data analysis from this study indicated that participants' MSD severity scores ranged from a minimum of 0 to a maximum of 4. The validity and reliability of the NMQ were previously confirmed by

Mokhtarinia et al who reported an intra-class correlation coefficient (ICC) exceeding 0.70 (24). Absenteeism was assessed using the Job Absenteeism Questionnaire, which consists of two primary sections. The first section collects demographic data, including age, gender, education level, marital status, employment type, work shifts, and the number of absent days over the past year. The second section evaluates factors related to job absenteeism through 32 items, rated by participants on a five-point Likert scale ranging from "1 = very low" to "5 = very high". The overall possible score for this questionnaire ranges from 32 to 160. The content validity of this instrument has been confirmed in previous studies, and its reliability was established through test-retest analysis, yielding a correlation coefficient of r = 0.87 (25).

Noise annoyance among the hospital staff was evaluated according to ISO Standard 15666 using a ten-point scale from 0 to 10, where 0 denotes no annoyance and 10 indicates extreme annoyance. The respondents' scores were classified into five categories: 0–2 (no annoyance), 2–4 (mild annoyance), 4–6 (moderate annoyance), 6–8 (severe annoyance), and 8–10 (extreme annoyance) (26). All data in this study were collected via interviews and self-report questionnaires. The participants were informed of their right to withdraw from the study at any time.

Data Analysis

Data were analyzed using SPSS-19 software. Descriptive statistics, ANOVA, and correlation analysis were employed to interpret the findings.

Ethical Considerations

This study was conducted in full compliance with ethical principles and was approved by the Ethics Committee of Birjand University of Medical Sciences (IR.BUMS.REC.1398.150). All participant's information was kept confidential, and participation was entirely voluntary. Informed consent was obtained from all participants before data collection.

Results

The participants in this study were 260 healthcare staff employed at two teaching hospitals in eastern Iran. The participants' ages ranged from 22 to 56 years, with a mean age of 31.25 ± 7.93 years. Moreover, 56.2% of the participants were female, 73.8% were married, and 74.2% held a bachelor's degree. The mean number of sick leave days was 12.3 ± 9.52, with a maximum of 300 days. The mean number of entitlement leave was 29.7 ± 9.5 days, with a maximum of 270 days, while the mean number of unpaid leave days was 0.69 ± 0.05, with a maximum of 10 days.

As illustrated in Figure 1, the prevalence of mild pain among the participants was reported as follows: 52% in the neck (95% CI: 45.9%–58.1%), 39% in the shoulders (95% CI: 33.1%–44.9%), 37% in the wrists (95% CI: 31.1%–42.9%), and 39% in the lower back (95% CI: 33.1%–44.9%). Moreover, 22% (95% CI: 17%–27%) and 12% (95% CI: 8.1%–15.9%) of participants reported experiencing severe and very severe lower back pain, respectively. The overall mean MSD severity score among participants was 2.00 ± 0.31. The severity of musculoskeletal symptoms significantly differed across occupational groups. Midwives reported significantly greater musculoskeletal discomfort compared to nurses ($P = 0.014$) and technicians ($P = 0.018$). Similarly, physicians experienced significantly higher discomfort than nurses ($P < 0.001$) and technicians ($P = 0.001$), as did emergency medical personnel relative to nurses ($P < 0.001$) and technicians ($P = 0.002$) (Table 1).

The assessment of noise annoyance revealed that 33.8% of the participants reported experiencing a high level of annoyance caused by workplace noise (Figure 2). The data showed no significant associations between job absenteeism and marital status, gender, age, or work experience. However, education level was significantly related to both sick leave ($P = 0.015$) and unpaid leave ($P = 0.004$). Moreover, type of employment was significantly associated with sick leave ($P = 0.048$) and unpaid leave ($P < 0.001$) (Table 2).

As indicated in Table 2, the number of sick leave and entitlement leave days differed significantly across occupational groups. Post hoc comparisons also revealed that head nurses took significantly more sick leave days than physicians ($P = 0.033$) and midwives ($P = 0.035$). Conversely, emergency medical staff had significantly fewer sick leave days than technicians ($P = 0.020$), physicians ($P = 0.010$), and midwives ($P = 0.024$). Furthermore, nurses reported a significantly higher number of sick leave days than technicians ($P = 0.032$), but significantly fewer than physicians ($P = 0.013$). The data also showed practical nurses recorded significantly more entitlement leave days than both emergency medical staff ($P = 0.014$) and nurses ($P = 0.020$). Furthermore, nurses took significantly more entitlement leave days than emergency medical personnel ($P = 0.011$).

A statistically significant increase in sick leave was observed among employees experiencing higher levels of

Table 1. Comparison of musculoskeletal disorder scores among different occupational groups

Occupational group	MSD scores	*P* value
Physicians	2.16 ± 0.07	< 0.001*
Nurses	1.86 ± 0.32	
Technicians	1.96 ± 0.51	
Emergency Staff	2.10 ± 0.55	
Midwives	2.19 ± 0.04	
Practical nurses	1.97 ± 0.29	
Head nurses	1.78 ± 0.40	
Total	2.00 ± 0.31	

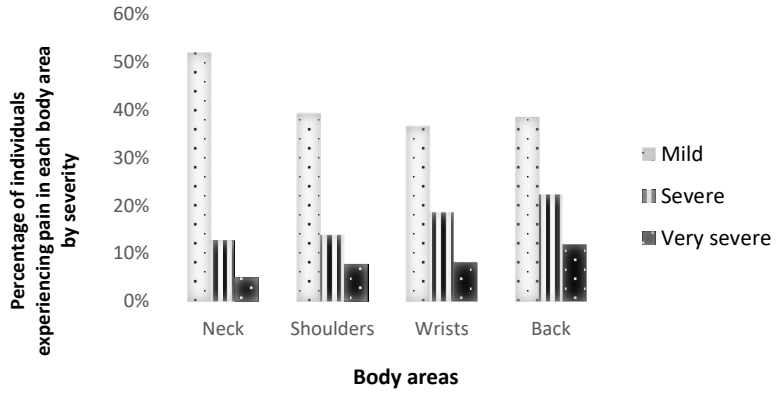

Figure 1. Pain severity in different body areas

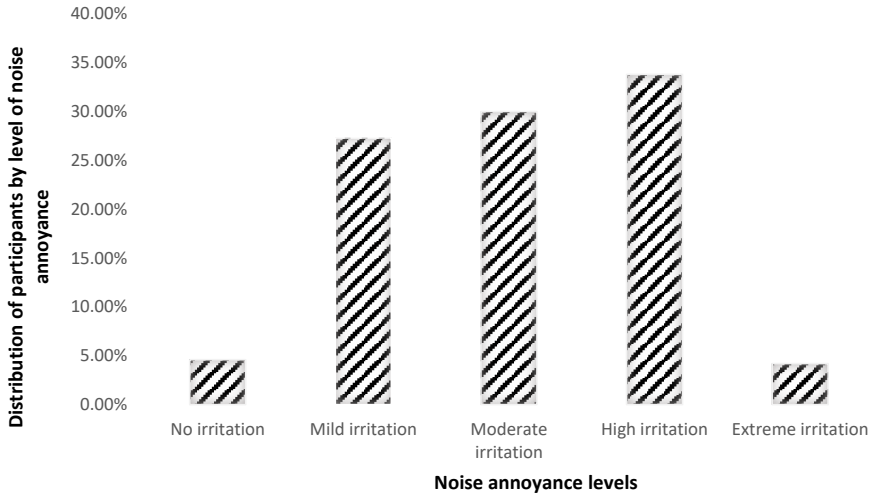

Figure 2. Workplace noise annoyance levels experienced by different hospital staff

discomfort due to workplace noise and those diagnosed with MSDs (Table 3).

Discussion

This study investigated the relationship between various types of job absenteeism and both musculoskeletal disorders and noise annoyance among medical staff in teaching hospitals in Birjand, Iran and showed that sick leave had the highest absenteeism rate with a mean number of 12.03 ± 9.52 days. In comparison, Arab et al reported a higher mean sick leave duration of 18.85 ± 6.64 days per year among nurses, likely reflecting differences in work environments and contributing factors examined in their study (27). Conversely, a separate study focusing on administrative staff revealed significantly lower absenteeism rates, which may be attributed to variations in occupational roles and working conditions (28).

An analysis of the musculoskeletal complaints in the participants showed that 52%, 39%, 37%, and 39% of participants reported mild pain in the neck, shoulders, wrists/hands, and lower back areas, respectively. Furthermore, 22% and 12% of the participants experienced moderate and severe pain, respectively, in the lower back area. A study by Zareei et al investigating the prevalence of work-related MSDs among obstetricians and gynecologists reported pain frequencies in the neck, lower back, and shoulders that were consistent with the findings of the present study (28). Similarly, Nadri et al examined musculoskeletal discomfort among dentists and identified the highest levels of discomfort in the lower back, neck, and shoulders, corroborating our results (5). Musculoskeletal pain is notably prevalent among healthcare workers, particularly in the neck, shoulders, wrists, and lower back, largely due to prolonged working hours, extended periods of standing, patient handling, and suboptimal ergonomic conditions. Consequently, preventive planning and improvements in workplace ergonomics are essential.

The findings from the present study demonstrated a significant association between job type and the number of sick leave and entitlement leave days. Furthermore, the severity of MSDs varied significantly across occupational groups. Specifically, an increase in MSD severity among physicians and nurses was associated with a higher number of sick leave days, whereas among technicians, a rise in musculoskeletal problems correlated with an

Table 2. Job absenteeism and its relationship with demographic variables among healthcare staff

Variable	Category	Frequency (%)	Sick Leave (Mean ± SD)	*P* value	Entitlement Leave (Mean ± SD)	*P* value	Unpaid Leave (Mean ± SD)	*P* value
Total	—	260 (100%)	12.3 ± 9.52	—	29.7 ± 9.5	—	0.69 ± 0.05	—
Gender	Female	146 (56.2%)	16.67 ± 6.51	0.220	38.49 ± 11.62	0.896	0 ± 0	0.109
	Male	114 (43.8%)	11.56 ± 6.39		10.39 ± 6.58		1.04 ± 0.13	
Education	Diploma	22 (8.5%)	11.19 ± 10.05	0.015	13.6 ± 8.0	0.423	0 ± 0	0.004
	Associate's degree	8 (3.1%)	9.72 ± 5.25		23.91 ± 10.82		0.36 ± 0.02	
	Bachelor's degree	193 (74.2%)	36.48 ± 10.35		11.02 ± 5.56		0 ± 0	
	Master's degree	9 (3.5%)	11.69 ± 9.89		9.59 ± 4.43		0 ± 0	
	PhD	21 (8.1%)	79.29 ± 34.43		10.69 ± 8.57		1.42 ± 3.77	
	Specialist	7 (2.7%)	1.57 ± 0.57		8.71 ± 4.9		0 ± 0	
Marital Status	Married	192 (73.8%)	44.79 ± 13.92	0.662	33.92 ± 10.64	0.198	0.72 ± 0.05	0.670
	Single	61 (23.5%)	12.85 ± 6.89		10.41 ± 5.91		0.64 ± 0.08	
	Divorced	7 (2.7%)	3.74 ± 3.00		13.59 ± 10.28		0 ± 0	
Employment Type	Permanent	55 (21.2%)	51.2 ± 15.49	0.048	9.67 ± 7.64	0.001	0 ± 0	0.319
	Contractual	51 (19.6%)	68.33 ± 28.42		62.32 ± 26.05		0 ± 0	
	Temporary	125 (48.1%)	8.55 ± 6.04		9.34 ± 5.75		0.89 ± 0.08	
	Outsourced	29 (11.2%)	9.23 ± 4.03		0.92 ± 0.31		0.93 ± 0.17	
Occupational group	Physicians	22 (8.2%)	86.32 ± 77.00	0.011	10.35 ± 6.05	0.046	2.13 ± 0.45	0.083
	Nurses	159 (61.2%)	40.21 ± 11.37		37.06 ± 11.91		0 ± 0	
	Technicians	23 (8.8%)	9.00 ± 8.43		6.94 ± 5.04		0 ± 0	
	Emergency Staff	18 (6.9%)	6.44 ± 8.11		13.42 ± 11.44		1.18 ± 0.28	
	Midwives	7 (2.7%)	14.29 ± 9.76		7.31 ± 4.29		0 ± 0	
	Practical Nurse	25 (9.6%)	10.77 ± 8.04		8.00 ± 3.92		0 ± 0	
	Head Nurses	6 (2.3%)	1.55 ± 1.00		0 ± 0		0 ± 0	
Quantitative Variables	Age (years)	31.25 ± 7.93	r = 0.02	0.784	r = 0.04	0.552	r = 0.01	0.853
	Number of Children	1.80 ± 1.46	r = 0.16	0.01	r = -0.09	0.166	r = 0.01	0.857
	Weekly Work Hours	55.8 ± 17.42	r = -0.03	0.648	r = -0.15	0.140	r = 0.02	0.747
	Work Experience	7.23 ± 7.20	r = -0.04	0.548	r = 0.04	0.491	r = -0.03	0.667

Table 3. The relationship between MSDs and noise annoyance with types of job absenteeism by occupational group

Variable	Sick Leave r (*P* value)	Entitlement Leave r (*P* value)	Unpaid Leave r (*P* value)
Noise annoyance	0.13 (0.044)*	-0.17 (0.006)*	-0.03 (0.758)
MSDs (Total)	0.13 (0.037)*	-0.003 (0.960)	-0.077 (0.213)

P-values < 0.05: Significant

increased number of entitlement leave days. Similarly, Safaeian et al identified musculoskeletal problems as the leading cause of illness-related absenteeism among healthcare personnel (15).

Heydari et al examined individual and occupational risk factors and outcomes associated with MSDs among emergency personnel and found that Red Crescent staff were several times more likely than firefighters to experience musculoskeletal discomfort. This resulted in higher absenteeism rates and increased physician visits (29). These findings supported the observations in the present study confirming variations in absenteeism and musculoskeletal disorder prevalence across different occupational groups. Similarly, a study by Coggon et al demonstrated that long-term absenteeism due to MSDs was more prevalent among nurses compared to administrative staff (30), confirming the results of the present study. Overall, it can be argued that physicians and nurses endure greater musculoskeletal strain—particularly in the back and neck—due to prolonged standing and patient handling. Conversely, technicians are more prone to wrist and neck problems, likely resulting from repetitive tasks and extended periods of sitting. These differences suggest that the nature of job tasks significantly influences the severity and location of MSDs. In contrast, a study by Kumalo investigating the relationship between work-related MSDs, absenteeism, and clinic visits among nurses found no significant association between these disorders

and sick leave usage (31). This finding contradicts the results of the present study. The discrepancies may be attributable to variations in study populations, workplace conditions, organizational culture, research methodologies, and individual factors. Kumalo's study focused exclusively on nurses, whereas the present study addressed a broader range of healthcare workers, thereby covering a wider spectrum of job tasks and occupational pressures. In addition, differences in hospital conditions, management styles, and cultural attitudes toward sick leave may contribute to the divergent findings. Variations in data collection instruments and operational definitions of key variables also play a role. Moreover, individual factors such as age, work experience, and the level of social support are important determinants influencing these outcomes.

Discomfort caused by workplace noise is another critical factor that can prompt employees to avoid noisy occupational environments. Given that noise annoyance varies among individuals, the findings of this study revealed a direct and significant correlation between the extent of sick leave taken by healthcare staff and their reported level of noise-induced discomfort. Accordingly, Tavares et al demonstrated that perceived noise levels in the workplace significantly affect employees' presence and engagement in their work environment (32), findings consistent with those of the present study. Considering that healthcare settings inherently involve the use of numerous noisy devices and equipment, which may cause varying degrees of distress, implementing noise reduction strategies and creating calmer hospital environments can yield considerable benefits for both patients and staff. Undoubtedly, healthcare personnel working in a peaceful environment are more likely to experience improved physical and psychological well-being, which, in turn, positively influences the quality of care they deliver. Given the prevalent challenges in healthcare environments, such as staffing shortages and uneven distribution across shifts, it is essential to identify both individual and environmental contributors to MSDs and noise annoyance among staff.

This study was conducted with some limitations. It did not explore the specific underlying causes of noise annoyance or musculoskeletal disorders. Thus, future studies need to investigate these causative factors in greater detail to inform targeted interventions.

Conclusion

The findings from this study revealed that musculoskeletal disorders were most prevalent in the neck, with 52% of participants reporting mild pain, followed by the lower back and shoulders (each 39%) and wrists (37%). These findings highlight the critical need for ergonomic interventions and better management of physical stressors in these vulnerable body areas. Moreover, 33.8% of healthcare personnel reported significant noise-related discomfort in their work environment, a factor known to reduce concentration and elevate psychological stress, thereby indirectly impairing job performance and physical health. Furthermore, notable differences in sick leave and entitlement leave days were observed across occupational groups. Accordingly, physicians and nurses, who experienced more severe musculoskeletal symptoms, also had higher rates of sick leave. These findings highlight how the nature of occupational tasks influences both the type and extent of absenteeism.

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Authors' Contribution

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Formal analysis: Elaheh Allahyari.
Investigation: Fereshteh Sadavipour.
Methodology: Fereshteh Sadavipour, Elaheh Allahyari.
Project administration: Fereshteh Sadavipour, Vahideh Abolhasannejad, Mahmoud Sadeghi Khorashad.
Resources: Fereshteh Sadavipour.
Software: Elaheh Allahyari, Fereshteh Sadavipour.
Supervision: Vahideh Abolhasannejad, Mahmoud Sadeghi Khorashad.
Validation: Fereshteh Sadavipour, Vahideh Abolhasannejad, Mahmoud Sadeghi Khorashad.
Visualization: Fereshteh Sadavipour, Vahideh Abolhasannejad.
Writing – original draft: Fereshteh Sadavipour, Vahideh Abolhasannejad, Mahmoud Sadeghi Khorashad.
Writing – review & editing: Fereshteh Sadavipour, Vahideh Abolhasannejad.

Competing Interests

There are no conflicts of interest related to this study.

Ethical Approval

All ethical considerations related to conducting the research were strictly observed.

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