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Original Research

Effect of Smartphone Use on Musculoskeletal Pain Among Healthcare Workers: A Cross-Sectional Study

Enes Efe Is, Selda Ciftci Inceoglu, Banu Kuran

Department of Physical Medicine and Rehabilitation, University of Health Sciences Türkiye, Sisli Hamidiye Etfal Training and Research Hospital, Istanbul, Türkiye

Abstract

Objectives: This study aimed to investigate the relationship between smartphone use and musculoskeletal pain among healthcare workers of different occupations. The research sought to examine the connection between smartphone habits and the prevalence and severity of musculoskeletal pain, with a focus on work-related and personal smartphone use, physical activity, temporomandibular dysfunction and neck disability.

Methods: The study utilized a cross-sectional survey design conducted via Google Forms targeting healthcare workers affiliated with Sisli Hamidiye Etfal Training and Research Hospital. The survey comprised 99 questions assessing demographic and professional information, health conditions, smartphone addiction, physical activity level, musculoskeletal pain, and pain-related disability.

Results: A total of 207 hospital staff members' responses were included in the analysis. Participants with higher smartphone addiction scores exhibited a significantly younger mean age and increased smartphone usage post-pandemic. No significant differences were found in physical activity levels between groups. However, those with higher addiction scores reported more frequent pain in the jaw and elbows, greater neck disability score, and a higher prevalence of temporomandibular dysfunction. The study also revealed a significant association between smartphone addiction and multi-site musculoskeletal pain.

Conclusion: The findings indicate that smartphone addiction among healthcare workers is associated with specific patterns of musculoskeletal pain, particularly in the jaw and elbows, and increased neck disability scores. The study highlights the need for targeted interventions to promote healthier smartphone habits and mitigate musculoskeletal pain among healthcare professionals.

Keywords: Healthcare workers, musculoskeletal pain, smartphone addiction, smartphone use

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Smartphones, increasingly integrated into healthcare, enhance communication and information access for patient care but also blur the line between work and personal life for healthcare workers. This dual usage might contribute to the rise in musculoskeletal pain among a group already prone to such issues.[1,2] The empirical evidence

Address for correspondence: Enes Efe Is, MD. Department of Physical Medicine and Rehabilitation, University of Health Sciences Türkiye, Sisli Hamidiye Etfal Training and Research Hospital, Istanbul, Türkiye
Phone: +90 537 328 19 44 **E-mail:** enefeis@gmail.com

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highlights a significant association between excessive smartphone use and musculoskeletal discomfort, affecting areas such as the thumbs, hands, wrists, elbows, shoulders, neck, upper back, waist, and hips, with reported discomfort frequencies ranging from 8.2% to 89.9%, emphasizing the need for immediate attention to individual well-being and patient safety.[3] Musculoskeletal pain affects the quality of life and occupational performance of healthcare professionals, making it crucial to investigate smartphone use's role in this scenario.[4,5]

This study is the first to explore the relationship between smartphone use and musculoskeletal pain among healthcare workers of different occupations. Using a cross-sectional survey design, it examines the connection between smartphone habits and the prevalence and severity of musculoskeletal pain, considering factors like work and non-work smartphone use, physical activity, and history of temporomandibular dysfunction and neck disability. By shedding light on the nuances of smartphone use and its potential association with musculoskeletal pain, this study aims to provide valuable insights for targeted interventions and healthier smartphone habits within the healthcare workforce and the broader population.

Methods

This study utilized Google Forms to survey healthcare workers at Sisli Hamidiye Etfal Training and Research Hospital, with approval from the local ethics committee (Approval No: 2256). Conducted in accordance with the principles of the Declaration of Helsinki, the data collection took place between April 5 and April 30, 2023. The survey, distributed with the support of the hospital administration and chief doctors of departments, was completed by 223 staff members. It included 99 questions covering demographics, health conditions, mood, smartphone addiction, physical activity, musculoskeletal pain, and disability. Mood was assessed using the Beck Depression Inventory, excluding participants with scores above 16 due to potential influence on pain-related parameters.[6,7] Smartphone addiction was measured with the Smartphone Addiction Scale-Short Version (SAS-SV), with a cut-off score of 29.5 indicating addiction.[8,9] Physical activity was evaluated using the International Physical Activity Questionnaire-Short Form (IPAQ-SF), categorizing participants into low, moderate, and high activity levels.[10,11] Musculoskeletal pain assessment covered various body regions, with intensity measured using the Visual Analog Scale (VAS), and the duration of pain was also assessed. Neck disability was assessed using the Neck Disability Index (NDI)[12,13], and temporomandibular joint dysfunction (TMD) was evaluated with the Fonseca Anamnestic Index (FAI).[14-16]

Statistical Analysis

The analyses were conducted using the SPSS v 28.0 program (SPSS Inc., Chicago, IL, USA). In the descriptive statistics of the data, mean, standard deviation, median, minimum, maximum, frequency, and ratio values were employed. The distribution of variables was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Independent sample t-tests and Mann-Whitney U tests were utilized z variables, the chi-square test was employed, and in cases where the conditions for the chi-square test were not met, the Fischer test was used.

Results

The analysis revealed significant differences in age between participants with Smartphone Addiction Scale-Short Version scores (SAS-SVS) below 29.5 and those above 29.5, with the former group being older ($p=0.002$). No significant differences were observed in gender distribution, body mass index, or occupational distribution between the groups. However, department distribution varied significantly, with a higher proportion of management unit employees in the SAS-SVS>29.5 group ($p=0.002$). The SAS-SVS<29.5 group reported more work-related smartphone usage, while the SAS-SVS>29.5 group reported an increase in smartphone usage after the pandemic ($p<0.001$). No significant difference in physical activity levels was found between the groups ($p=0.224$) (Table 1).

Regarding pain, both groups reported similar rates of musculoskeletal pain, with no significant differences in mean pain intensity or duration. However, the distribution of pain sites differed, with the SAS-SVS>29.5 group experiencing higher rates of jaw and elbow pain ($p=0.005$ and $p=0.030$, respectively). This group also reported more widespread pain across multiple body regions ($p=0.018$) and scored higher on the FAI and NDI ($p=0.001$ and $p=0.046$, respectively). There were no significant differences in work absence due to pain or painkiller usage between the groups (Tables 2 and 3).

Discussion

This study aimed to elucidate the association between smartphone addiction and related symptoms among healthcare professionals, as smartphones have become integral to both professional and personal activities. We found significant differences in age and smartphone usage patterns between healthcare workers with high and low smartphone addiction scores. Notably, those with higher scores experienced more pain in specific locations like the jaw and elbow, greater pain-related neck disability, a higher prevalence of multi-site pain, and TMD.

Table 1. Participant characteristics and intergroup comparisons: Demographics, occupation, smartphone usage, and physical activity

	SAS-SVS<29.5		SAS-SVS>29.5		p
	Mean±SD/n (%)	Median	Mean±SD/n (%)	Median	
Age (year)	39.8±10.8	39.5	35.3±11.2	33.0	0.002[m]
Sex					
Female	69 (69.0)		72 (67.3)		0.792[X²]
Male	31 (31.0)		35 (32.7)		
Body Mass Index (kg/m²)	24.9±3.9	24.7	24.5±4.3	24.2	0.490[t]
Occupation					
Physician	42 (42.0)		43 (40.2)		0.893[X²]
Physiotherapist	10 (10.0)		8 (7.5)		
Nurse-Midwife-Physical Therapy Technician	24 (24.0)		28 (26.2)		
Secretary, Security, Staff	24 (24.0)		28 (26.2)		
Department					
Internal medical specialties	74 (74.0)		76 (71.0)		0.002[X²]
Surgical specialties	18 (18.0)		7 (6.5)		
Management	8 (8.0)		24 (22.4)		
Smartphone Addiction Scale-Short Version Score	20.5±6.7	22.0	39.0±6.8	37.0	<0.001[m]
Primary Purpose of Smartphone Usage					
Work	33 (33.0)		14 (13.1)		0.001[X²]
Personal	67 (67.0)		93 (86.9)		
Increase in Smartphone Usage after Pandemic					
(-)	46 (46.0)		23 (21.5)		<0.001[X²]
(+)	54 (54.0)		84 (78.5)		
Increase in Smartphone Usage after the Earthquake					
(-)	62 (62.0)		56 (52.3)		0.161[X²]
(+)	38 (38.0)		51 (47.7)		
International Physical Activity Questionnaire-Short Form Category					
Low	28 (28.0)		36 (33.6)		0.224[X²]
Moderate	53 (53.0)		44 (41.1)		
High	19 (19.0)		27 (25.2)		

SAS-SVS: Smartphone Addiction Scale-Short Version Score; SD: Standard Deviation; t: Independent Samples t-test; m: Mann-Whitney U Test; X^2: Chi-Square Test.

The risk of smartphone addiction is generally higher among younger individuals. Our findings of a younger average age among those with smartphone addiction align with existing literature.[17] While some studies suggest varying levels of smartphone addiction between genders[8,18], our study found no significant difference. Interestingly, smartphone addiction was more common among those working in management roles.

The COVID-19 pandemic has significantly altered daily habits and working conditions, leading to an increase in smartphone addiction due to changes in routine and limited social interaction.[19,20] Our study observed an increase in smartphone usage post-pandemic among the addiction group, but no change in usage patterns following the earthquake that occurred in our country on February 6, 2023.

Physical activity is known to prevent problematic smartphone use[21], but our study found no significant difference in physical activity levels between groups with and without smartphone addiction. Excessive smartphone use is associated with physical symptoms like neck, shoulder, hand/wrist and elbow pain.[3] Our study found no significant difference in pain intensity and duration between groups, but the addiction group reported more frequent elbow and jaw pain.

The poor head posture associated with smartphone use can lead to cervical spine issues and temporomandibular joint problems.[22-24] Our study supports this, with higher FAI and NDI scores among those with smartphone addiction.

A limitation of this research, which is also a frequent methodological constraint in similar studies, is the complex nature of musculoskeletal pain, indicating that smartphone usage by itself may not be the only contributing factor.[3]

Table 2. Pain-related metrics and intergroup comparisons: Pain parameters, work absence, painkiller usage, and disability

	SAS-SVS<29.5		SAS-SVS>29.5		p
	Mean±SD/n (%)	Median	Mean±SD/n (%)	Median	
Site of MP					
Head	27 (27.0)		26 (24.3)		0.656$^{X^2}$
Jaw	3 (3.0)		15 (14.0)		0.005$^{X^2}$
Neck	45 (45.0)		57 (53.3)		0.234$^{X^2}$
Back	46 (46.0)		67 (62.6)		0.016$^{X^2}$
Shoulder	25 (25.0)		32 (29.9)		0.430$^{X^2}$
Elbow	9 (9.0)		21 (19.6)		0.030$^{X^2}$
Hand-Wrist	19 (19.0)		29 (27.1)		0.167$^{X^2}$
Lower Back	40 (40.0)		55 (51.4)		0.100$^{X^2}$
Hip	14 (14.0)		12 (11.2)		0.546$^{X^2}$
Knee	16 (16.0)		26 (24.3)		0.138$^{X^2}$
Ankle	13 (13.0)		18 (16.8)		0.441$^{X^2}$
Foot	24 (24.0)		27 (25.2)		0.837$^{X^2}$
MP in > 1 Site					
(-)	33 (33.0)		20 (18.7)		0.018$^{X^2}$
(+)	67 (67.0)		87 (81.3)		
Leave/Medical Absence Due to MP					
(-)	84 (84.0)		92 (86.0)		0.690$^{X^2}$
(+)	16 (16.0)		15 (14.0)		
Use of Painkillers in the Last 1 Month					
(-)	42 (42.0)		44 (41.1)		0.898$^{X^2}$
(+)	58 (58.0%)		63 (58.9)		
Painkiller Usage Frequency in Last Month (days/week)	2.1±1.3	2.0	2.2±1.6	2.0	1.000^{m}
Visual Analog Scale Score for Different Sites of MP					
Head	5.2±2.2	5.0	5.2±1.8	5.0	0.765^{m}
Jaw	5.7±3.1	5.0	5.1±2.4	4.0	0.712^{t}
Neck	4.5±2.3	4.0	4.9±2.0	5.0	0.216^{m}
Back	5.5±2.2	5.5	5.2±2.1	5.0	0.402^{m}
Elbow	5.7±2.8	5.0	3.8±2.1	3.0	0.051^{t}
Hand-Wrist	4.2±2.4	3.0	5.2±2.0	5.0	0.067^{m}
Lower Back	5.1±2.0	5.0	5.2±2.3	5.0	0.900^{m}
Fonseca Anamnestic Index Score	20.1±18.1	15.0	28.1±20.7	25.0	0.001^{m}
Neck Disability Index Score	9.6±7.2	7.0	11.7±7.2	9.0	0.046^{m}

SAS-SVS: Smartphone Addiction Scale-Short Version Score; SD: Standard Deviation; Med: Median; MP: Musculoskeletal Pain; t: Independent Samples t-test; m: Mann-Whitney U Test; X^2: Chi-Square Test.

To minimize this limitation, participants' depression levels were measured using the Beck Depression Inventory, and individuals with scores exceeding 16 were not included. Furthermore, there were no significant differences found in physical activity levels between the two groups, which may affect pain outcomes.

The absence of significant differences in pain frequency at the wrist, fingers, and neck areas may result from the sample size, potentially affecting the statistical power, along with temporary pain associated with the cross-sectional design of the study or the heterogeneous distribution of occupational tasks within the groups, despite no significant difference in group allocation. On the other hand, more pronounced pain in the jaw and elbow regions can be explained by the forward head posture and flexed elbow positions commonly associated with smartphone use.[22-24]

Moreover, the occurrence of neck pain in both groups was considerably greater than the global prevalence, possibly masking significant differences. Nonetheless, increased neck disability scores were noted in the group with higher smartphone use, which should be highlighted.

Table 3. Intergroup analysis of musculoskeletal pain duration based on smartphone addiction scores across various anatomical sites

	Duration (weeks)	SAS-SVS < 29.5		SAS-SVS > 29.5		
		n	%	n	%	p
Head	0-6	19	70.4	18	69.2	0.928$^{X^2}$
	6-12	5	18.5	2	7.7	
	>12	3	11.1	6	23.1	
Jaw	0-6	0	0.0	6	40.0	0.515$^{X^2}$
	6-12	1	33.3	3	20.0	
	>12	2	66.7	6	40.0	
Neck	0-6	21	46.7	25	43.9	0.899$^{X^2}$
	6-12	5	11.1	8	14.0	
	>12	19	42.2	24	42.1	
Back	0-6	22	47.8	28	41.8	0.816$^{X^2}$
	6-12	6	13.0	10	14.9	
	>12	18	39.1	29	43.3	
Elbow	0-6	4	44.4	10	47.6	0.873$^{X^2}$
	6-12	2	22.2	3	14.3	
	>12	3	33.3	8	38.1	
Hand-Wrist	0-6	12	63.2	14	48.3	0.595$^{X^2}$
	6-12	3	15.8	6	20.7	
	>12	4	21.1	9	31.0	
Lower Back	0-6	14	35.0	22	40.0	0.358$^{X^2}$
	6-12	4	10.0	10	18.2	
	>12	22	55.0	23	41.8	

SAS-SVS: Smartphone Addiction Scale-Short Version Score; SD: Standard Deviation; MP: Musculoskeletal Pain; X^2: Chi-Square Test.

The limitations of this study, shared by similar research, highlight the need for future studies to adopt more comprehensive approaches to investigate the complex etiology of musculoskeletal pain and its relation to smartphone usage. While a significant difference was observed in the primary outcome, the secondary outcomes did not demonstrate significant differences, which may be attributed to an insufficient sample size, as indicated by the post hoc power analysis. Addressing these limitations through studies with larger sample sizes and robust methodologies will provide deeper insights into the specific factors contributing to musculoskeletal pain associated with smartphone use.

Conclusion

Smartphone addiction among healthcare workers may be associated with certain musculoskeletal pain, especially in the jaw and elbows, and increased neck disability scores. Our study highlights the need for targeted interventions to promote healthier smartphone habits and reduce musculoskeletal pain among healthcare professionals. Increased smartphone use is also correlated with various symptoms and pathophysiological conditions, emphasizing the need for a biopsychosocial approach in evaluating and managing problematic smartphone use. Further research is needed to investigate the broader effects of smartphone use on healthcare workers' well-being and professional performance.

Disclosures

Ethics Committee Approval: The study was approved by the Sisli Hamidiye Etfal Training and Research Hospital Clinical Research Ethics Committee (date: 04.04.2023, no: 2256).

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Informed Consent: The first question of the online survey asked participants for their written consent to participate in the survey.

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