



PREVALENCE OF MUSCULOSKELETAL DISCOMFORTS AMONG ADDICTED SMARTPHONE USERS

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Abstract

Introduction: In recent time people use their smartphones routinely and excessively for different purposes, which is causing many health problems to them including musculoskeletal issues.

Objective: To find the prevalence of musculoskeletal discomfort among smartphone users.

Methodology: This was analytical cross-sectional study that was conducted in Gujrat, Pakistan. It contained a sample size of 346 individuals. In this study those were included which were willing to participate in study and age ranges from 20 to 40 years and those were excluded who gave incomplete information, with any traumatic injury, had reported rheumatoid arthritis, with mental disorders and any radiculopathy. Non- probability convenient sampling technique was used for sampling. Data were collected from individuals by Nordic musculoskeletal questionnaire NMQ and short version of smartphone addiction scale SAS- SV.

Results: Out of 346 addicted participants, 190 (54.9%) were male and 156 (45.1%) were female, both with average age 25 years. So, out of total participants, 230 (66.5%) had neck discomfort, 171 (49.4%) had discomfort in wrists/hands, 150 (43.4%) had discomfort in upper back, 143 (41.3%) had lower back discomfort along with some participant counts 110 (31.8%) had shoulder discomfort, 88 (25.4%) had elbow discomfort and 11.6%, 6.9%, 5.8% in lower limbs including hips/thighs, knees, ankles/feet respectively

Conclusion: We conclude that due to smartphone addiction both male and female had symptoms in their whole body, but severity of those symptoms differs according to region which is most effected. Mostly participants had most discomforts in neck, wrist/hands, upper back and lower back with some effect to shoulder and lower limbs also. So, there is a need to create an awareness of diverse effects which are due to smartphone addiction in people to reduce these discomforts' ratio in population.

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Key Words: Musculoskeletal discomfort, Musculoskeletal pain, Smartphone addiction, Smartphone effects, Nordic questionnaire, Smartphone addiction scale short version (SAS-SV)

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INTRODUCTION

Acute or persistent discomfort that involve bones and soft tissues is referred as musculoskeletal discomfort and this problem is widespread in the world¹. Mostly neck and shoulder discomfort are common in musculoskeletal problems². Despite the fact that the first cellphone had been developed in 1992, the name "smartphone" wasn't officially coined until 1995, when the device's capabilities expanded beyond just conversations.³ A smartphone is a common gadget with touchscreen, networks and internet and software that can handle difficult task⁴.

According to study, now 25% more people experience these problems in last 10 years⁵. In middle age workers, the functioning in unnatural positions or conducting hand labor that is repetitious, like composing texts, reading, and typing, may be required for extended periods of time⁶. Now a days, a smartphone is frequently used by students for their study purposes. During using these devices they often remain in poor postures for long time which cause certain musculoskeletal problems in them⁷.

In today's global environment, smartphones have grown into a crucial part of daily life and are essential to even ordinary tasks.⁸ Young adults are highly affected by musculoskeletal discomfort find their life more stressful and challenging as there is major rise in frequency of neck, shoulder and back pain⁹. Student's life experiences seriously affected by discomfort in the cervical region as well as the lumbar region which are revealed to rank first and fourth leading reasons of years spent with disability¹⁰.

In Turkey, women were more prone than men to become addicted to using smartphones.¹¹ Musculoskeletal discomfort is associated also with ergonomic conditions, when the workplace is uncomfortable for students' bodies it affect their working capability¹². Some authors did study on musculoskeletal discomfort in these

populations (students in health colleges and health workers). Several figures of prevalence musculoskeletal discomfort with a variety of severity levels have been reported in studies on students¹³.

METHODOLOGY:

Inclusion Criteria:

- Age 20-40 years
- Those who were willing to participate in study
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Exclusion Criteria:

- Participant with Incomplete information.
- Had any traumatic injury (Brain injury, Spinal cord injury, Spine fractures, Broken and dislocated bones) with in last 6 months
- Disoriented patients
- Reported Cervical & Lumbar Radiculopathy
- Reported surgery within last 6-12 months

DATA COLLECTION

My research sought to determine the frequency of musculoskeletal pain among smartphone users. This research was done within four months of approval of research committee & data were collected from general population of District Gujrat, Punjab, Pakistan. It was done using the non-probability convenient sampling technique. and consent was taken from the sample size of 346 individuals for their data collection through Smartphone Addiction Scale short version (SAS-SV) to check smartphone addiction and Nordic Musculoskeletal Questionnaire (NMQ) to check musculoskeletal discomfort. The inclusion criteria were young adults and those who agreed to take part in the research. Those were excluded, who gave incomplete data, disoriented person, any

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surgery with in last 6-12 months, fracture, had reported rheumatoid arthritis and had reported cervical and lumber radiculopathy.

STATISTICAL ANALYSIS

Data will be entered and analyzed using statistical package for Social Sciences (SPSS) software version 24. For descriptive analysis, mean and standard deviation will be calculated for quantitative variables whereas Frequency and percentages will be calculated for qualitative variables. For inferential statistics,

RESULTS

appropriate statistical test will be applied. All results will be calculated at 95% confidence interval and P-value ≤ 0.05 will be considered as a significant value.

ETHICAL CONSIDERATION

Informed consent was obtained for all the population in the study. We also obtained permission from gernal population of district gujrat conduct the investigation. All information and data collection were kept confidential.

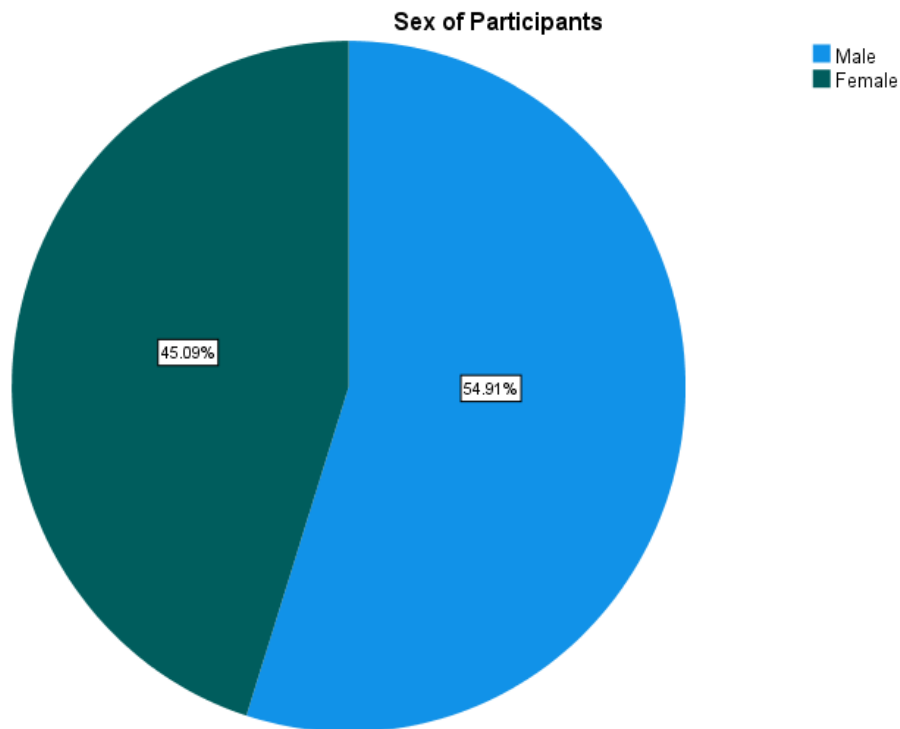
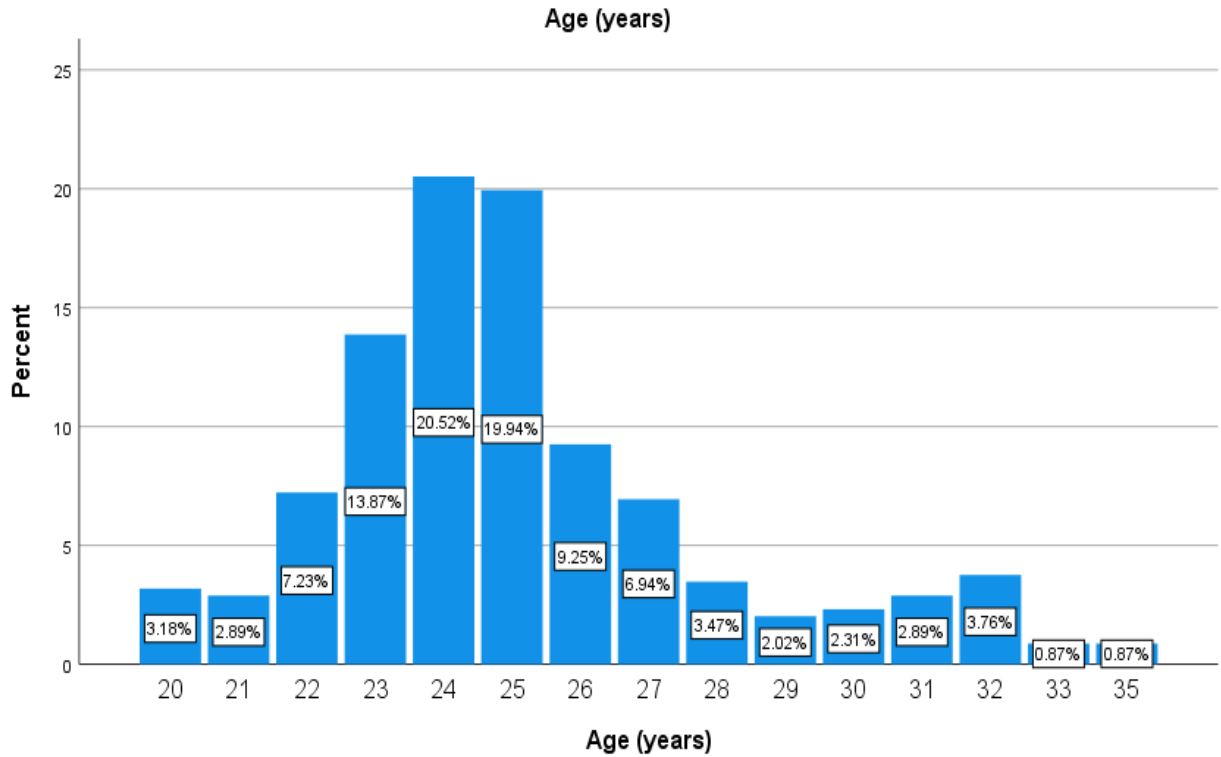


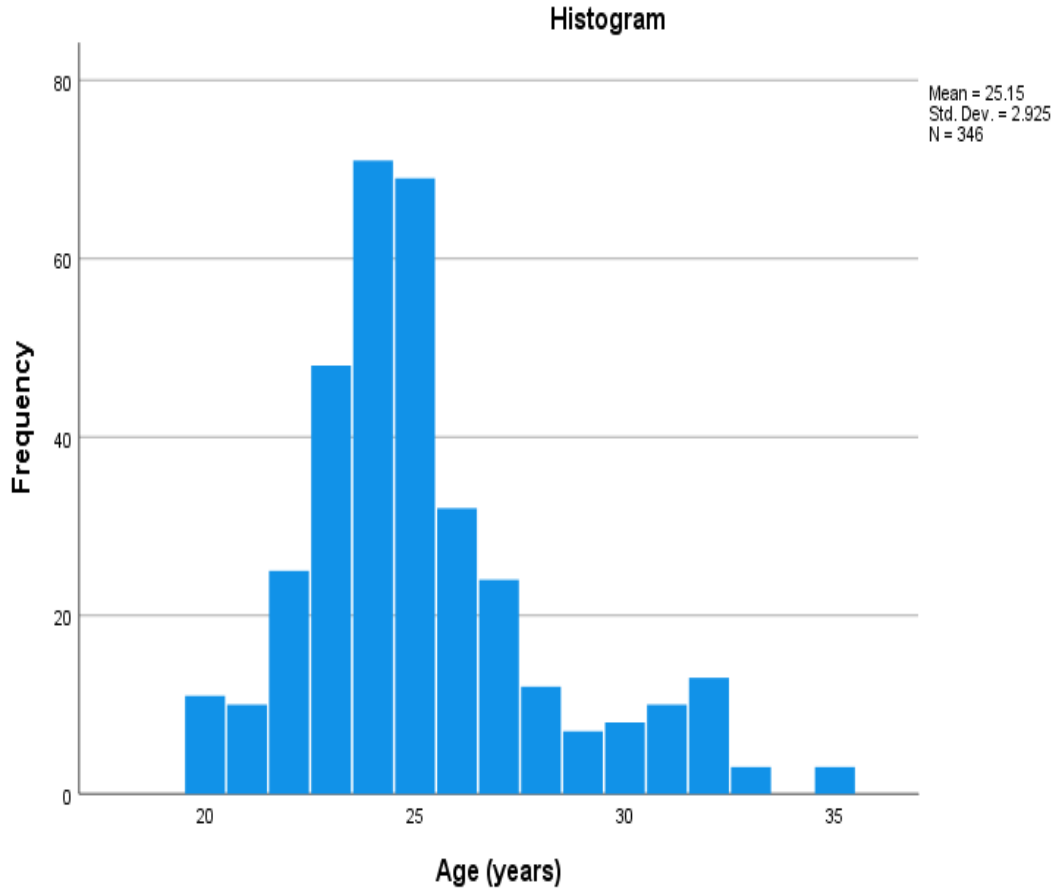
Figure 1: Gender Distribution: This graph shows that in this study Male 190 (54.91%) were more than Females 156 (45.09%) out of total 346 participants.



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Figure 2: Percentage of different ages of participants

This graph shows that out of total participants (346), 3.1% were of 20 years, 2.8% were 21 years old, 7.2% were of 22 years, 13.8% were of 23 years, 20.5% were 24 years old, 19.9% were of 25 years, 9.25% were of 26 years, 6.9% were 27 years old, 3.4% were 28 years old, 2% were 29 years old, 2.3% were 30 years old, 2.8% were of 31 years, 3.7% were 32 years old, 0.8% were 33 years old and 0.8% were 35 years old



2025

Figure 3: Frequency of ages of participants

This graph shows that Mean value of age was 25.15 while the Standard deviation was 2.92.

Table 5.1: Statistics of Smartphone Addiction

Addiction Score			
Male	N	Valid	190
		Missing	0
	Mean		41.1316
	Std. Deviation		4.87283
Female	N	Valid	156
		Missing	0
	Mean		41.1346
	Std. Deviation		4.59465

This table shows that all the males 190 and females 156 who participated were addicted with Mean value (41.1) for both male and female or Standard deviation values were (4.87 for male, 4.59 for female).



Table 5.2: Frequency of participants having neck, upper back, lower back, hips/thighs, knees, ankles/feet discomfort gender wise

Questions	Male			Female		
	Total	N	%	Total	N	%
Have you at any time during the last 12 months had trouble (ache, pain, discomfort numbness) in neck?	190	122	64.2	156	108	69.2
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in upper back?	190	81	42.6	156	69	44.2
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in lower back?	190	79	41.6	156	64	41.0
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in one or both hips/thighs?	190	19	10.0	156	21	13.5
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in one or both knees?	190	14	7.4	156	10	6.4
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in one or both ankles/feet?	190	6	3.2	156	14	9.0

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According to this table out of total male and female participants 190 (100%) and 156 (100%) respectively, 122 (64.2%) males and 108 (69.2%) females had neck pain, 81(42.6%) males and 69 (44.2%) females had pain in their upper back, 79 (41.6%) males and 64 (41%) females had pain in their lower back, 19 (10%) males and 21 (13.5%) females had pain, 14 (7.4%) males and 10 (6.4%) females had pain in one or both knees, 6 (3.2%) males and 14 (9%) females had pain.

Table 5.3: Frequency of participants having shoulder, elbow and wrist discomfort gender wise

Questions	Problem side	Male			Female		
		Total	N	%	Total	N	%
Have you at any time during the last 12	Right	190	20	10.5	156	14	9.0



months had (ache, pain, discomfort, numbness) in shoulder?	Left	190	12	6.3	156	10	6.4
	Both	190	24	12.6	156	30	19.2
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in elbows?	Right	190	23	12.1	156	21	13.5
	Left	190	13	6.8	156	13	8.3
	Both	190	12	6.3	156	6	3.8
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in wrist/hands?	Right	190	48	25.3	156	44	28.2
	Left	190	30	15.8	156	17	10.9
	Both	190	11	5.8	156	21	13.5

This table shows that out of 190 (100%) male and 156 (100%) female participants; 20 (10.5%) males and 14 (9%) females had pain in right shoulder, 12 (6.3%) males and 10 (6.4%) females had pain in left shoulder, 24 (12.6%) males and 30 (19.2%) females had pain in both shoulders; 23(12.1%) males and 21 (13.5%) females had pain in right elbow, 13 (6.8%) males and 13 (8.3%) females had pain in left elbow, 12 (6.3%) males and 6 (3.8%) females had pain in both elbows; 48 (25.3%) males and 44 (28.2%) females had pain in right wrist/hand, 30 (15.8%) males and 17 (10.9%) females had pain in left wrist/hand, 11 (5.8%) males and 21(13.5%) females had pain in both wrists/hands.

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Table 5.4:Crosstabulation of neck discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had trouble (ache, pain, discomfort numbness) in neck?	No	Count	68	48	116
		% within Sex of Participants	35.8%	30.8%	33.5%
	Yes	Count	122	108	230
		% within Sex of Participants	64.2%	69.2%	66.5%
Total		Count	190	156	346
		% within Sex of Participants	100.0%	100.0%	100.0%
Chi- Square	0.96	P value		0.32	

This table shows that out of 346 (100%) participants 230 (66.5%) participants had neck discomfort while 116 (33.5%) participants had not neck discomfort, out of 230 participants with neck discomfort 122



(64.2%) were male and 108 (69.2%) were female and out of 116 participants without neck discomfort 68 (35.8%) were male and 48 (30.8%) were female. Chi- square value was 0.96 and p value was 0.32.

Table 5.5: Cross tabulation of shoulder discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in shoulder?	No	Count	134	102	236
		% within Sex of Participants	70.5%	65.4%	68.2%
	Yes in right shoulder	Count	20	14	34
		% within Sex of Participants	10.5%	9.0%	9.8%
	Yes in left shoulder	Count	12	10	22
		% within Sex of Participants	6.3%	6.4%	6.4%
	Yes in both shoulders	Count	24	30	54
		% within Sex of Participants	12.6%	19.2%	15.6%
Total	Count	190	156	346	
	% within Sex of Participants	100.0%	100.0%	100.0%	
Chi- Square	2.93	P value		0.40	

2028

This table shows that out of 346 participants 236 (68.2%) participants 134 (70.5%) males and 102 (65.4%) females had not shoulder discomfort while 34 (9.8%) including 20 (10.5%) males and 14 (9%) females had discomfort in right shoulder, 22 (6.4%) including 12 (6.3%) males and 10 (6.4%) females had discomfort in left shoulder, 54 (15.6%) had discomfort in both shoulders including 24 (12.6%) males and 30 (19.2%) females. Chi- square value was 2.93 and p values was 0.40.

Table 5.6: Cross tabulation of elbow discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in elbows?	No	Count	142	116	258
		% within Sex of Participants	74.7%	74.4%	74.6%
	Yes in right elbow	Count	23	21	44
		% within Sex of Participants	12.1%	13.5%	12.7%
	Yes in left elbow	Count	13	13	26
		% within Sex of Participants	6.8%	8.3%	7.5%
	Yes in both elbow	Count	12	6	18
		% within Sex of	6.3%	3.8%	5.2%



		Participants			
Total	Count		190	156	346
	% within Sex of Participants		100.0%	100.0%	100.0%
Chi- Square	1.38	P value		0.70	

This table shows that out of 346 participants 258 (74.6%) participants 142 (74.7%) males and 116 (74.4%) females had not elbow discomfort while 44 (12.7%) including 23 (12.1%) males and 21 (13.5%) females had discomfort in right elbow, 26 (7.5%) including 13 (6.8%) males and 13 (8.3%) females had discomfort in left elbow, 18 (5.2%) had discomfort in both elbows including 12 (6.3%) males and 6 (3.8%) females. Chi- square value was 1.38 and p values was 0.70.

2029

Table 5.7: Cross tabulation of wrist/hand discomfort with gender

			Sex of Participants		Total	
			Male	Female		
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in wrist/hands?	No	Count	101	74	175	
		% within Sex of Participants	53.2%	47.4%	50.6%	
	Yes in right wrist or hand	Count	48	44	92	
		% within Sex of Participants	25.3%	28.2%	26.6%	
	Yes in left wrist or hand	Count	30	17	47	
		% within Sex of Participants	15.8%	10.9%	13.6%	
	yes in both wrist or hand	Count	11	21	32	
		% within Sex of Participants	5.8%	13.5%	9.2%	
	Total	Count	190	156	346	
		% within Sex of Participants	100.0%	100.0%	100.0%	
	Chi- Square	7.79	P value		0.05	

This table shows that out of 346 participants 175 (50.6%) participants including 101 (53.2%) males and 74 (47.4%) had not wrist/hand discomfort while 92 (26.6%) including 48 (25.3%) males and 44 (28.2%) females had discomfort in right wrist/hand, 47 (13.6%) including 30 (15.8%) males and 17 (10.9%) females had discomfort in left wrist/hand, 32 (9.2%) had discomfort in both wrists/hands including 11 (5.8%) males and 21 (13.5%) females. Chi- square value was 7.79 and p values was 0.05.



Table 5.8: Cross tabulation of upper back discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in upper back?	No	Count	109	87	196
		% within Sex of Participants	57.4%	55.8%	56.6%
	Yes	Count	81	69	150
		% within Sex of Participants	42.6%	44.2%	43.4%
Total		Count	190	156	346
		% within Sex of Participants	100.0%	100.0%	100.0%
Chi- Square	0.08	P value		0.76	

This table shows that out of 346 (100%) participants 196 (56.6%) participants including 109 (57.4%) males and 87 (55.8%) females had not upper back discomfort, while 150 (43.4%) participants including 81 (42.6%) males and 69 (44.2%) females had upper back discomfort. Chi- square value was 0.08 and p value was 0.76.

2030

Table 5.9: Cross tabulation of lower back discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in lower back?	No	Count	111	92	203
		% within Sex of Participants	58.4%	59.0%	58.7%
	Yes	Count	79	64	143
		% within Sex of Participants	41.6%	41.0%	41.3%
Total		Count	190	156	346
		% within Sex of Participants	100.0%	100.0%	100.0%
Chi- Square	0.01	P value		0.91	

This table shows that out of 346 (100%) participants 203 (58.7%) participants including 111 (58.4%) males and 92 (59%) females had not lower back discomfort, while 143 (41.3%) participants including 79 (41.6%) males and 64 (41%) females had lower back discomfort. Chi- square value was 0.01 and p value was 0.91.



Table 5.10: Cross tabulation of hips/thighs discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in one or both hips/thighs?	No	Count	171	135	306
		% within Sex of Participants	90.0%	86.5%	88.4%
	Yes	Count	19	21	40
		% within Sex of Participants	10.0%	13.5%	11.6%
Total		Count	190	156	346
		% within Sex of Participants	100.0%	100.0%	100.0%
Chi- Square	1.00	P value		0.31	

2031

This table shows that out of 346 (100%) participants 306 (88.4%) participants including 171 (90%) males and 135 (86.5%) females had not hips/thighs discomfort, while 40 (11.6%) participants including 19 (10%) males and 21 (13.5%) females had hips/thighs discomfort. Chi- square value was 1.00 and p value was 0.31.

Table 5.11: Cross tabulation of knees discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in one or both knees?	No	Count	176	146	322
		% within Sex of Participants	92.6%	93.6%	93.1%
	Yes	Count	14	10	24
		% within Sex of Participants	7.4%	6.4%	6.9%
Total		Count	190	156	346
		% within Sex of Participants	100.0%	100.0%	100.0%
Chi- Square	0.12	P value		0.72	

This table shows that out of 346 (100%) participants 322 (93.1%) participants including 176 (92.6%) males and 146 (93.6%) females had not knees discomfort, while 24 (6.9%) participants including 14 (7.4%) males and 10 (6.4%) females had knees discomfort. Chi- square value was 0.12 and p value was 0.72.



Table 5.12: Cross tabulation of ankles/feet discomfort with gender

			Sex of Participants		Total
			Male	Female	
Have you at any time during the last 12 months had (ache, pain, discomfort, numbness) in one or both ankles/feet?	No	Count	184	142	326
		% within Sex of Participants	96.8%	91.0%	94.2%
	Yes	Count	6	14	20
		% within Sex of Participants	3.2%	9.0%	5.8%
Total		Count	190	156	346
		% within Sex of Participants	100.0%	100.0%	100.0%
Chi- Square	5.32	P value		0.02	

2032

This table shows that out of 346 (100%) participants 326 (94.2%) participants including 184 (96.8%) males and 142 (91%) females had not ankles/feet discomfort, while 20 (5.8%) participants including 6 (3.2%) males and 14 (9%) females had ankles/feet discomfort. Chi-square value was 5.32 and p

DISCUSSION

As we did study in Gujrat district of Pakistan to find out which region of body were most effected due to smartphone addiction, which explained that mostly participants had discomfort in their neck region followed by wrists/hands, upper back, lower back also and lower limbs were also found to be affected to some extent. So, we had compared our results with other studies mentioned below.

The results of a study conducted in 2021 with establishing a connection between the use of smartphones and the growing incidence of musculoskeletal discomfort is the main objective among young people with the sample size of 249 revealed that the areas of the body where musculoskeletal discomfort was mentioned the most frequently were the upper back (70.3%), neck (65.9%), and wrists/hands (68.7%)⁵⁷. In contrast of this study, our study

with the sample size of 346 showed that most of the discomfort was in neck region (66.5%), wrists/hands (49.4%), upper back (43.4%), lower back (41.3%) as compared to other regions of body. They didn't examine discomfort in lower limb, but in this study we examine lower extremities also which showed some discomfort in lower limbs along with upper limbs.

The outcomes of a 2019 study looking at the impact of smartphones on students at Tikrit University's musculoskeletal pain revealed that neck pain (31.54%) and wrist discomfort (25.38%) are the two most common types of pain reported by study participants⁶¹. But our study put emphasize on whole body discomfort due to smartphone addiction. So, according to our study, the incidence rates of neck, wrist/hands, upper portion of the back and lower part of back were most prevalent with the values 66.5%, 49,4%, 43,4%, 41.3% respectively. In 2022, a research was carried out with the intention of of determining among undergraduates of Saudi nation, the incidence of upper- extremity musculoskeletal diseases and how they are related to cellphone dependence and usage revealed that participants' utilisation of smartphones was to



be an underlying cause of 20.13%, 5.11%, and 13.42% of MSDs in the areas of upper limb over a time frame of one year³⁶. As mentioned above study was done in covid- 19 in Saudia, but our study was conducted in Pakistan after covid- 19 which showed that there were high prevalence of neck (66.5%), wrist/hand (49.4%), upper back (43.4%) and lower back (41.3%) and also some effect to shoulder, elbow and lower limbs, these figures told that Pakistani people are more prone to their phones.

In 2017, the research was undertaken with the aim of evaluating whether cell phone usage was an indication of risk for an increased incidence of upper-limb and neck discomfort among undergraduates. It was discovered that some students had upper limb and neck problems. The following most frequent symptoms were related to the right shoulder (13.93%) and left shoulder (11.07%)⁵⁹. The above study was done in 2017, with less use of phones as compared to recent times, now people are more engage with their phones due to new updates in social media apps, and for their online works. So, there is some changes in effect on musculoskeletal health due to smartphone usage. The results of our study showed that neck, wrists/hands, upper back and lower back were mostly in discomfort with prevalence rate (66.5%, 49.4%, 43.4%, 41.3%) respectively.

In order to determine mobile phone dependence & perceptions of discomfort in medical healthcare staff, the survey was carried out in 2021. The results showed that the students who took part in the research had a 25.71 7.49 SAS-SV score. All of the participants' neck pain, elbow, shoulder, wrist, eye, and ear burning were discovered to be brought on by their use of cellphones⁷⁵. In contrast, we did study to know which region of the body had musculoskeletal discomfort due to excessive smartphone usage, which showed that upper half region of body was found to be most affected due to smartphone usage and had problem in cervical region, wrists/hands, upper portion of back and lower part of back also.

At Qassim University, in order to assess the relationship among cellphone overuse and

musculoskeletal discomfort in medical graduates, a study was conducted in 2019. It shows that elbow discomfort (08.3%) was the least common type of pain associated with smartphone addiction, which was accompanied by discomfort of lower portion of back (59.5%), shoulder pain (46.8%), and then neck pain (40.0%)⁴. But in the study, we did in Gujrat district of Pakistan, we found that most participants had neck pain (66.5%) followed by wrists/hands (49.4%), upper back (43.4%) and lower back (41.3%) along with some effects to shoulder and lower limbs also due to excessive smartphone usage for their online work and conversations.

A survey was done in 2022 with the goal to find pattern of musculoskeletal discomfort in youth and educators during lockdown caused by online education and teaching services explained that 88 percent of those polled indulged in online educational activities, and almost 61 percent of them reported having musculoskeletal discomfort. 71% of respondents thought that working on phone was to blame for their suffering. Symptoms of headache (29.8%), low back pain (33.4%), and neck discomfort (51.3%) were the most frequently reported complaints⁸¹. But in our study, which we did on general population to check where most discomforts occur in musculoskeletal system due to excessive smartphone usage, we found that neck, wrist/hands, upper part of back and lower portion of back had most discomfort with values (66.5%, 49.4%, 43.4%, 41.3%) respectively. Above mentioned study check symptoms of headache also, but we didn't check symptoms other than musculoskeletal discomforts.

Youngsters' Musculoskeletal Symptoms Linked to time they spent on phones revealed that average of muscles and joints involvement was calculated to be eighty-five percent over the past 1 year, with neck problem accounting for 28.9 percent of those cases and lower back discomfort for 21.9%, while shoulder and upper-back discomfort accounted for 14.9% and 11.4% of those cases, respectively⁸². In contrast, we found that only neck, wrists/hands, upper

part of back and lower part of back discomforts were most prevalent as compared to other musculoskeletal regions of body. In this study, least prevalent regions of body with discomfort were shoulder, elbow, hips/thighs, knees, ankle/feet.

CONCLUSION

We conclude that due to smartphone addiction both male and female had symptoms in their whole body, but severity of those symptoms differs according to region which is most effected. Mostly participants had most discomforts in neck, wrist/hands, upper back and lower back with some effect to shoulder and lower limbs also. So, there is a need to create an awareness of diverse effects which are due to smartphone addiction in people to reduce these discomforts' ratio in population.

LIMITATIONS

- A study on posture abnormality and their consequences due to excessive smartphone usage can also be done
- As we did study only to know prevalence, So, a correlation can also be found between smartphone addicted and non-addicted participants and their musculoskeletal discomforts.
- A single anatomical region can be investigated to rule out more than one symptom due to excessive smartphone usage.

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