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PREVALENCE OF MYOFASCIAL TRIGGER POINTS IN UPPER TRAPEZIUS DUE TO SMARTPHONE USAGE AMONG THE SMARTPHONE ADDICTED STUDENTS OF IGTAMSU, ZIRO

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ABSTRACT

Background: Smartphones are now a necessary part of everyday life. However, maintaining an unergonomic posture for extended periods of time can lead to persistent muscle contractions and trigger point development, especially in the upper trapezius muscle.

Objective: The study aims to assess the prevalence of myofascial trigger points in upper trapezius among the smartphone addicted students of IGTAMSU.

Materials and Methods: In this exploratory study, the participants were students of IGTAMSU, Ziro. In order to evaluate socio-demographic profiles, smartphone usage characteristics (duration, screen size, typing style, body posture, addiction status), perceived pain level & its duration and management and the existence of upper trapezius myofascial trigger points, information was gathered via self-report questionnaire, SAS-SV, NPRS and physical examination by palpation method.

Result: Among 431 participants, 109 students all fulfilled the requirements for inclusion. 77.7% respondents used smartphones for ≥ 4 hours, 98.3% used devices with screens ≥ 6 inches, 36.4% slouched while sitting, 70.3% typed with both hands, and 65.6% were addicted to smartphones. According to the study, 100% of the smartphone addicted students with pain duration ≥ 3 months had upper trapezius myofascial trigger points, predominantly, bilateral trigger points (97.2%) and latent trigger points were the most common (55%) which indicates that myofascial trigger point is more prevalent in smartphone addicted students. Conclusion: The study highlights the significance of disciplined self-monitoring of device usage duration and posture improvement in accordance with ergonomics recommendation by demonstrating a connection between upper trapezius myofascial pain syndrome and smartphone usage duration, posture, and addiction.

Keywords: Smartphone, Students, Upper Trapezius, Myofascial Pain Syndrome, Smartphone Addiction, Myofascial Trigger points.

INTRODUCTION

Smartphone have now become an important element of the contemporary period and excessive use of them has spread like wildfire throughout the globe raising public health issues. Smartphone are used for a variety of purposes, such as improving general productivity, finding information, interacting with others, entertainment, relaxation and diversion [1]. Smartphones are becoming a more integral part of people daily lives

as they offer an increasing number of applications for an ever-widening range of usage scenarios [2]. The age range of smartphone users is wide, from students to the elderly. However, students use them for extended periods of time resulting into poor posture and repetitive motions, which can cause musculoskeletal disorders[3], while smartphones provide substantial benefits but it has also brought about a number of disadvantages such as phrases like "Problematic Mobile Phone Use", "smartphone addiction" [4]. The WHO has identified smartphone addiction as a behavioral addiction due to the rapid adoption of smartphones [5]. Numerous studies demonstrate that smartphone addiction is linked to detrimental effects on mental, physical and psychological health, reduced immunity, poor sleep quality, physical dysfunction, eye strain and increased day time fatigue are all linked to problematic smartphone use [6 7]. According to a review study, thumbs (19%-53%), hands and wrists (13%-32%), elbows (14.1%-15%), and neck and upper back (55.8%-89.9%) were the body parts most frequently linked to smartphone use [8]. Adolescents and young adults, particularly university students, reported a higher prevalence of smartphone addiction in many countries [9 10 11 12]. When using smartphone for extended period of time, users frequently hold the device below eye level with their head tilted forward, which can result in head, neck and back pain, as well as postural abnormalities like scoliosis, lordosis and kyphosis [13 14] including forward head posture and text neck syndrome (TNS) [15 16] and excessive neck flexion causes prolonged elongation of the neck flexors, which results muscle fatigue and eventually it results into development of Myofascial pain syndrome (MPS), MPS is a regional pain syndrome which is caused by myofascial trigger points resulting into local and referred pain. It is more common in women and can affect up to 85% of the general population [17]. The core element of MPS is MTrPs [18]. MTrPs is a hypersensitive nodule that causes localized pain in or around the afflicted muscle and is typically located in the taut band of the skeletal muscle or fascia. It is of two types: latent and active. The latent trigger points only causes pain during examination such as palpation or compression of the trigger points and a jump sign is a sudden, jerky movement that happens when a finger is moved over a strand in the opposite direction of the muscle fibers, whereas the active trigger point causes pain while at rest and contributes to fatigue, range of motion restriction, muscle weakness and the onset of muscle cramps. The prevalence of MTrPs has been observed that 95% of patient with chronic pain and 45% of people referred to pain clinics have myofascial trigger points [19]. Trigger points are situated in regions that are susceptible to mechanical stress [20]. Research on university students revealed that both left and right upper trapezius had higher percentages of myofascial trigger points [21]. Specifically, the upper trapezius muscle is involved in 97.5% of MPS cases [22]. A common musculoskeletal complaint is shoulder pain, with the upper trapezius being one of the most affected regions [23]. The UT muscle is the most sensitive muscle of the body, it might be the outcome of the upper trapezius muscle's constant struggle against gravity to keep the head, neck and eyes level in an upright position [24] and it is most likely the muscle that myofascial trigger points affect most frequently, additionally trigger points are more common [25 26 27 28]. To lessen the discomfort that comes with using a smartphone, some researchers have put forth recommendations related to neck flexion [29]. Current research has shown how smartphone usage among students can negatively impact and results in development of myofascial trigger points that causes neck pain among university students, as smartphones are now a significant part of the educational system. Understanding knowledge gap of people and preventive measures into action will ultimately lessen disruptions to academic performances and enhance general well-being.

AIM AND OBJECTIVES

AIM

The aim of this study is to assess the prevalence of myofascial trigger points in upper trapezius among the smartphone addicted students of IGTAMSU.

OBJECTIVES

1.To assess the most affected side (right, left or bilateral) in upper trapezius among participants who reported having myofascial trigger points.

2. To determine the status of myofascial trigger point (latent or active) among participants who reported having upper trapezius myofascial trigger points.

3. METHODOLOGY

3.1. Study Design: Exploratory Survey

3.2. Study Setting: IGTAMSU, Ziro

3.3. Study Duration: 1 Year

3.4. Sample Size: 456

3.5. Method of Data Collection: Questionnaire

3.6. Sampling technique: Purposive

3.7. Selection Criteria:

A. Inclusion Criteria-

i. Gender- Both male and female
ii. Age- 18 years and above
iii. Registered students of IGTAMSU at the time of research study
iv. Willingness to complete the questionnaire and voluntarily participate as subjects in the research
v. Experiencing neck pain, no less than 3 months
vi. Students who are smartphone addicted (SAS-SV).

B. Exclusion Criteria-

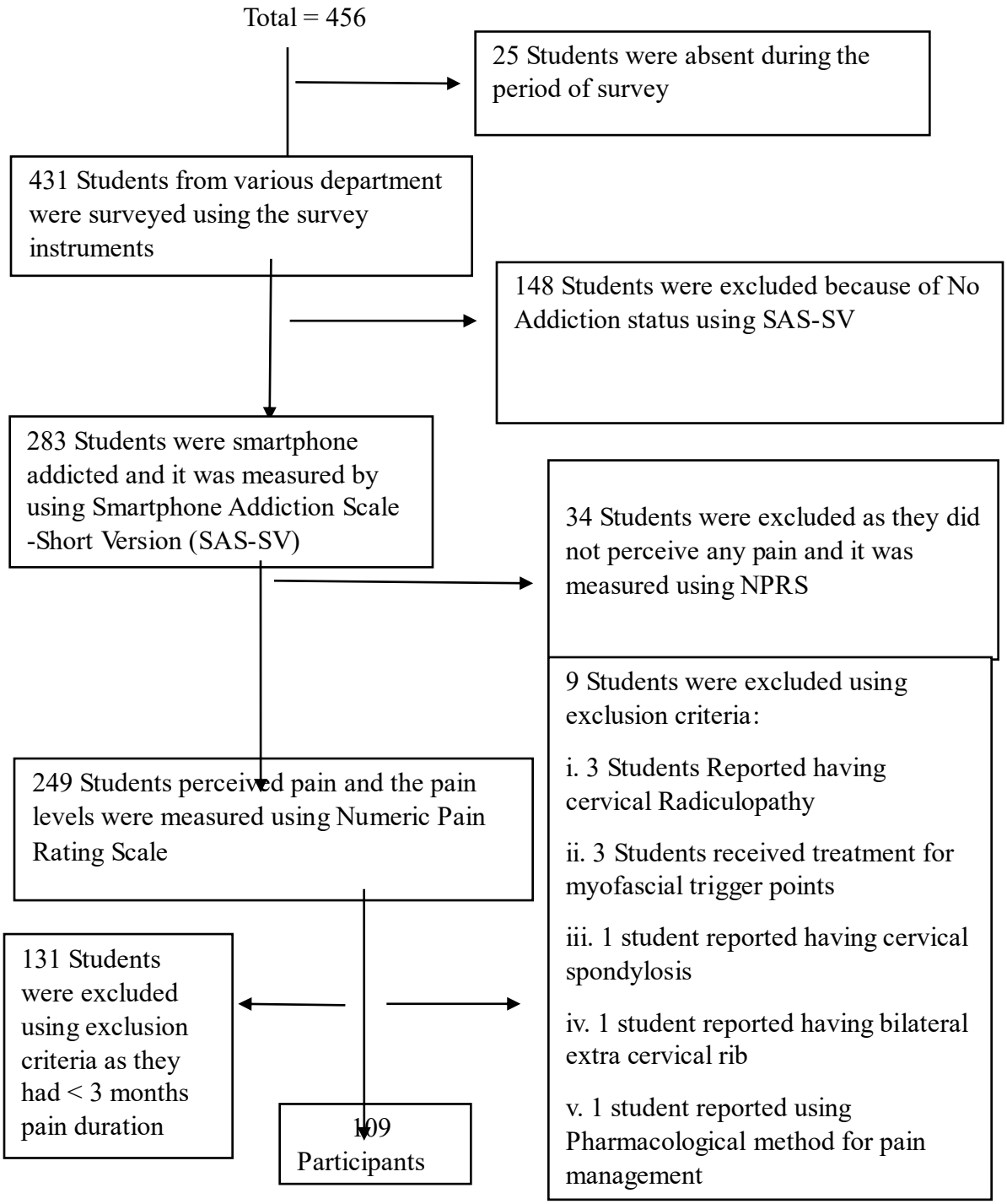
i. Not willing to participate
ii. Students who did not complete the questionnaires
iii. Students who are not smartphone addicted (SAS-SV)
iv. Treatment of trigger points (last 3 months)
v. Students who used pharmacological pain management
vi. History of neck trauma & surgery
vii. History of pre-existing conditions- Cervical radiculopathy, cervical myelopathy, fibromyalgia.

3.8. Materials/ equipment required: Questionnaire, pen, paper, writing pad.

3.9. Measuring Tools: -

3.9.1 Self - report Questionnaires,
3.9.2 Smartphone Addiction Scale-Short Version (SAS-SV),
3.9.3 Numeric Pain Rating Scale (NPRS),

SAMPLE SELECTION CHART



3.9.4 Trigger point palpation by researcher using IASP diagnostic criteria:

a. Palpable taut band will be identified within the skeletal muscle.
b. Hypersensitive areas will be identified within the taut band.
c. Pain sensations shifted to the stimulated hypersensitivity area.
d. Local twitch response observed during snapping palpation of the taut band.
e. A "jump sign" will be detected.
f. Increased pain intensity reported by the patient.
g. Predictable patterns in referred pain will be observed.
h. Detection of weakness or muscle contraction
i. Pain felt during stretching or contraction of the specific skeletal muscle.

3.10. Statistical Tool: Data was entered in and analyzed by Microsoft Excel 2016.

3.11. Statistical analysis: Descriptive data were presented in the form of frequencies and percentages for all qualitative variables. Mean and standard deviations were reported for quantitative variables.

3.12. Ethical Clearance: Ethical approval for this study was obtained from the Institutional Ethics Committee of Indira Gandhi Technological and Medical Sciences University, Ziro (Annexure 2). All participants provided written informed consent (Annexure 3) and the study was conducted with confidentiality and anonymity upheld.

3.13. Procedure:

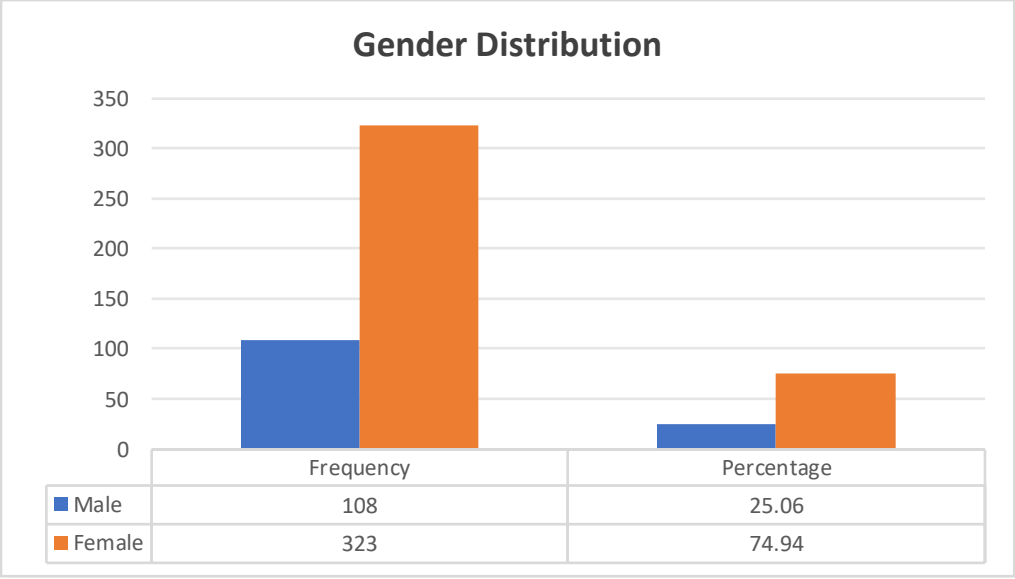
a. The ethical clearance was obtained from the university before the study began.
b. The predetermined inclusion and exclusion criteria were used to select participants
c. Informed consent was obtained from each participant after being fully informed of the study's objectives and methods.
d. Self-reported questionnaires were used to collect data.
e. This was followed by, participants who fulfilled the inclusion criteria underwent a physical examination using the palpation method to find trigger points.

4. RESULT

Table 1. Gender Distribution

Gender	Frequency	Percentage
Male	108	25.06
Female	323	74.94

Fig 1. Gender Distribution

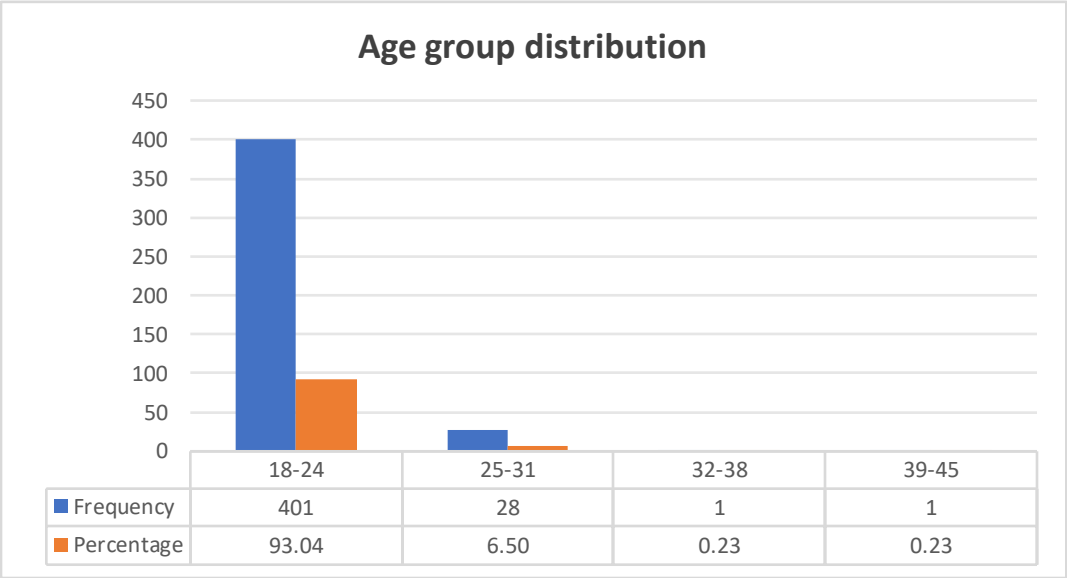


Out of 431 respondents, most of the participants involved in this study were female (74.9%) with a total of 323 respondents and male (25.0%) with a total of 108 respondents based on the data presented in Table 1, Fig.1

Table 2. Age Distribution

Age Group	Frequency	Percentage
18-24	401	93.04
25-31	28	6.50
32-38	1	0.23
39-45	1	0.23
Mean Age = ±21.25058005		

Fig 2. Age Distribution

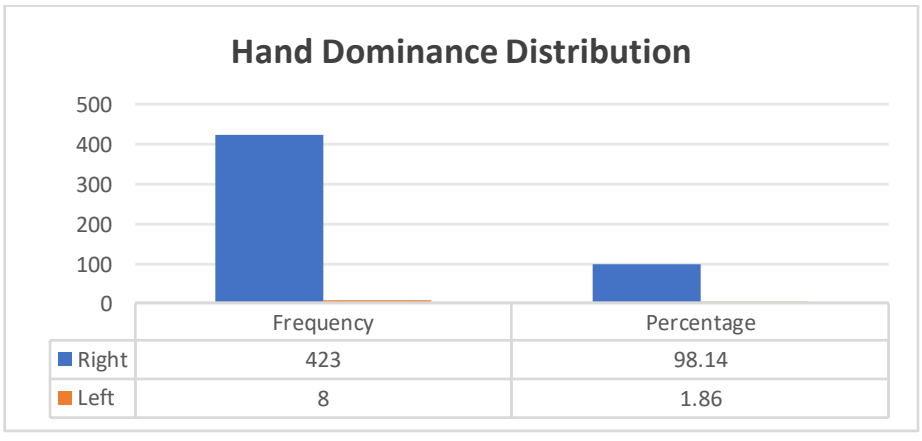


The age of the respondents varied from 18-39 years (mean age 21.25±2.29) as shown in the Table 2 & Fig. 2. The majority of the participants age ranged from 18-24 years with 401 respondents (93%), 25-31 years with 28 respondents (6.4%), 32-38 years with 1 respondent (0.23%) and 39-45 years with 1 respondent (0.23%).

Table 3. Hand Dominance Distribution

Dominance	Frequency	Percentage
Right	423	98.14
Left	8	1.86

Fig 3. Hand Dominance Distribution

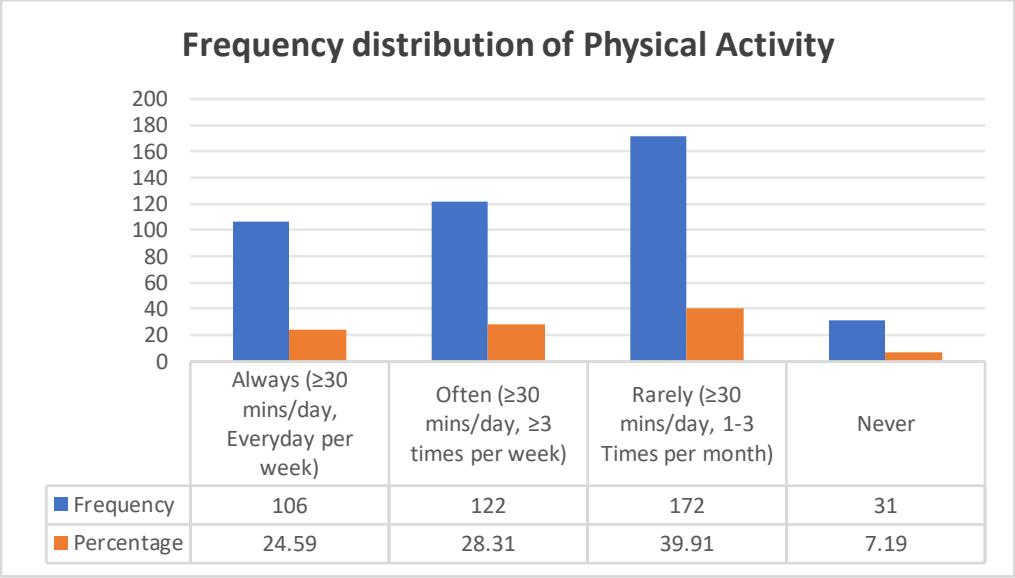


The above given Table 3 & Fig.3 showed the distribution of hand dominance side which resulted that the maximum number of respondents were right-handed with 423 (98.1) respondents and left-handed with 8 (1.8%) respondents.

Table 4. Frequency distribution of Physical Activity

Physical activity Range	Frequency	Percentage
Always (≥30 mins/day, Every-day per week)	106	24.6
Often (≥30 mins/day, ≥3 times per week)	122	28.31
Rarely (≥30 mins/day, 1-3 Times per month)	172	39.91
Never	31	7.19

Fig 4. Frequency Distribution of Physical Activity

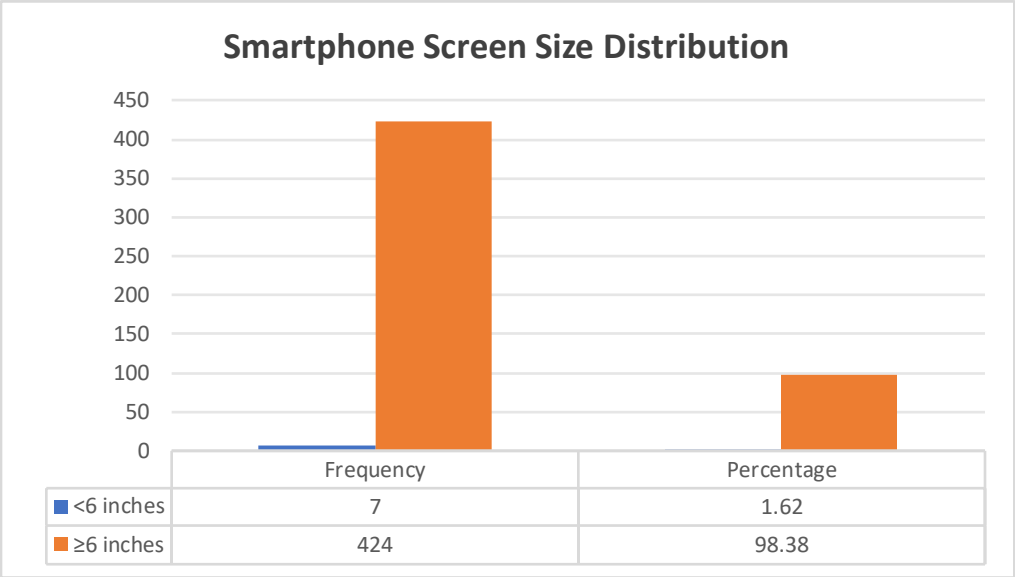


The participants frequency distribution of physical activity (Table 4 & Fig. 4) are grouped into four category and the result showed that physical activity Rarely (≥30 mins/day, 1-3 Times per month) made up the majority with 172 respondents (39.9%), Often (≥30 mins/day, ≥3 times per week) with 122 (28.3%), Always (≥30 mins/day, Every-day per week) with 106 (24.5%), and Never with 31 respondents (7.1%).

Table 5. Smartphone screen size distribution

Smartphone Screen Size	Frequency	Percentage
<6 inches	7	1.62
≥6 inches	424	98.38

Fig 5. Smartphone screen size distribution

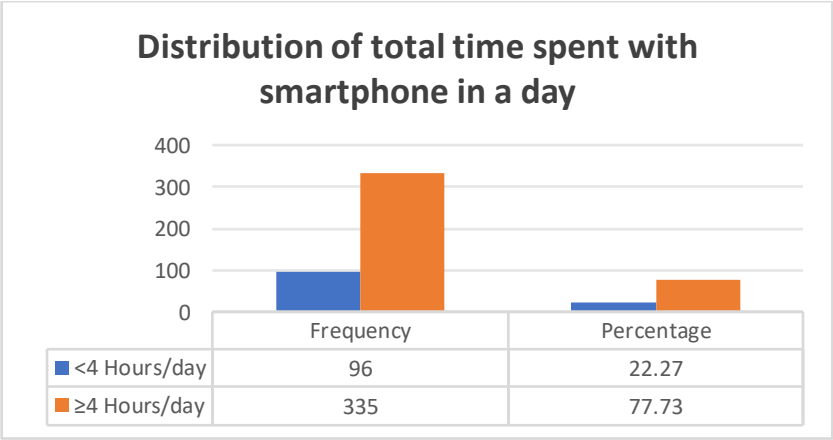


The distribution of smartphone screen size among participants (Table 5. & Fig.5) showed that majority of the respondents 424 (98.3%) used smartphone with a screen size of ≥ 6 inches, and 7 respondents (1.6%) used smartphones with a screen size of < 6 inches.

Table 6. Distribution of total time spent with smartphone in a day

Time Spent with smartphone	Frequency	Percentage
<4 Hours/day	96	22.27
≥4 Hours/day	335	77.73

Fig 6. Distribution of total time spent with smartphone in a day

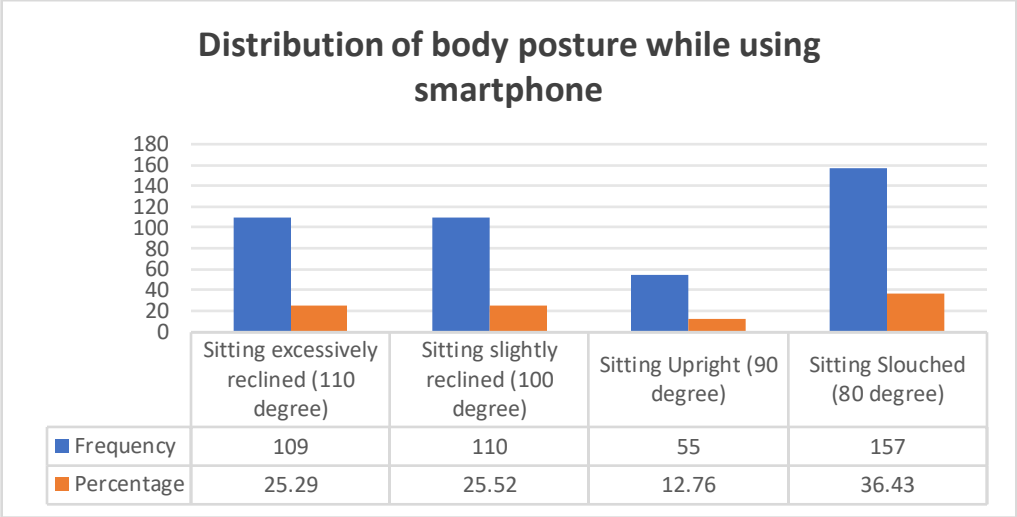


Among the 431 respondents, the majority of the participants 335 (77.7%) used smartphone for ≥ 4 hours/day. Meanwhile, 96 respondents (22.2%) used their smartphones < 4 hours/day as shown in the Table 6.

Table 7. Distribution of body posture while using smartphone

Body Posture while using smartphone	Frequency	Percentage
Sitting excessively reclined (110 degree)	109	25.29
Sitting slightly reclined (100 degree)	110	25.52
Sitting Upright (90 degree)	55	12.76
Sitting Slouched (80 degree)	157	36.43

Fig 7. Distribution of body posture while using smartphone

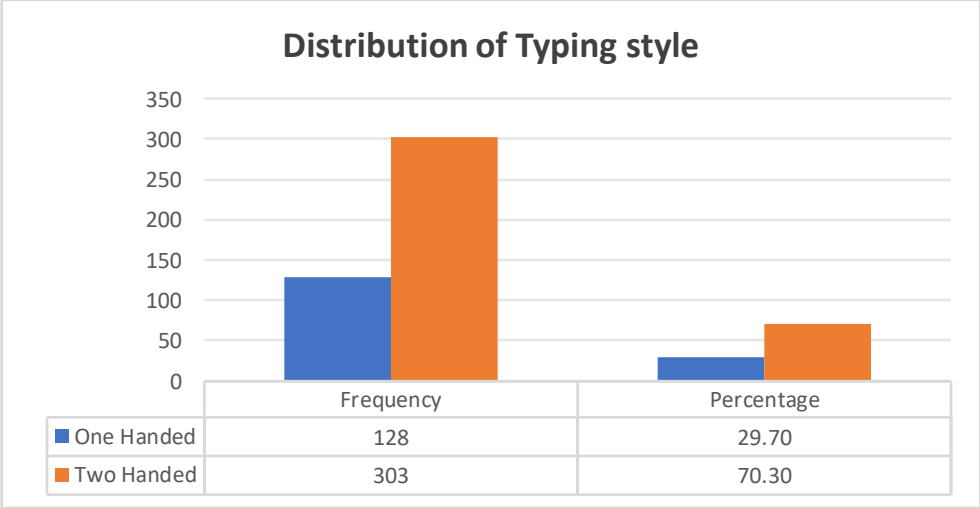


The body posture adopted while using smartphones among the respondents (Table 7). It was observed that 157 (36.4%) of the respondents used a posture of sitting slouched (80 degree), 110 (25.5%) sitting slightly reclined (100 degree), 109 (25.2%) sitting excessively reclined (110 degree) and 55 (12.7%) sitting upright (90 degree) respectively.

Table 8. Typing style distribution

Typing style	Frequency	Percentage
One Handed	128	29.70
Two Handed	303	70.30

Fig 8. Typing style distribution

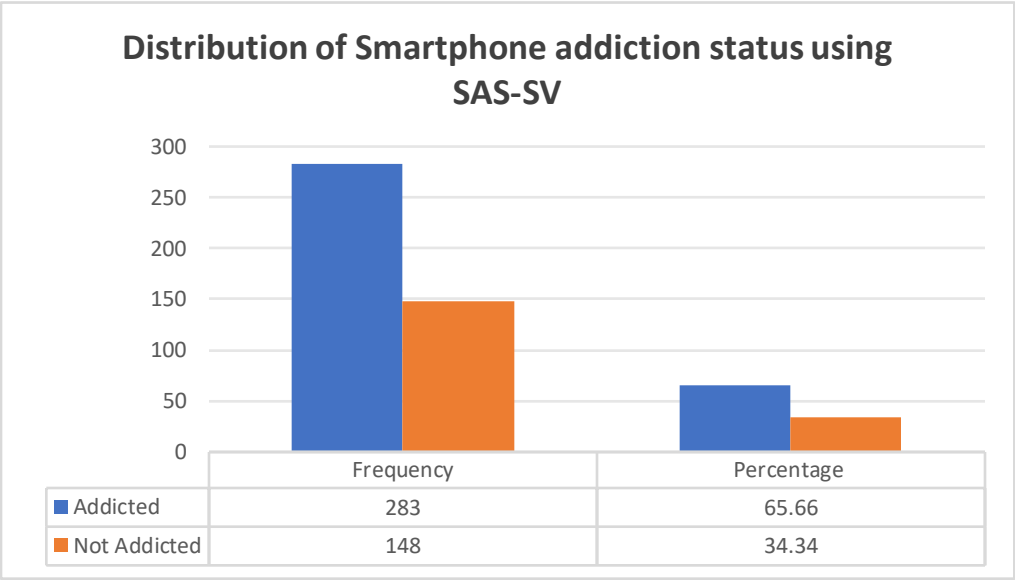


Among total respondents, the distribution of typing style indicated that 303 respondents (70.3%) preferred to type with both hands, while the remaining 128 respondents (29.6%) typed with one hand (Table 8 & Fig. 8).

Table 9. Distribution of smartphone addiction status using SAS-SV

Smartphone addiction status	Frequency	Percentage
Addicted	283	65.66
Not Addicted	148	34.34

Fig 9. Distribution of smartphone addiction status using SAS-SV

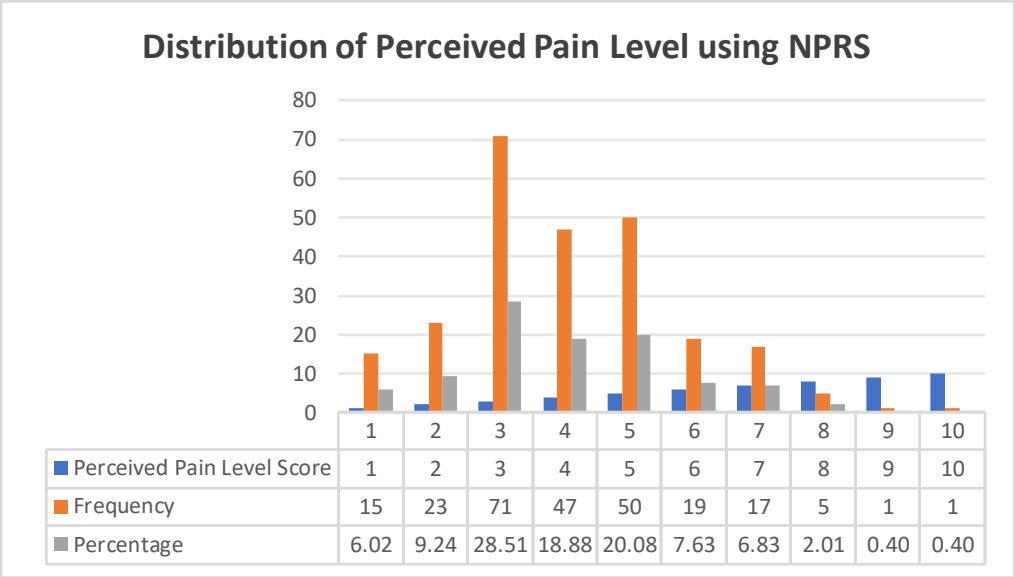


Based on the addiction status assessed with the SAS-SV questionnaire, the result showed that 283 respondents (65.6%) scored above the pre-defined cutoff, which suggests that the surveyed individuals had smartphone addiction and 148 respondents (34.3%) scored less than the pre-defined cut off, which suggests that those individuals had no addiction (Table 9/Fig. 9).

Table 10. Distribution of perceived pain level score using NPRS

Perceived Pain Level Score	Frequency	Percentage
1	15	6.02
2	23	9.24
3	71	28.51
4	47	18.88
5	50	20.08
6	19	7.63
7	17	6.83
8	5	2.01
9	1	0.4
10	1	0.4

Fig 10. Distribution of Perceived Pain Level Score using NPRS

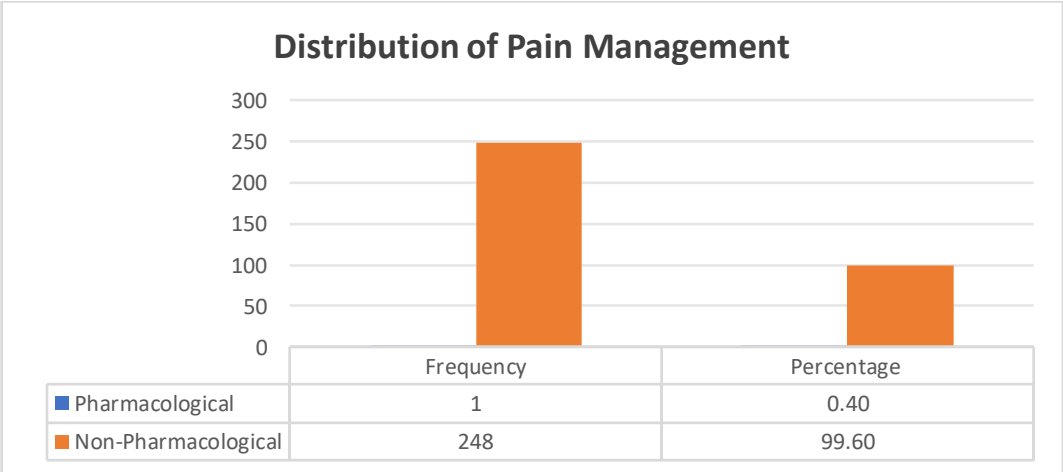


The participants perceived pain level scores as measured by the Numeric Pain Rating Scale (NPRS). A pain score of 3 was reported by the largest percentage of respondents (28.5%), followed by scores of 5 (20.1%), 4 (18.9%), 2 (9.2%), 6 (7.6%), 7 (6.8%) 1 (6%). Only a small percentage of respondents – 2.0%, 0.4%, and 0.4% respectively reported higher pain scores of 8, 9 and 10.

Table 11. Distribution of pain management

Pain Management	Frequency	Percentage
Pharmacological	1	0.40
Non-Pharmacological	248	99.60

Fig 11. Distribution of pain management

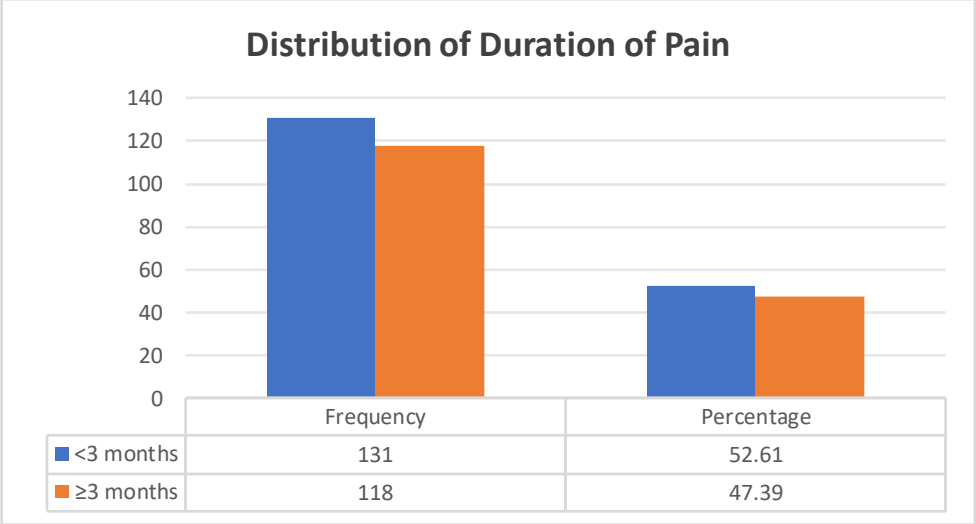


The distribution of the pain management methods among the participants (Table 12) showed that the majority of the participants (99.6%) used non-pharmacological pain management, whereas only a very small percentage of respondents (0.4%) reported using pharmacological pain management (Table 11, Fig.11).

Table 12. Distribution of Pain duration

Duration of Pain	Frequency	Percentage
<3 months	131	52.61
≥3 months	118	47.39

Fig 12. Distribution of Duration of Pain

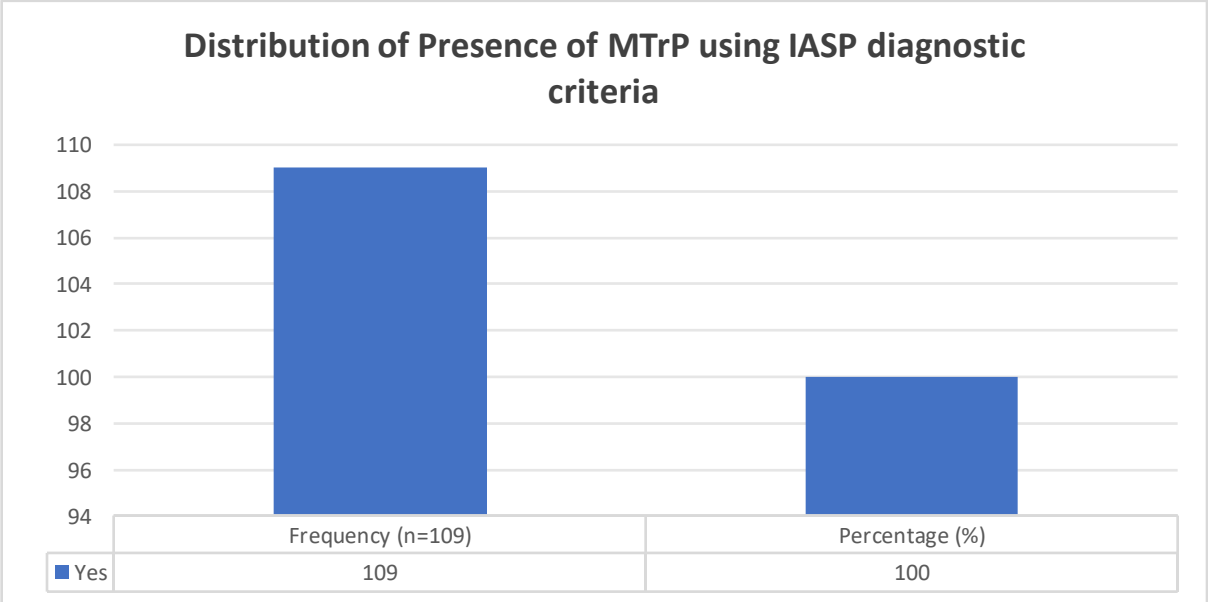


According to the distribution of pain duration as shown in the Table 12. The majority of participants, 131 (52.6%) had pain for < 3 months, while 118 (47.3%) had pain for ≥ 3 months.

Table 13. Distribution of presence of MTrP

MTrP Presence	Frequency (n=109)	Percentage (%)
Yes	109	100

Fig 13. Distribution of Presence of MTrPs

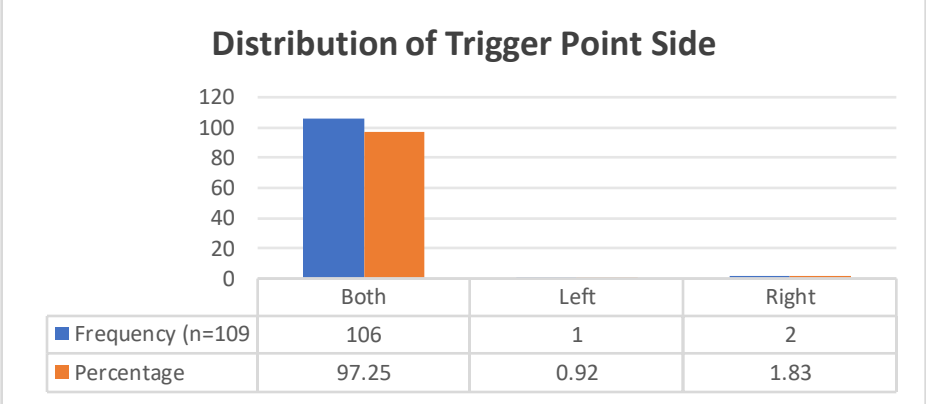


The distribution of MTrP among smartphone users who had experienced pain for ≥ 3 months is as follows, based on the IASP diagnostic criteria myofascial trigger points were found in every one of the 109 individuals (100%) as shown in Table 13 & Fig. 13. This implies that MTrPs were completely prevalent among smartphone users in the study population who had chronic pain.

Table 14. Distribution of Trigger Point Side

Trigger Point Side	Frequency	Percentage
Both	106	97.25
Left	1	0.92
Right	2	1.83

Fig 14. Distribution of Trigger Point Side

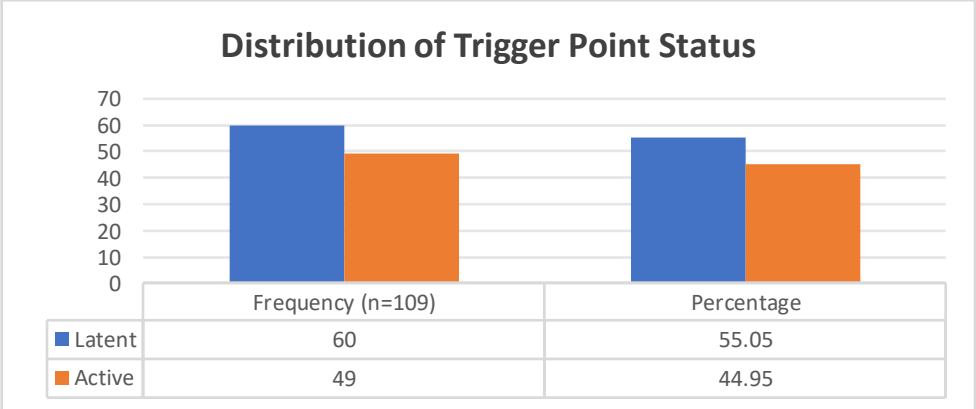


Among the 109 participants with myofascial trigger points. The result shown in Table 14/ Fig.14, bilateral trigger points were found to be the most common with 107 respondents (97.2%), followed by right sided involvement with 2 respondents (1.8%) and left sided with 1 respondent (0.9%).

Table 15. Distribution of trigger point status

Trigger Point Status	Frequency	Percentage
Latent	60	55.05
Active	49	44.95

Fig 15. Distribution of Trigger Point Status



The myofascial trigger point status of the 109 participants who were diagnosed using Travell and Simons clinical diagnostic criteria as shown in Table 15. According to the findings, latent trigger points made up the majority of cases (55%), whereas active trigger points made up a comparatively smaller percentage (44.9%). The pattern showed that people with chronic pain who use smartphone are more likely to have latent trigger points.

DISCUSSION

Students growing reliance on smartphones for social, recreational and educational purposes has made musculoskeletal issues linked to extended smartphone use a growing health concern because of prolonged neck flexion and bad posture when using a smartphone, the upper trapezius muscle is especially vulnerable [13]. In this study, the maximum of the participants were smartphone addicts. Nearly half of the participants had smartphone addiction, according to the SAS-SV questionnaire evaluation, which is in line with results from Liu et al. in China [30]. The majority of the smartphone addicts had smartphone screen size ≥ 6 inches. Walankar et al. found a correlation between the size of smartphone screens and the incidence of pain, which may be due to increased muscle activity brought on by adopting a cervical flexion posture when using larger screens [3].

The study by Al-Rajabi et al. showed that smartphone addiction was more common in female than in male. This result is in line with previous research showing that female students were more addicted to smartphones than male students [9]. The results of this study showed that most of the participants were female. Another study conducted by S.C Surya et al. the majority of the participants were female, which may have resulted from the sampled populations higher proportion of female students and the growing trend of more women pursuing medical studies. The prevalence of UT MPS among smartphone addict students were significant and more common [31]. According to study by Putri in Indonesia, where the majority of students used smartphones for ≥ 4 hours/day same as the majority of participants in this study used smartphones for ≥ 4 hours/day. This prolonged use is associated with a higher prevalence of upper trapezius muscle MPS [32]. In this study, students with smartphone addiction had a significant prevalence of myofascial trigger points (100%). The International Association for the study of pain (IASP) diagnostic criteria revealed that all participants with pain lasting longer than three months had myofascial trigger points. This result indicates a strong correlation between myofascial trigger points and persistent musculoskeletal pain in smartphone users. Khalid M et al. conducted study, and the result showed that the trapezius is the muscle most frequently found to have MTrPs and concluded that there is no correlation between gender and active or latent trigger points [21]. In the current study, bilateral trigger points were found to be the most common, followed by left side and right side. Indicating symmetrical strain on the shoulder and cervical muscles during extended smartphone use. Yasarer et al. study found that those with smartphone addictions had more latent trigger points than those without. Additionally, daily smartphone use was substantially higher among smartphone addicts than among non-addicts [33]. Similarly, the current study found that among smartphone addicts, latent trigger points were more prevalent than active trigger points. Latent trigger points may eventually become active trigger points if not or improperly managed.

CONCLUSION

According to the findings of this exploratory study, the smartphone addiction was highly prevalent among IGTAMSU students and frequency of myofascial trigger points in the upper trapezius were found in 100% of the smartphone addicts who had pain for ≥ 3 months. This is because excessive gadget use causes neck muscles, especially the upper trapezius to contract continuously, which results in myofascial pain. Latent trigger points were marginally more prevalent than active trigger points, and bilateral involvement predominated. These results imply that students who are addicted to smartphones frequently have upper trapezius myofascial dysfunction, which frequently manifests in a latent form and affects both sides. In order to lessen musculoskeletal issues linked to excessive smartphone use, the results offer initial baseline data and

highlight the significance of early assessment, ergonomic education, and preventive physiotherapy interventions.

LIMITATIONS

This primary study used a cross-sectional design which restricts the establishment of casual relationships between these variables. The study only included students from a single institution who were addicted to smartphones, which may limit its applicability to other populations, the study cannot determine the relative risk associated with smartphone addiction because there was no comparison group of students who were not addicted. The development of myofascial trigger points was not thought to be impacted by using a smartphone while in lying positions. Furthermore, self-report biases and individual subjectivity may be present when using a self-report questionnaire, also the cervical range of motion, which may reveal functional impairments connected to upper trapezius myofascial pain syndrome was not evaluated in this study. Additionally, the pressure pain was not assessed, which could have yielded more objective information about the degree of myofascial pain. Despite these limitations, this study demonstrated noteworthy strengths because it was the first to assess smartphone use behaviour in relation to MPS, particularly in the upper trapezius of the smartphone addicted students and highlighting its clinical significance and promoting more research.

RECOMMENDATIONS

According to the result of this exploratory study, students who are addicted to smartphones should be regularly screened for upper trapezius myofascial trigger points and taught appropriate smartphone use practices, such as limiting extended use and taking regular breaks. Students should receive the proper physiotherapy interventions such as stretching, strengthening exercises, myofascial release technique, if their trigger points have been identified. To better understand how smartphone addiction affects MTrP prevalence, future research should include both smartphone-addicted and non-addicted students. Researchers may also look at correlations with neck posture, pain intensity, functional disability, and the length of time spent using a smartphone. To find out if using ergonomic interventions or cutting back on smartphone use reduces the incidence of upper trapezius trigger points, longitudinal studies are required.

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