Online ISSN 3007-3197 Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 7 (2025)

# Association Of Excessive Usage Of Smartphone With Prevalance Of Median Nerve Signs And Symptoms

[1]Babar Ali, [2]Isra Rizwan, [3]Dr. Noreen Ahmed, [4]Umer Abdullah, [5]Muhammad Tahir Akram

## Article Details

**Keywords:** Smart Phone And Median Nerve

**Babar Ali**
Physiotherapy House officer at Jinnah Postgraduate Medical Center Karachi. babaraleesolangi@gmail.com
**Isra Rizwan**
Physiotherapist at Jinnah Postgraduate Medical Center Karachi. Jinnah Postgraduate Medical Center Karachi. Israrizwan05@gmail.com
**Dr. Noreen Ahmed**
Consultant Physiotherapist Dawa Health Care Karachi. noreenahmedshah93@gmail.com
**Umer Abdullah**
Physiotherapy Student at Ziauddin University Karachi. umerabdullah430@gmail.com
**Muhammad Tahir Akram**
Consultant Physiotherapist at Patient aids' Foundation JPMC, Incharge Physiotherapist at Baws Health Facility, Public Health Specialist. dr.mtahir92@gmail.com

## ABSTRACT

Background: Users usually hold smartphone with single hand which compels individuals to engage in repetitive wrist and thumb flexion and extension which impact the median nerve. Overuse of smartphone may decrease the handgrip strength and hand function. Increased usage causes weakness in hand and wrist due to repeated movements of them, which in turn leads to many musculoskeletal disorders, like injury to nerves, muscles and tendons in the fingers, hands, wrist, arms, elbows, shoulders, and neck which if ignored, may lead to long term damage Material And Methods : This study was conducted on 100 participants to determine the Association of excessive usage of smartphone users with prevalence of median nerve sign and symptoms. The data was collected by filling consent form by using Bustan carpal tunnel syndrome questionnaire and Cornell mobile phone hand questionnaires. The type was study was cross sectional and data was analyzed to by SPSS 25 version. Result: 100 students were participated in our surveyed study in which result shows that more than 8 hours users were 29 (29%), more than 3 hours users 31 (31%), Among collected population we found (28%) of the students were complaining of pain numbness burning and tingling sensation after one-hour usage of smart phone. Conclusion: This study was demonstrated that hand and wrist pain are common now a days. Smart phone user who use their mobile three hours a day are 31% and because of excessive smart phone usage 19% feel pain, 37% feel numbness, 26% feel tingling sensation, 9% feel burning sensation and 20% feeling loss of movement among them. Among those 28% says they feel pain after one hour and 37% says its last up to half an hour..


DOI: Availability

## INTRODUCTION

### BACKROUND

Smartphones are portable devices having a touch screen that can be used with stylus or finger touch.[1] Computers were first invented for the use of calculation but now is being used for gaming, internet and browsing, however, evolution of smartphone has replaced computers. In addition to reduce the popularity of these devices several decades of rule. After smartphone now there are tablet pcs, which is adjustment between smartphone and personal computer.[2] Now a days, smartphones are being used for chatting, tweeting, social media interactions, communication, formatting documents and other activities.[3] Utilization of smartphone has been expanding among youth, however, affecting physical and mental health. Moreover, physiotherapy students are opened to the everyday aspects of Physiotherapist routine, an overflowing schedule of studies and uncontrollable use of technologies.[4] Smartphones are used by doctors as well as students in duration of their internships to assist patient by health application. [5]

Users usually hold smartphone with single hand which compels individuals to engage in repetitive wrist and thumb flexion and extension which impact the median nerve.[6] The function of hands is the most important tool to connect with the world, it includes a variety of functions such as dexterity, coordination, grip and endurance, however the most important function for using smartphone and manipulating or performing things with agility is dexterity.[7] Overuse of smartphone may decrease the handgrip strength and hand function. Increased usage causes weakness in hand and wrist due to repeated movements of them, which in turn leads to many musculoskeletal disorders, like injury to nerves, muscles, and tendons in the fingers, hands, wrists, arms, elbows, shoulders, and neck, which if ignored, may lead to long-term damage. [8-9]

The muscles which are responsible for the movements of hand while operating smartphone, are supplied by median nerve. The median nerve innervates the 1st and 2nd lumbrical muscles, the superficial head of thenar muscles such as opponens pollicis, abductor pollicis brevis and flexor pollicis brevis. Frequent repetitive movements that accompanies to excessive usage of these muscles of hands can lead to median nerve damage.[10-11]

According to our observation, university student spends on an average >7 to 8 hours/day while using smartphones and it is noticed that users who spent minimum 5 hours or more, utilizing electronic devices may lead to minor stress injuries, which may also affect the size of median nerve and thickening of flexor pollicis longus tendon.[12-13]

**OBJECTIVE**

The objective of this study is to investigate the association of excessive use of smart phone and prevalence of median nerve sign and symptoms.

**RATIONALE**

The use of smartphone has been increasing over the decades and there are concerns that their use may cause negative effects on median nerve and causing symptoms such as; pain, muscle weakness, tingling, numbness and loss of movement.

**OPERATIONAL DEFINITION**

**CARPAL TUNNEL SYNDROME**

It is common neurological condition in which the median nerve which runs from your forearm into the palm of hand, it become compressed or squeezed at wrist.

**MUSCULOSKELETAL DISORDER**

Musculoskeletal disorders are injuring or disorder of muscle, nerve, tendon, joints, cartilage and spinal discs.

**CONGENITAL DEFORMITY**

Congenital disorders can be defined as structural or functional anomalies that occur during intrauterine life or by birth.

**LITERATURE REVIEW**

A study on association between hand discomfort and the dimensions of hand and mobile phone in 2019 demonstrated that hand dimensions and mobile dimension are related to the development of hand discomfort, but the total duration of touch screen mobile usage, hours per day, history of keypad mobile usage, and type of activity such as chatting and playing video games was also more responsible for developing hand discomfort in the individuals.[14]

Prevalence of median nerve tightness and its association with upper limb function among smartphone users of public sector university, Karachi in august 2022. The study concluded that prolonged usage of smartphone can lead to symptoms of median nerve tightness. However, it does not affect upper limb function, handgrip and pinch strength.[15]

Pain and associated function limitation of wrist among students using smartphone in June 2022. This study concludes that there is significant association between smartphone use with pain and functional disability experienced by understudies in their wrist joint.[16]

Smartphone addiction and manual coordination can affect the hand strength and hand pain in normal teenage students in October 2022. The positive correlation which is found addiction of

smartphone in teenage students causes hand pain and smartphone usage is a risk factor of hand pain. Therefore, reduce and prevent the risks of overusing smartphones. In future studies conduct an inquiry for the safe period of time for smart phone use per day. It is the responsibility of the parents and school managers to control smartphone use in this population to avoid its risk.[17]

A study demonstrating the effect of smartphone usage of median nerve in 2018. This study concluded that excessive use of smartphone can lead to median nerve injury. In recent decades, there has been an extensive usage of smartphones even at the level of addiction. This should be noted while designing the smartphones and voice applications should be used more often. It can be beneficial to follow up the median nerve conductions of patients who are addicted to smartphones with the help of electrophysiological studies.[18]

A study demonstrating the interrelation between cell phone usage and musculoskeletal disorder in school going children in march 2022. The conclusion of this study is that the use of MP for any activity was associated with sleep deprivation and pain in wrist/hands followed by neck and upper back pain. The usage of MP should be limited to avoid the stress on musculoskeletal parts of the body.[19]

A study on characteristics of musculoskeletal complaints among students using digital devices for online class in 2020 demonstrated that musculoskeletal complain which are primarily neck, shoulder, elbow, wrist, thoracic and lumbar pain during online class, attributed to prolonged time on the computer, mobile and laptop/incorrect sitting position, uncomfortable position, and stress. Using digital devices for online classes was significantly associated with physical activity level (insufficiency active), site of pain, duration of the class, feel during online classes (uncomfortable position), and using an electronic device (mobile).[20]

The association between smartphone addiction and thumb/wrist pain. Those students who use their smartphones frequently have moderate wrist and thumb pain. While a positive Finkelstein test result was not linked to smartphone addiction, discomfort may still arise from other clinical and subclinical alterations in the soft tissues of the thumb and wrist. The correlation between high PRWHE scores and frequent smartphone use was indicative of this. Our higher frequency than that of other studies assessing the prevalence of smartphone addiction may suggest that the problem is becoming more widespread.

In order to prevent smartphone addiction, the impact on people needs to be better understood through the use of more precise diagnostic tools. While we are pleased with the size of our sample,

there were a number of significant issues with our study. Information about the length of time spent using the smartphone, where the participants were when using it, their overall physical habits, and their hobbies have not been gathered. Our study did not account for information regarding other devices, such as personal computers and tablets, or how frequently they are used.[21] Impact of Smartphone Overuse on Grip Strength, Pinch Strength, and Cross-Sectional Area of Flexor Pollicis Longus Tendon and Median Nerve. The results of this study show that the breadth, weight, and length of smartphones, as well as high levels of addiction, may be related to changes in the median nerve and flexor pollicis longus tendon.[22]

Correlation of smartphone use addiction with text neck syndrome and SMS thumb in physiotherapy students. In summary the current study demonstrated that students who are hooked to smartphones may have musculoskeletal issues in their hands and neck, particularly affecting their thumb. These issues may initially be temporary but may eventually result in long-term handicap. This bolsters the case for public health education initiatives to educate the public, particularly students, about the health hazards linked to excessive smartphone use.[23]

The relationship between smartphone usage duration (using smartphone's ability to monitor screen time) with hand-grip and pinch-grip strength among young people: an observational study. In summary, the current study showed a negative correlation between hand grip and pinch grip strength and extended smartphone use. According to the findings, there was a small correlation between longer smartphone use and poorer pinch and hand grips. Prospective longitudinal studies on the effects of prolonged smartphone use on hand muscles should be the focus of future research.[24]

Problematic smartphone use is associated with de Quervain's tenosynovitis symptomatology among young adults. We discovered that over 50% of the subjects had De Quervain's tenosynovitis symptomatology in addition to problematic smartphone use. In a young Peruvian population, we discovered a correlation between problematic smartphone use and a higher prevalence of De Quervain's tenosynovitis symptomatology.[25]

Effect of smartphone usage on neck muscle endurance, hand grip and pinch strength among healthy college students. The results of this study demonstrated that among young, healthy male college students, smartphone addiction can have a deleterious impact on neck flexor endurance but not hand grip or pinch strength. Thus, more research might look into whether limiting the amount of time spent on smartphones lessens their detrimental effects on neck flexor endurance.[26]

Work-related risk factors for Carpal Tunnel Syndrome among Majmaah University female

touchscreen users. The study concluded that Majmaah University's female touchscreen users, particularly those who were undergraduates, appeared to be at a higher risk of acquiring CTS. Moreover, wrist flexion range of motion (ROM) may serve as a useful predictor of changes in wrist posture following extended touchscreen usage. Moreover, it was discovered that the type of work, age, BMI, years of dominant hand, and number of hours spent using a touchscreen each day were risk factors for CTS symptoms.[27]

Evaluating hand performance and strength in children with high rates of smartphone usage. The findings showed that frequent usage of smartphones reduced hand function and pinch-grip and hand strength. In other words, high-frequency smartphone users' dominant hands showed decreased hand and pinch-grip strengths. Nonetheless, the dominant hands' hand functions were compromised between heavy and light smartphone users.[28]

Relationship between information and communication device usage and development of hand disorders. There was a substantial correlation between intensive ICT usage and hand problems, as evidenced by the higher likelihood of positive results for intensive ICT users in either the Phalen test or the combined Phalen and Eichhoff tests. Guidelines for preventing the excessive use of information and communication devices can be developed based on these findings.[29]

The relationship between carpal tunnel syndrome, smartphone use, and addiction. While there is a chance that smartphone addiction will contribute to CTS, the impact of smartphone addiction on the severity of CTS was not investigated in this study. The association between disease severity, smartphone use, and smartphone addiction in CTS patients deserves further investigation to provide clarification on this problem.[30]

Association of Upper Extremity Pain with the Duration Spent on the Smartphone. The study concluded that Because a range of problems can arise over time, consumers must use their smartphones for extended periods of time. The severity and range of upper extremity symptoms that may appear are related to the amount of time spent on a phone, so the participant's time spent could go down. Remembering that the employment of these high-tech devices is required by today's scientific and general markets. It is our duty to increase danger awareness and put the required preventative measures in place. Less hand use may lead to a decrease in symptoms because the upper extremities are the site of most musculoskeletal pain in joints and muscles. Furthermore, these measures arising from the usage of a handheld device can be achieved with sufficient precautions, risk awareness, rehabilitation and physiotherapy, and use constraints.[31]

Musculoskeletal disorder and pain associated with smartphone use: A systematic review of

biomechanical evidence. According to this comprehensive review, using a smartphone may increase the risk of both clinical and subclinical musculoskeletal abnormalities, as well as associated factors in the areas of the hand and thumb, shoulder and arm, and head and neck. The results of every study included in this review provide a compelling case, but the data also needs to be weighed against the middling scores on the modified Downs and Black checklist.[32]

Smartphone addiction and its complications related to health and daily activities among university students in Saudi Arabia. It was shown that a significant number of students suffered from smartphone addiction. Compared to male students, female students were found to be more hooked, which may be related to Saudi culture and society, where women are less socially connected than men. However, the advent of cellphones has a negative influence on kids' physical and mental health, and there may be serious long-term repercussions.

Reduce the frequency of smartphone addiction in order to improve students' general health, which is undoubtedly a cornerstone of any community. Programs to raise awareness through the media or even the school system may aid in problem control. It might add to the strain on the healthcare system if it didn't get under control.[33]

Association of Smartphone Use Duration with Physical Fitness among University Students: Focus on Strength and Flexibility. According to the results of the current study, Chinese university students who used smartphones for longer periods of time had worse levels of physical fitness (strength and flexibility). These results suggest that limiting the amount of time university students spend using smartphones each day is a good way to keep them from losing physical fitness. Our research offers strong support for young people' physical health and its implications for health education and preventive medicine. To validate these results and prove causation, further carefully planned prospective trials or randomized studies are needed in the future.[34]

## MATERIAL AND METHODS

### STUDY DESIGN

A cross-sectional based study

### STUDY SETTING

Institute of physiotherapy and nursing in Hyderabad

### STUDY DURATION

Six months

**SAMPLE SIZE**

Sample size will be 100

**SAMPLE TECHNIQUE**

Non-probability convenient sampling techniques will be used for the survey

**INCLUSION CRITERIA**

- Physiotherapists
- Physiotherapy students
- Nursing students
- Age will be 18-30
- Both gender(male/female) will be considered
- Smartphone user greater than 1 hours

**EXCLUSION CRITERIA**

- Recent work-related injury
- Sport injuries
- Congenital deformity
- Musculoskeletal disorder

**INSTRUMENTATION/TOOLS**

Boston Carpal Tunnel Syndrome Questionnaire, Cornell mobile phone hand questionnaires

**DATA COLLECTION PROCESS**

Consent form will be given to the participants for their permission

Questionnaire will be provided to the willing participants

**DATA ANALYSIS PROCEDURE**

Data will be analyzed by using SPSS (Statically package for social science)

**RESULT**

**TABLE 4.1: HOW MANY HOURS YOU SPENT ON MOBILE PHONE?**

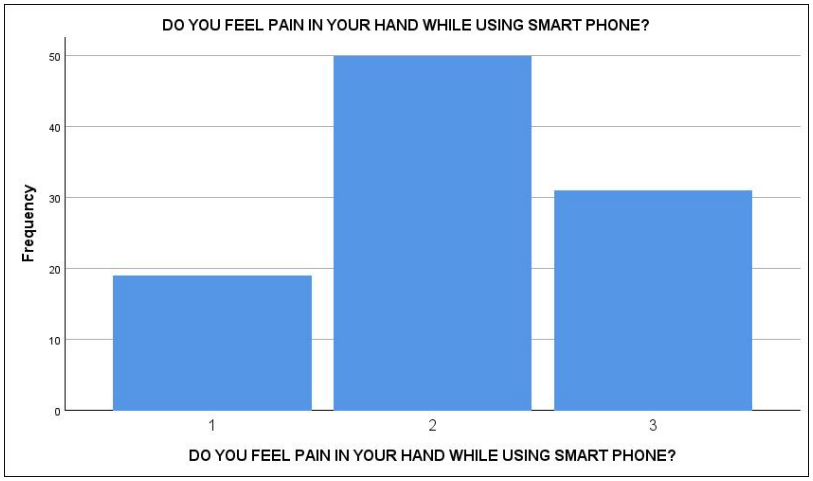
| | Frequency | Percentage |
|---|---|---|
| One hour | 12 | 12.0 |
| Three hours | 31 | 31.0 |
| Five hours | 20 | 20.0 |
| Eight hours | 8 | 8.0 |
| More than eight hours | 29 | 29.0 |
| Total | 100 | 100.0 |

Based on survey research data collection table 4.1 shows the frequency and percentage of mobile phone users in which 12 (12.0%) are one-hour mobile phone user 31 (31.0%) are the three hours mobile phone users ,20 (20.0%) are five hours mobile phone users, 8 (8.0%) are the eight hours mobile phone users, 29 (29.0%) are more than eight hours mobile phone users.

**TABLE 4.2: DO YOU FEEL PAIN IN YOUR HAND WHILE USING SMART PHONE?**

| | Frequency | Percentage |
|---|---|---|
| Yes | 19 | 19.0 |
| No | 50 | 50.0 |
| Sometime | 31 | 31.0 |
| Total | 100 | 100.0 |

.

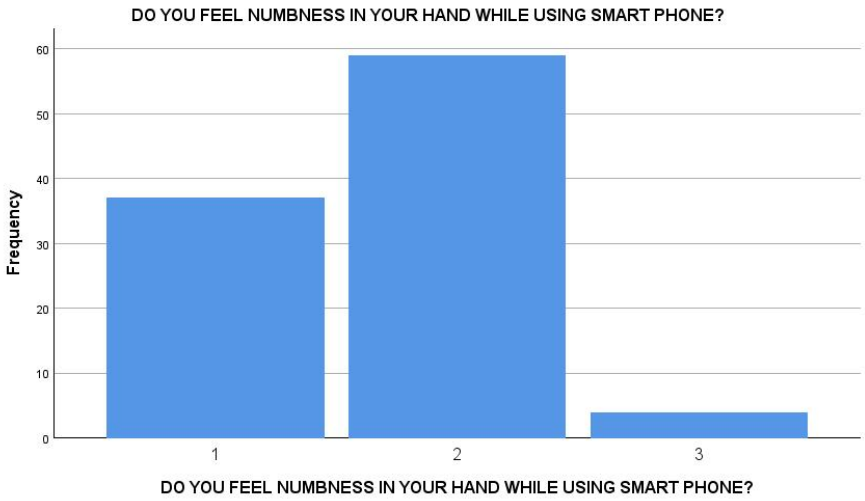



Based on survey research data collection table 4.2 shows the frequency and percentage of mobile phone users who feel pain while using smart phone in which 19 (19.0%) say yes, 50 (50.0%) says

no and 31 (31.0%) says some time they feel pain

**TABLE 4.3: DO YOU FEEL NUMBNESS IN YOUR HAND WHILE USING SMART PHONE?**

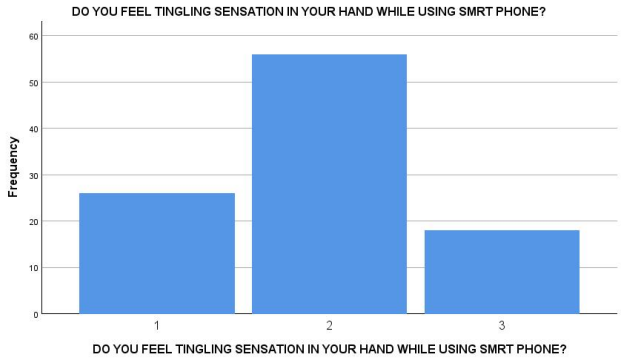
| | Frequency | Percentage |
|---|---|---|
| Yes | 37 | 37.0 |
| No | 59 | 59.0 |
| Sometime | 4 | 4.0 |
| Total | 100 | 100.0 |




Based on survey research data collection table 4.3 shows the frequency and percentage of mobile phone users who feel numbness while using smart phone in which 37 (37.0%) say yes, 59 (59.0%) says no and 4 (4.0%) says some time they feel pain.

**TABLE 4.4: DO YOU FEEL TINGLING SENSATION IN YOUR HAND WHILE USING SMART PHONE?**

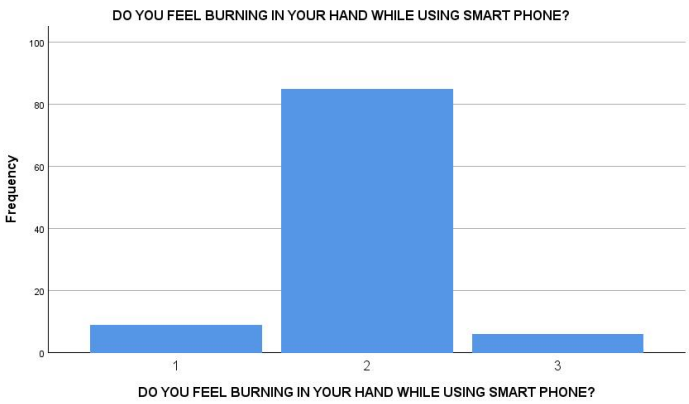
| | Frequency | Percentage |
|---|---|---|
| Yes | 26 | 26.0 |
| No | 56 | 56.0 |
| Sometime | 18 | 18,0 |
| Total | 100 | 100.0 |




Based on survey research data collection table 4.3 shows the frequency and percentage of mobile phone users who feel tingling while using smart phone in which 26 (26.0%) say yes, 56 (56.0%) says no and 18 (18.0%) says some time they feel pain.

**TABLE 4.5: DO YOU FEEL BURNING IN YOUR HAND WHILE USING SMART PHONE?**

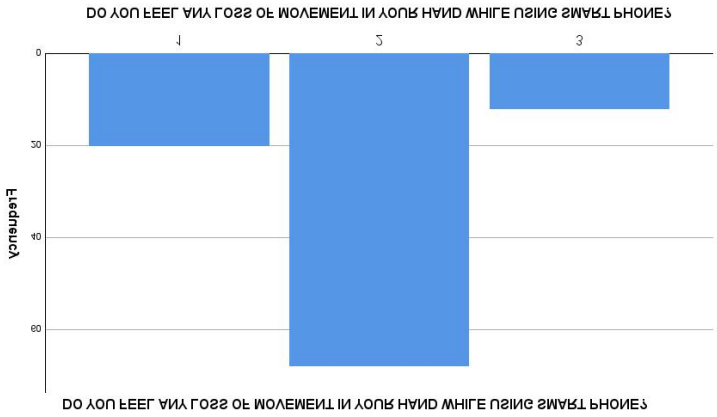
| | Frequency | Percentage |
|---|---|---|
| Yes | 9 | 9.0 |
| No | 85 | 85.0 |
| Sometime | 6 | 6.0 |
| Total | 100 | 100.0 |




Based on survey research data collection table 4.5 shows the frequency and percentage of mobile phone users who feel burning while using smart phone in which 9 (9.0%) say yes, 85 (85.0%) says no and 6 (6.0%) says some time they feel pain.

**TABLE 4.6: DO YOU FEEL ANY LOSS OF MOVEMENT IN YOUR HAND WHILE USING A SMART PHONE?**

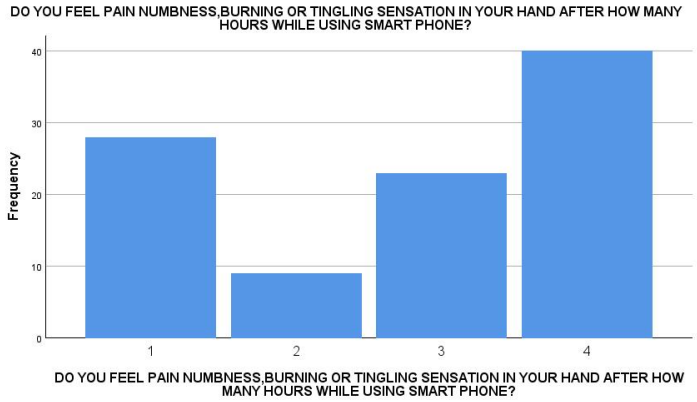
| | Frequency | Percentage |
|---|---|---|
| Yes | 20 | 20.0 |
| No | 68 | 68.0 |
| Sometime | 12 | 12.0 |
| Total | 100 | 100.0 |



Based on survey research data collection table 4.6 shows the frequency and percentage of mobile phone users who feel any loss of movement in your hand while using smart phone in which 20 (20.0%) say yes, 68 (68.0%) says no and 12 (12.0%) says some time they feel pain.

**TABLE 4.7: DO YOU FEEL PAIN, NUMBNESS, BURNING OR TINGLING SENSATION IN YOUR HAND AFTER HOW MANY HOURS WHILE USING SMART PHONE?**

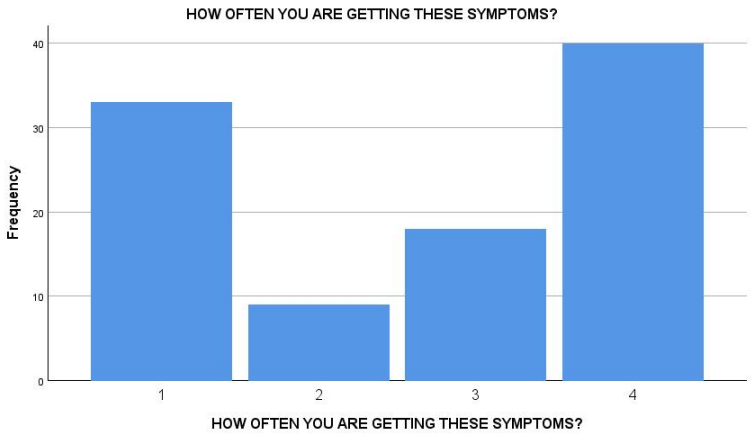
| | Frequency | Percentage |
|---|---|---|
| One hour | 28 | 28.0 |
| Three hours | 9 | 9.0 |
| Five hours | 23 | 23.0 |
| Never | 40 | 40.0 |
| Total | 100 | 100.0 |




Based on survey research data collection table 4.7 shows the frequency and percentage of mobile phone users who feel pain, numbness, burning or tingling sensation in your hand after how many hours while using smart phone in which 28 (28.0%) are for after one hour , 9 (9.0%) are after three hours, 23 (23.0%) are five hours after , 40 (40.0%) are those who never feel pain, numbness , burning or tingling sensation in hand.

**TABLE 4.8: HOW OFTEN YOU ARE GETTING THESE SYMPTOMS?**

| | **Frequency** | **Percentage** |
|---|---|---|
| One week | 33 | 33.0 |
| One month | 9 | 9.0 |
| Few month | 18 | 18.0 |
| Never | 40 | 40.0 |
| Total | 100 | 100.0 |

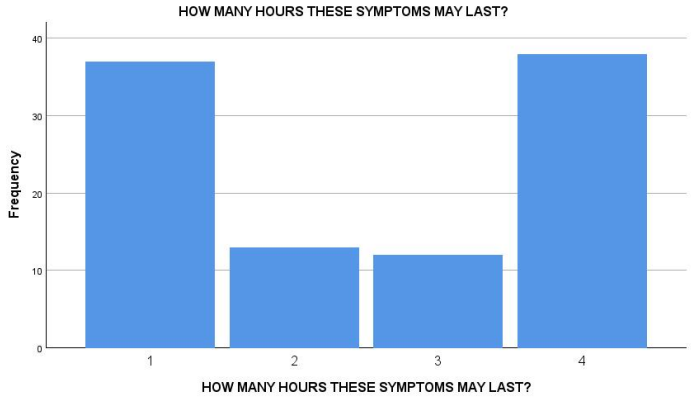



Based on survey research data collection table 4.8 shows the frequency and percentage of mobile phone users who are getting symptoms while using smart phone in which 33 (33.0%) say from

one week, 9 (9.0%) says from one month , 18 (18.0%) say fron few month and 40 (40.0%) say never they got symptoms

**TABLE 4.9: HOW MANY HOURS THESE SYMPTOMS MAY LAST?**

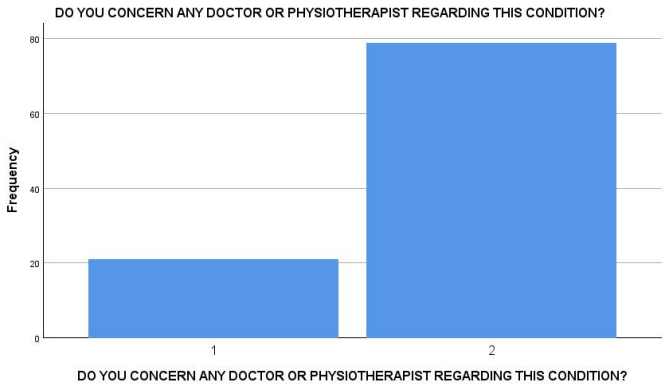
| | Frequency | Percentage |
|---|---|---|
| Half hour | 37 | 37.0 |
| One hour | 13 | 13.0 |
| Few hour | 12 | 12.0 |
| Never | 38 | 38.0 |
| Total | 100 | 100.0 |




Based on survey research data collection table 4.9 shows the frequency and percentage of how many hours these symptoms may last 37 (37.0%) say up to half hour, 13 (13.0%) says up to one hour , 12 (12.0%) say up to few month and 38 (38.0%) say never they got symptoms.

**TABLE 4.10: DO YOU CONCERN ANY DOCTOR OR PHYSIOTHERAPIST REGARDING THIS CONDITION?**

| | Frequency | Percentage |
|---|---|---|
| Yes | 21 | 21.0 |
| No | 79 | 79.0 |
| Total | 100 | 100.0 |




Based on survey research data collection table 4.10 shows the frequency and percentage of mobile phone users who concern to any doctor or physiotherapist after getting symptoms while using smart phone in which 21 (21.0%) say yes and 79 (79.0%) say no.

**TABLE 4.11: DURNING THE LAST WEEK HOW OFTEN DO YOU EXPERIENCE ACHE, PAIN DISCOMFORT IN USE OF SMART PHONE USERS (AREA A1 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 71 | 71.0 |
| 1-2 times last weeks | 19 | 19.0 |
| 3-4 times last week | 5 | 5.0 |
| Once every week | 3 | 3.0 |
| Several times every day | 2 | 2.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.11 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area A1 during the last week, and this indicates how often the feel these symptoms, in which 71 (71.0%) are never, 19 (19.0%) are 1-2 times in last weak, 5 (5.0%) are 3-4 times in last week, 3 (3.0%) are once every week and 2 (2.0%) are several times every day.

**TABLE 4.12: IF YOU EXPERIENCE ACHE, PAIN AND DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA A2 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 79 | 79.0 |
| Moderately uncomfortable | 14 | 14.0 |

| | | |
|---|---|---|
| Very uncomfortable | 7 | 7.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.12 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area A2, and this indicates how uncomfortable this the feel these in which 79 (79.0%) are 14 (14.0%) are moderately uncomfortable and 7 (7.0%) are very uncomfortable.

**TABLE 4.13: IF YOU EXPERIENCE ACHE, PAIN AND DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA A3 RIGHT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Not at all | 77 | 77.0 |
| Slightly interfered | 19 | 19.0 |
| Substantially interfered | 4 | 4.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.13 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area A3 and this indicates how uncomfortable this the feel these in which 77 (77.0%) are not at all, 19 (19.0%) are slightly interfered and 4 (4.0%) are substantially interfered.

**TABLE 4.14: DURNING THE LAST WEEK HOW OFTEN DO YOU EXPERIENCE ACHE, PAIN DISCOMFORT IN USE OF SMART PHONE USERS (AREA B1 RIGHT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Never | 69 | 69.0 |
| 1-2 times last weeks | 12 | 12.0 |
| 3-4 times last weeks | 17 | 17.0 |
| Once every week | 2 | 2.0 |
| Several times every day | 0 | 0.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.14 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area B1 during the last

week, and this indicates how often the feel these symptoms in which 69 (69.0%) are never, 12 (12.0%) are 1-2 times in last weak, 17 (17.0%) are 3-4 times in last week, 2 (2.0%) are once every week and 0 (0.0%) are several times every day.

**TABLE 4.15: IF YOU EXPERIENCE ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA B2 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 80 | 80.0 |
| Moderately uncomfortable | 17 | 17.0 |
| very uncomfortable | 3 | 3.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.15 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area B2, and this indicates how uncomfortable this the feel these in which 80 (80.0%) are 17 (17.0%) are moderately uncomfortable and 3 (3.0%) are very uncomfortable.

**TABLE 4.16: IF YOU EXPERIENCE ACHE, PAIN AND DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA B3 RIGHT HAND)?**

| | Frequency | percentage |
|---|---|---|
| Not at all | 79 | 79.0 |
| Slightly interfered | 20 | 20.0 |
| Substantially interfered | 1 | 1.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.16 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area B3 and this indicates how uncomfortable this the feel these in which 79 (79.0%) are not at all, 20 (20.0%) are slightly interfered and 1 (1.0%) are substantially interfered.

**TABLE 4.17: DURNING THE LAST WEEK HOW OFTEN DO YOU EXPERIENCE ACHE, PAIN DISCOMFORT IN USE OF SMART PHONE USERS (AREA C1 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 59 | 59.0 |
| 1-2 times last week | 17 | 17.0 |
| 3-4 times last week | 10 | 10.0 |
| Once every week | 10 | 10.0 |
| Several times every day | 4 | 4.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.17 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area C1 during the last week, and this indicates how often the feel these symptoms, in which 59 (59.0%) are never, 17 (17.0%) are 1-2 times in last week, 10 (10.0%) are 3-4 times in last week, 10 (10.0%) are once every week and 4 (4.0%) are several times every day.

**TABLE 4.18: IF YOU EXPERIENCE ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA C2 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 67 | 67.0 |
| Moderately uncomfortable | 26 | 26.0 |
| Very uncomfortable | 7 | 7.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.18 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area C2, and this indicates how uncomfortable this the feel these in which 67 (67.0%) are 26 (26.0%) are moderately uncomfortable and 7 (7.0%) are very uncomfortable.

**TABLE 4.19: IF YOU EXPERIENCE ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA C3 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Not at all | 65 | 65.0 |
| Slightly interfered | 28 | 28.0 |
| Substantially interfered | 7 | 7.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.19 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area C3 and this indicates how uncomfortable this the feel these in which 65 (65.0%) are not at all, 28 (28.0%) are slightly interfered and 7 (7.0%) are substantially interfered.

**TABLE 4.20: DURNING THE LAST WEEK HOW OFTEN DO YOU EXPERIENCE ACHE, PAIN DISCOMFORT IN USE OF SMART PHONE USERS (AREA D1 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 65 | 65.0 |
| 1-2 times last week | 20 | 20.0 |
| 3-4 times last week | 7 | 7.0 |
| Once every week | 4 | 4.0 |
| Several times every day | 4 | 4.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.10 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area D1 during the last week, and this indicates how often the feel these symptoms, in which 65 (65.0%) are never, 20 (20.0%) are 1-2 times in last week, 7 (7.0%) are 3-4 times in last week, 4 (4.0%) are once every week and 4 (4.0%) are several times every day.

**TABLE 4.21: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA D2 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 76 | 76.0 |

| | | |
|---|---|---|
| Moderately uncomfortable | 15 | 15.0 |
| Very uncomfortable | 9 | 9.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.21 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area D2, and this indicates how uncomfortable this the feel these in which 76 (76.0%) are 15 (15.0%) are moderately uncomfortable and 9 (9.0%) are very uncomfortable.

**TABLE 4.22: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA D3 RIGHT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Not at all | 76 | 76.0 |
| Slightly interfered | 17 | 17.0 |
| Substantially interfered | 7 | 7.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.22 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area D3 and this indicates how uncomfortable this the feel these in which 76 (76.0%) are not at all, 17 (17.0%) are slightly interfered and 7 (7.0%) are substantially interfered.

**TABLE 4.23: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA E1 RIGHT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Never | 64 | 64.0 |
| 1-2 times last week | 16 | 16.0 |
| 3-4 times last week | 7 | 7.0 |
| Once every week | 7 | 7.0 |
| Several times every day | 6 | 6.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.23 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area A1 during the last week, and this indicates how often the feel these symptoms, in which 64 (64.0%) are never, 17

(17.0%) are 1-2 times in last weak, 7 (7.0%) are 3-4 times in last week, 7 (7.0%) are once every week and 6 (6.0%) are several times every day.

**TABLE 4.24: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA E2 RIGHT HAND)?**

| | FREQUENCY | PERCENTAGE |
|---|---|---|
| Slightly uncomfortable | 76 | 76.0 |
| Moderately uncomfortable | 16 | 16.0 |
| Very uncomfortable | 8 | 8.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.24 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area E2, and this indicates how uncomfortable this the feel these in which 80 (80.0%) are 16 (16.0%) are moderately uncomfortable and 8 (8.0%) are very uncomfortable.

**TABLE 4.25: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA E3 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Not at all | 72 | 72.0 |
| Slightly interfere | 17 | 17.0 |
| Substantially interfere | 11 | 11.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.25 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area E3 and this indicates how uncomfortable this the feel these in which 72 (72.0%) are not at all, 17 (17.0%) are slightly interfered and 11 (11.0%) are substantially interfered.

**TABLE 4.26: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA F1 RIGHT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 79 | 79.0 |
| 1-2 times last week | 9 | 9.0 |

| | | |
|---|---|---|
| 3-4 times last week | 6 | 6.0 |
| Once every week | 4 | 4.0 |
| Several times every day | 2 | 2.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.26 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area F1 during the last week, and this indicates how often the feel these symptoms, in which 79 (79.0%) are never, 9 (9.0%) are 1-2 times in last weak, 6 (6.0%) are 3-4 times in last week, 4 (4.0%) are once every week and 2 (2.0%) are several times every day.

**TABLE 4.27: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA F2 RIGHT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Slightly uncomfortable | 84 | 84.0 |
| Moderately uncomfortable | 14 | 14.0 |
| Very uncomfortable | 2 | 2.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.27 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area F2, and this indicates how uncomfortable this the feel these in which 84 (84.0%) are 14 (14.0%) are moderately uncomfortable and 2 (2.0%) are very uncomfortable.

**TABLE 4.28: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA F3 RIGHT HAND)?1**

| | Frequency | Percentage |
|---|---|---|
| Not at all | 77 | 77.0 |
| Slightly interfere | 18 | 18.0 |
| Substantially interfere | 5 | 5.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.28 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in right hand at Area F3 and this indicates

how uncomfortable this the feel these in which 77 (77.0%) are not at all, 18 (18.0%) are slightly interfered and 5 (5.0%) are substantially interfered

**TABLE 4.29: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA A1 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 74 | 74.0 |
| 1-2 times last week | 17 | 17.0 |
| 3-4 times last week | 6 | 6.0 |
| Once every week | 1 | 1.0 |
| Several times every day | 2 | 2.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.29 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area A1 during the last week, and this indicates how often the feel these symptoms, in which 74 (74.0%) are never, 17 (17.0%) are 1-2 times in last weak, 6 (6.0%) are 3-4 times in last week, 1 (1.0%) are once every week and 2 (2.0%) are several times every day.

**TABLE 4.30: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA A2 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 77 | 77.0 |
| Moderately uncomfortable | 15 | 15.0 |
| Very uncomfortable | 8 | 8.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.30 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area A2, and this indicates how uncomfortable this the feel these in which 77 (77.0%) are 15 (15.0%) are moderately uncomfortable and 8 (8.0%) are very
uncomfortable.

**TABLE 4.31: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA A3 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Not at all | 79 | 79.0 |
| Slightly interfere | 18 | 18.0 |
| Substantially interfere | 3 | 3.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.31 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in leftt hand at Area A3 and this indicates how uncomfortable this the feel these in which 79 (79.0%) are not at all, 18 (18.0%) are slightly interfered and 3 (3.0%) are substantially interfered.

**TABLE 4.32: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF A MOBILE PHONE (AREA B1 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 68 | 68.0 |
| 1-2 times last week | 15 | 15.0 |
| 3-4 times last week | 15 | 15.0 |
| Once every week | 1 | 1.0 |
| Several times every day | 1 | 1.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.32 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area B1 during the last week, and this indicates how often the feel these symptoms, in which 68 (68.0%) are never, 15 (15.0%) are 1-2 times in last weak, 15 (15.0%) are 3-4 times in last week, 1 (1.0%) are once every week and 1 (1.0%) are several times every day.

**TABLE 4.33: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA B2 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 77 | 77.0 |
| Moderately uncomfortable | 16 | 16.0 |

| | | |
|---|---|---|
| Very uncomfortable | 7 | 7.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.33 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area B2, and this indicates how uncomfortable this the feel these in which 77 (77.0%) are 16 (16.0%) are moderately uncomfortable and 7 (7.0%) are very uncomfortable.

**TABLE 4.34: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA B3 LEFT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Not at all | 82 | 82.0 |
| Slightly interfere | 17 | 17.0 |
| Substantially interfere | 1 | 1.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.34 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in leftt hand at Area B3 and this indicates how uncomfortable this the feel these in which 82 (82.0%) are not at all, 17 (17.0%) are slightly interfered and 1 (1.0%) are substantially interfered.

**TABLE 4.35: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA C1 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 62 | 62.0 |
| 1-2 times last week | 18 | 18.0 |
| 3-4 times last week | 11 | 11.0 |
| Once every week | 6 | 6.0 |
| Several times every day | 3 | 3.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.35 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area C1 during the last week, and this indicates how often the feel these symptoms, in which 62 (62.0%) are never, 18 (18.0%) are 1-2 times in last weak, 11 (11.0%) are 3-4 times in last week, 6 (6.0%) are once every

week and 3 (3.0%) are several times every day.

**TABLE 4.36: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA C2 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 72 | 72.0 |
| Moderately uncomfortable | 24 | 24.0 |
| Very uncomfortable | 4 | 4.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.36 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area C2, and this indicates how uncomfortable this the feel these in which 72 (72.0%) are 24 (24.0%) are moderately uncomfortable and 4 (4.0%) are very uncomfortable.

**TABLE 4.37: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA C3 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Not at all | 71 | 71.0 |
| Slightly interfere | 21 | 21.0 |
| Substantially interfere | 8 | 8.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.37 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area C3 and this indicates how uncomfortable this the feel these in which 71 (71.0%) are not at all, 21 (21.0%) are slightly interfered and 8 (8.0%) are substantially interfered.

**TABLE 4.38: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA D1 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 72 | 72.0 |
| 1-2 times last week | 15 | 15.0 |
| 3-4 times last week | 2 | 2.0 |

| | | |
|---|---|---|
| Once every week | 7 | 7.0 |
| Several times every day | 4 | 4.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.29 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area D1 during the last week, and this indicates how often the feel these symptoms, in which 72 (72.0%) are never, 15 (15.0%) are 1-2 times in last week, 2 (2.0%) are 3-4 times in last week, 7 (7.0%) are once every week and 4 (4.0%) are several times every day.

**TABLE 4.39: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA D2 LEFT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Slightly uncomfortable | 78 | 78.0 |
| Moderately uncomfortable | 14 | 14.0 |
| Very uncomfortable | 8 | 8.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.39 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area D2, and this indicates how uncomfortable this the feel these in which 78 (78.0%) are 14 (14.0%) are moderately uncomfortable and 8 (8.0%) are very uncomfortable.

**TABLE 4.40: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA D3 LEFT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Not at all | 78 | 78.0 |
| Slightly interfere | 12 | 12.0 |
| Substantially interfere | 10 | 10.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.40 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area D3 and this indicates how uncomfortable this the feel these in which 78 (78.0%) are not at all, 12 (12.0%) are slightly

interfered and 10 (10.0%) are substantially interfered.

**TABLE 4.41: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA E1 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Never | 68 | 68.0 |
| 1-2 times last week | 11 | 11.0 |
| 3-4 times last week | 10 | 10.0 |
| Once every week | 5 | 5.0 |
| Several times every day | 6 | 6.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.41 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area E1 during the last week, and this indicates how often the feel these symptoms, in which 68 (68.0%) are never, 11 (11.0%) are 1-2 times in last week, 10 (10.0%) are 3-4 times in last week, 5 (5.0%) are once every week and 6 (6.0%) are several times every day.

**TABLE 4.42: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA E2 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Slightly uncomfortable | 72 | 72.0 |
| Moderately uncomfortable | 19 | 19.0 |
| Very uncomfortable | 9 | 9.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.42 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area E2, and this indicates how uncomfortable this the feel these in which 72 (72.0%) are 19 (19.0%) are moderately uncomfortable and 9 (9.0%) are very
uncomfortable.

**TABLE 4.43: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA E3 LEFT HAND)?**

| | Frequency | Percentage |
|---|---|---|
| Not at all | 74 | 74.0 |
| Slightly interfere | 16 | 16.0 |
| Substantially interfere | 10 | 10.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.43 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area E3 and this indicates how uncomfortable this the feel these in which 74 (74.0%) are not at all, 16 (16.0%) are slightly interfered and 10 (10.0%) are substantially interfered.

**TABLE 4.44: DURING THE LAST WEEK HOW OFTEN DID YOU EXPERINCE ACHE, PAIN DISCOMFORT IN USE OF MOBILE PHONE (AREA F1 LEFT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Never | 82 | 82.0 |
| 1-2 times last week | 9 | 9.0 |
| 3-4 times last week | 3 | 3.0 |
| Once every week | 4 | 4.0 |
| Several times every day | 2 | 2.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.44 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area F1 during the last week, and this indicates how often the feel these symptoms, in which 82 (82.0%) are never, 9 (9.0%) are 1-2 times in last week, 3 (3.0%) are 3-4 times in last week, 4 (4.0%) are once every week and 2 (2.0%) are several times every day.

**TABLE 4.45: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT HOW UNCOMFORTABLE WAS THIS (AREA F2 LEFT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Slightly uncomfortable | 87 | 87.0 |
| Moderately uncomfortable | 10 | 10.0 |

| | | |
|---|---|---|
| Very uncomfortable | 3 | 3.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.45 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area A2, and this indicates how uncomfortable this the feel these in which 87 (87.0%) are 10 (10.0%) are moderately uncomfortable and 3 (3.0%) are very uncomfortable.

**TABLE 4.46: IF YOU EXPERIENCED ACHE, PAIN DISCOMFORT DID THIS INTERFERE WITH YOUR ABILITY TO USE OF MOBILE PHONE (AREA F3 LEFT HAND)?**

| | **Frequency** | **Percentage** |
|---|---|---|
| Not at all | 75 | 75.0 |
| Slightly interfere | 19 | 19.0 |
| Substantially interfere | 6 | 6.0 |
| Total | 100 | 100.0 |

According to survey research data collection table 4.46 indicates the frequency and percentage of smart phone users those feel pain, ache and discomfort in left hand at Area B3 and this indicates how uncomfortable this the feel these in which 75 (75.0%) are not at all, 19 (19.0%) are slightly interfered and 6 (6.0%) are substantially interfered.

**DISCUSSION**

This study investigated the association of excessive use of smart phone and prevalence of median nerve sign and symptoms. Previous studies have investigated how excessive smartphone usage affect the individual's hand movement, discomfort and pain, but our study is unique in the dimension of that how excessive smart phone usage can cause median nerve sign and symptoms. Our study demonstrated a very effective relation of excessive smart phone usage and median nerve sign and symptoms such as pain, discomfort and burning.

We used Cornell hand discomfort chart to explain the association of median nerve and excessive smart phone usage sign and symptoms because it elaborated hand in separate parts.

The previous study reported that majority of the participants spent >6 hours daily to use a smartphone and had median nerve tightness.[15] According to our study 29% are those who spend smartphone more than eight hours a day. A previous study revealed that intensive use of smartphone seemed to have stiffer median nerves than non-intensive smartphone users, and that

it would appear reasonable to conclude that their nerves had begun to undergo minor physiological changes, such as ischemia and fibrosis, that would inhibit shape change.[15] In our study there are student who feel pain, numbness, burning or tingling sensation are (28%) after one-hour smartphone usage and there are students who feel pain, numbness, burning and tingling sensation are (23%) after five hours of smartphone usage.

Our findings are consistent with those of a study by Ahmed et al, which found that 29.2 percent of physiotherapy students experienced thumb pain as a result of excessive usage of smartphones.[17] In our study there are 19% students are experienced pain in wrist/hand due to excessive usage of smartphone.

**CONCLUSION**

Smart phone user who use their mobile three hour a day are 31% and because of excessive smart phone usage 19% feel pain, 37% feel numbness, 26% feel tingling sensation, 9% feel burning sensation and 20% feeling loss of movement among them. Among those 28% says they feel pain after one hour and 37% says its last up to half an hour. These findings showed that the eventual adverse effect of long term excessive mobile usage can harm the individual health and cause the median nerve damage.

These negative effects can be subsiding by shortening the duration and low usage of mobile that ultimately over the time reduce the median nerve complain and symptoms. Therefore, further studies could be done to investigate that how these symptoms reduce with other means.

**STRENGTH AND WEAKNESS**

**STRENGTHS**

The information gathered from students using the Cornell hand discomfort questionnaire and the Boston carpal tunnel syndrome questionnaire, with their informed consent and under our supervisor's guidance, is what makes our study strong.

We had given awareness to those students who did not have knowledge about median nerve sign and symptoms

**WEAKNESS**

many students were having problem regarding their privacy that it shall not be shared with any one.

If participants have difficulty remembering when they used their smartphones or when they felt discomfort, numbness, or lack of mobility in the median nerve, then self-reported results may be skewed.

**RECOMMENDATION**

Excessive usage of any electrical gadgets is harmful to human body mechanisms, nowadays mobile phone is playing pivot role in the surviving of human life.

Surveyed study revealed that excessive usage of cellphone is affecting median nerve functions, it's essential to avoid excessive usage of it.

Most of the users were not aware about these side effects of excessive usage so being a medical (Rehabilitative Specialist) the awareness, preventive measures and side effects session were delivered among cellphone users, as they also acknowledged on given session.

**REFRENCES**

1. Toh SH, Coenen P, Howie EK, Mukherjee S, Mackey DA, Straker LM. Mobile touch screen device use and associations with musculoskeletal symptoms and visual health in a nationally representative sample of Singaporean adolescents. Ergonomics. 2019 Jun 3;62(6):778-93.

2. Alruzayhi MK, Almuhaini MS, Alwassel AI, Alateeq OM. The effect of smartphone usage on the upper extremity performance among Saudi youth, KSA. Rom J Rhinol. 2018 Jan 1;8(29):47-53.

3. Amjad F, Farooq MN, Batool R, Irshad A. Frequency of wrist pain and its associated risk factors in students using mobile phones. Pakistan Journal of Medical Sciences. 2020 May;36(4):746.

4. Ladeira BM, Modena AL, de Castro Carletti EM, Bigaton DR, Pelai EB, Mescollotto FF. Pain, smartphone overuse and stress in physiotherapy university students: An observational cross-sectional study. Journal of Bodywork and Movement Therapies. 2023 Apr 1;34:104-9.

5. Rad MZ, Ghuchani SR, Bahaadinbeigy K, Khalilzadeh MM. Real time recognition of heart attack in a smart phone. Acta Informatica Medica. 2015 Jun;23(3):151.

6. Rania R, MOUSA ME, Khaled A, MARWA Sh MOSTAFA SA. Effect of bilateral versus unilateral use of smartphone on cross sectional area of median nerve. The Medical Journal of Cairo University. 2019 Jun 10;87(June):2201-5.

7. Chae SG. The Study on Relationship between Mobile Phone Text Usage and Hand Dexterity. International journal of internet, broadcasting and communication: IJIBC. 2019;11(3):77-86.

8. Mustafaoglu R, Yasaci Z, Zirek E, Griffiths MD, Ozdincler AR. The relationship between

smartphone addiction and musculoskeletal pain prevalence among young population: a cross-sectional study. The Korean journal of pain. 2021 Jan 1;34(1):72-81.

9. Eapen C, Kumar B, Bhat AK. Prevalence of cumulative trauma disorders in cell phone users. Journal of Musculoskeletal research. 2010 Sep;13(03):137-45.

10. Ghasemi-Rad M, Nosair E, Vegh A, Mohammadi A, Akkad A, Lesha E, Mohammadi MH, Sayed D, Davarian A, Maleki-Miyandoab T, Hasan A. A handy review of carpal tunnel syndrome: From anatomy to diagnosis and treatment. World journal of radiology. 2014 Jun 6;6(6):284.

11. Chammas M, Boretto J, Burmann LM, Ramos RM, Santos Neto FC, Silva JB. Carpal tunnel syndrome-Part I (anatomy, physiology, etiology and diagnosis). Revista brasileira de ortopedia. 2014 Sep;49:429-36.

12. Alosaimi FD, Alyahya H, Alshahwan H, Al Mahyijari N, Shaik SA. Smartphone addiction among university students in Riyadh, Saudi Arabia. Saudi Med J 2016; 37: 675-83.

13. Kee IK, Byun JS, Jung JK, Choi JK. The presence of altered craniocervical posture and mobility in smartphone-addicted teenagers with temporomandibular disorders. Journal of physical therapy science. 2016;28(2):339-46.

14. Damodaran KK, Sharma V, Purushothaman S. Relationship between the hand discomfort with the dimensions of hand and touch screen mobiles. Drug Invention Today. 2019 Mar 15;12(3):537-40.

15. Latif A, Baig AA, Wajid SA, Ali SS. Frequency of median nerve tightness and its association with upper limb functions among smartphone users of a public sector university, Karachi. JPMA. The Journal of the Pakistan Medical Association. 2022 Aug 1;72(8):1529-34.

16. John J, Govind GS, PP A. PAIN AND ASSOCIATED FUNCTIONAL LIMITATIONS OF WRIST AMONG STUDENTS USING SMARTPHONE-A CROSS-SECTIONAL STUDY.

17. Mohamed AE, Mamdouh KA, Elshennawy S, Aly MG, Eltalawy HA. Smartphone Addiction and Manual Coordination, Strength and Hand Pain in Normal Teenage Students: A Cross-Sectional Study. The Egyptian Journal of Hospital Medicine. 2022 Oct 1;89(1):5666-71.

18. Faik İL, BÜYÜKGÖL H, KAYHAN F, Hatice KÖ. The effect of smartphone usage on the median nerve. Cukurova Medical Journal. 2018 Jan 1;43(1):67-72.

19. Mandhwani S, Zia S, Shaikh ES, Duarte D, Tanveer E. Association between cell phone usage and musculoskeletal disorders in school going children. Journal of Musculoskeletal Research. 2022 Mar 31;25(01):2250003.

20. Mojumder IM. Characteristics of musculoskeletal complaints among students using digital devices for online classes (Doctoral dissertation, Bangladesh Health Professions Institute, Faculty of Medicine, the University of Dhaka, Bangladesh).

21. Baabdullah A, Bokhary D, Kabli Y, Saggaf O, Daiwali M, Hamdi A. The association between smartphone addiction and thumb/wrist pain: A cross-sectional study. Medicine. 2020 Mar;99(10).

22. Samuel PS, Alahmari KA, Adam M, Reddy RS, Ahmad I, Kakaraparthi VN, Rengaramanujam K, Tedla JS, Hussein A, Alshahrani MS. Influence of Smartphone Overuse on Grip Strength, Pinch Strength, and Cross-Sectional Area of Flexor Pollicis Longus Tendon and Median Nerve. Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin. 2021 Dec;31(06):360-6.

23. Shah PP, Sheth MS. Correlation of smartphone use addiction with text neck syndrome and SMS thumb in physiotherapy students. Int J Community Med Public Health. 2018 Jun;5(6):2512.

24. Osailan A. The relationship between smartphone usage duration (using smartphone's ability to monitor screen time) with hand-grip and pinch-grip strength among young people: an observational study. BMC musculoskeletal disorders. 2021 Dec;22:1-8.

25. Benites-Zapata VA, Jiménez-Torres VE, Ayala-Roldán MP. Problematic smartphone use is associated with de Quervain's tenosynovitis symptomatology among young adults. Musculoskeletal Science and Practice. 2021 Jun 1;53:102356.

26. Alshahrani A, Samy Abdrabo M, Aly SM, Alshahrani MS, Alqhtani RS, Asiri F, Ahmad I. Effect of smartphone usage on neck muscle endurance, hand grip and pinch strength among healthy college students: A cross-sectional study. International journal of environmental research and public health. 2021 Jun 10;18(12):6290.

27. Mohammad WS. Work-related risk factors for Carpal Tunnel Syndrome among Majmaah University female touchscreen users. Pakistan Journal of Medical Sciences. 2019 Sep;35(5):1221.

28. Radwan NL, Ibrahim MM, Mahmoud WS. Evaluating hand performance and strength in children with high rates of smartphone usage: an observational study. Journal of physical therapy science. 2020;32(1):65-71.

29. Saito K, Saito Y. Relationship between Information and Communication Device Usage and Development of Hand Disorders. INQUIRY: The Journal of Health Care Organization, Provision, and Financing. 2021 Jul;58:00469580211029607.

30. Karaçorlu FN, Balgetir F, Pirinçci E, Deveci SE. The relationship between carpal tunnel syndrome, smartphone use, and addiction: A cross-sectional study. Turkish Journal of Physical Medicine and Rehabilitation. 2022 Dec;68(4):517.

31. Khan K, ur Rehman A, Maheshwari JD, Pasha GN, Mumtaz T, Nangrejo R. Association of Upper Extremity Pain with the Duration Spent on the Smartphone: A Cross Sectional Survey.

32. Eitivipart AC, Viriyarojanakul S, Redhead L. Musculoskeletal disorder and pain associated with smartphone use: A systematic review of biomechanical evidence. Hong Kong Physiotherapy Journal. 2018 Dec 14;38(02):77-90.

33. Alkhateeb A, Alboali R, Alharbi W, Saleh O. Smartphone addiction and its complications related to health and daily activities among university students in Saudi Arabia: A multicenter study. Journal of family medicine and primary care. 2020 Jul;9(7):3220.

34. Li W, Cui Y, Gong Q, Zhu Z. Association of Smartphone Use Duration with Physical Fitness among University Students: Focus on Strength and Flexibility. International Journal of Environmental Research and Public Health. 2022 Jun 16;19(12):7386.