



Original Article

Prevalence and Impact of Cell Phone Elbow among Mobile Users in Different Cities of Punjab, Pakistan

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ABSTRACT

Cell phone elbow is the pinching of ulnar nerve behind the elbow resulting in tingling or numbness within the hand when using a cell phone, sleeping with your elbows bent, or holding your arms bent and by your head for long period of time. **Objective:** To find out the prevalence of cellphone elbow among mobile phone users and its associated impairments and functional limitations. **Methods:** A cross-sectional study was conducted during October 2021 to April 2022. Data were collected from different Punjab colleges and universities: NUR International University, Riphah International University, The University of Lahore, University of Faisalabad, Niazi College of Physical Therapy and Fatima Memorial Hospital and College. Participants were recruited through convenience sampling from 17-50 years of age with positive Tinel sign test. Data collection were done by using the Numeric Pain Rating Scale and Boston Carpal Tunnel Syndrome Questionnaires. **Results:** Out of 250 subjects 33.2% were having noticeable symptoms associated with prolong phone usage. Among them 39.6% experienced numbness and tingling. Hand pain is reported in 32.8% and 27.6% experienced pain on ulna side of elbow. **Conclusions:** The prevalence of cell phone elbow was 33.2%, higher than the previous studies. This research advice the cell phone users to minimize their mobile usage, avoid prolonged calls, use hands alternately to avoid strain on one hand, use hands-free and ear pods while taking calls.

INTRODUCTION

Cell phone elbow, is actually cubital tunnel syndrome that cause pain, burning, aching, and tingling like symptoms on the medial side of forearm and hand 5th finger and ulnar side of 4th finger [1]. Ulnar nerve entrapment occurs on the inner part of the elbow [2]. Usage of mobile handheld devices with forearm pronated and flexed elbow can decrease the motor conduction velocity of ulnar nerve more than other positions. The best position for elbow joint during using mobile handheld devices is 0°-45° elbow flexion with elbow supinated [3]. The time spent on mobile-phone has increased in the last decades leading to an

increased time spent with flexed elbow [4]. Mobile phones are now heavily used on a daily basis, especially since they become more widely available and affordable worldwide [5]. Technology has the potential to change not only lifestyle culture but also posture and behaviour [6]. In order to conduct nerve conduction studies, a peripheral nerve must be stimulated while a recording from a muscle that the nerve innervates is being used [7]. The medial hand's sensory function is provided by the superficial branch, while the deep branch innervates the hypothenar, third and fourth lumbricals, interosseous, adductor pollicis, and

deep head of the flexor pollicis brevis muscle [8, 9]. When pressure within the tunnel restricts the nerve, symptoms develop. Possible causes include arthritis, joint dislocation, fractures, and swelling of the tendon lining. Swelling in the tunnel can also occasionally result from fluid retention during pregnancy. By keeping the elbow bent for extended periods of time, symptoms deteriorate. Since the ulnar nerve is posterior to the elbow's axis of motion, it is stretched 4.5 to 8 mm during elbow flexion, and the cubital tunnel's cross-sectional area is reduced by up to 55% as intra-neural pressures rise up to 20 times during this motion. Two to three repeated and prolonged elbow flexion can irritate the ulnar nerve as a result, which can eventually result in cubital tunnel syndrome [10]. Patients who frequently use their cell phones for extended periods of time (also known as "cell phone elbow") have been found to have a link between prolonged elbow flexion and cubital tunnel syndrome. Long-term elbow flexion increases the risk of developing cubital tunnel syndrome and raising intra-neural pressure. Regular phone use causes these postural-induced symptoms, which are known as "mobile phone elbow"[11]. Patients who postpone seeing a doctor for the first time develop a chronic illness with hand weakness and complain of having trouble completing fine motor tasks, including trimming fingernails [12]. A motor impairment may show itself as a weak grasp (difficulty opening bottles or jars, for example), clumsy hands (difficulty typing), or problems with precision pinching skills (e.g., buttoning buttons). Patients with aberrant claw postures on their fourth and fifth fingers may find it difficult to hold objects in their hands [6]. The purpose of this research was to find out the prevalence of cell phone elbow among mobile phone users and to identify the impairments and functional limitations. As the usage of mobile phone is increasing at an alarming rate awareness related to it usage and impairments can be given to young population.

METHODS

A cross sectional study was carried out to find out the prevalence of cellphone elbow among mobile phone users' young adults in Punjab, Pakistan. Duration of the study was seven months from August 2021 to February 2022. Data were collected from different colleges and universities of Punjab; NUR International University, Riphah International University, The University of Lahore, University of Faisalabad, Niazi College of Physical Therapy and Physical Therapy Department of Fatima Memorial Hospital and College. Sample size of 250 individuals calculated through Raosoft software. Participants were recruited through convenience sampling. People who are smart phones users both males and females ranging from 17-50 years of age suffering with history of excessive cell phone use

(minimum 12-16 hours per day), elbow pain on dominant hand side, with positive Tinel sign test were included in this study. Patients having history of any surgery around elbow of dominant hand, trauma or neurological disorders of arm around elbow of dominant hand, non-electronic gadget users, systemic disorders like systemic lupus erythematosus or rheumatoid arthritis, musculoskeletal disorders around elbow of dominant hand and psychological disorders were excluded from the study. Data collections were done by using the self-developed questionnaire for mobile usag, pain was assessed by using Numeric Pain Rating Scale (NPRS) and the functional status of dominant hand was evaluated by Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) [13, 14]. Participants were informed that their identity would not be disclosed, and an informed consent were taken. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Descriptive data were presented as frequency/percentages whereas, quantitative variables in terms of mean & standard deviation.

RESULTS

Table 1 shows characteristics of the study participants, 65.6% of the participants were females and 34.4% participants were males. 38.4% were of 18-30 age, 52% per of 31-40 age and 9.6% were of 41-50 age.

Characteristics		Frequency (%)
Gender	Male	86(34.4)
	Female	164(65.6)
Age	18-30	96(38.4)
	31-40	130(52)
	41-50	24(9.6)

Table 1: Characteristics of the study participants (n=250)

Table 2 shows about the data related to mobile phone usage. Regarding duration of phone use; 35.6% individuals use average 2 hours per day, 40.0% individuals use 4 hours, 13.6% individuals use 8 hours and only 4.0% individuals use 10 hours. While 4.8% of individuals use more than 10, hours per day. Data regarding duration of single call; 145 individuals (58%) attend average single call 5 min per day, 56 individuals (22.4%) attend 6-15min, 23 individuals (9.20%) attend 16-30min and only 14 individuals (5.6%) attend 31-45min. While 12 individuals (4.80%) attend more than more than 1 hour phone calls per day. 16.4% of the participants prefer to listen a phone call on loudspeaker and 83.6% participants did not. 44.8% of the participants prefer using Hands free and 55.2% participants did not.

Characteristics		Frequency (%)
Average duration of phone usage per day	2 hours	89(35.6)
	4 hours	105(42)
	8 hours	34(13.6)
	10 hours	10(4)
	more than 10	12(4.8)
Average duration of a single phone call	5min	145(58)
	6-15min	56(22.4)
	16-30min	23(9.2)
	31-45 min	14(5.6)
	>1 hour	12(4.8)
Prefer listening to call on loudspeaker	Yes	41(16.4)
	No	209(83.6)
Prefer using Hands free	Yes	112(44.8)
	No	138(55.2)

Table 2: Descriptive statistics of mobile phone usage (n=250)

Figure 1 shows Pie chart of frequency and percentage for pain that individuals reported. 34.4% of participants rate 1 on the pain scale, 1.60% of participants rate 10 on the pain scale, 12.40% of participants rate 2 on the pain scale, 21.6% of participants rate 3 on the pain scale 9.6% of participants rate 4 on the pain scale 10.0% of participants rate 6 on the pain scale 5.60% of participants rate 7 on the pain scale 1.6% of participants rate 8 on the pain scale.

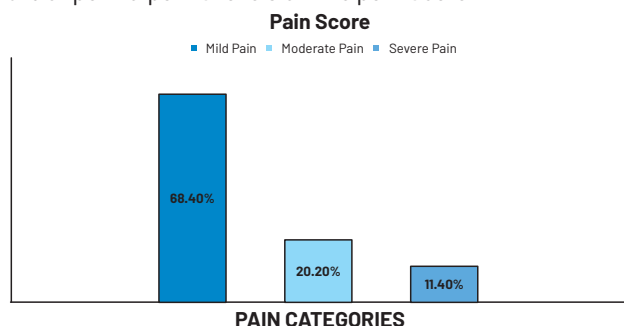


Figure 1: Numeric Pain Rate Scale percentage for Cell Phone Elbow

Table 3 shows impairment data that are present among participants. The participants report pain in hand 44.4% especially when it is bent, and 55.6% participants did not. 27.6% of the participant has reported aching pain on the inside of the elbow and 72.4% participants did not. The participants reported numbness and tingling in the hand or ring and little finger 39.6% especially when the elbow is bent, and 60.4% participants did not. About 33.2% of the participants had symptoms and 66.8% participants had no symptoms, 30% of the participants reported weak grip and clumsiness due to muscle weakness in the affected arm and hand while 70% participants were not affected. Tingling, aching, burning or numbness was reported in 28% of the participants reported in the ulnar forearm present.

Characteristics		Frequency (%)
Pain in hand especially when it is Bent	Yes	111(44.4)
	No	139(55.6)
Aching pain on the inside of the elbow	Yes	69(27.6)
	No	181(72.4)
Numbness and tingling in the hand	Yes	99(39.6)
	No	151(60.4)
Symptom after prolong phone use	Yes	83(33.2)
	No	167(66.8)
Weak grip due to muscle weakness in the affected arm and hand	Yes	75(30)
	No	175(70)
Tingling, aching, burning or numbness in the ulnar forearm present	Yes	70(28)
	No	180(72)

Table 3: Impairments of elbow, forearm and hand related cell phone elbow (n=250)

Table 4 shows results regarding functional status of the participants. The participants response for writing issue ranging from 'no difficulty' to 'cannot perform the activity at all due to hands and wrists symptoms' (1-5). Out of the 250 participants, 170 reported 'no difficulty' in writing task. The participants response for holding a book while reading ranging from 'no difficulty' to 'cannot perform the activity at all due to hands and wrists symptoms' (1-5). Out of the 250 participants, 65.6% reported 'no difficulty'. 27.2% reported little difficulty, 4.0% reported, Moderate difficulty, 1.6% reported Intense difficulty, 1.6% reported that they cannot perform activities. The participants response for Buttoning of clothes ranging from 'no difficulty' to 'cannot perform the activity at all due to hands and wrists symptoms' (1-5). Out of the 250 participants, 198 reported 'no difficulty'. Moreover, percentage of responses is shown in pie chart. The participants response for Household chores ranging from 'no difficulty' to 'cannot perform the activity at all due to hands and wrists symptoms' (1-5). Out of the 250 participants, 61.6% reported 'no difficulty'. 26.4% reported little difficulty, 5.6% reported Moderate difficulty, 3.2% reported intense difficulty and 3.2% reported that they cannot perform activities. The participants response for Carrying of grocery basket ranging from 'no difficulty' to 'cannot perform the activity at all due to hands and wrists symptoms' (1-5). Out of 250 participants 54.8% reported 'no difficulty'. 30.4% reported little difficulty, 8.4% reported Moderate difficulty, 2.8% reported intense difficulty, and 3.6% reported that they cannot perform activities. The participants response for Bathing and dressing ranging from 'no difficulty' to 'cannot perform the activity at all due to hands and wrists symptoms' (1-5). Out of the 250 participants, 84.4% reported 'no difficulty'. 9.20% reported little difficulty, 2.0% reported, Moderate difficulty, 1.4% reported Intense difficulty, 2.0% reported that they cannot perform activities. Functional status of Gripping of a phone handle percentage among the participants; Out of the 250

participants, 67.6% reported 'no difficulty'. 21.2% reported little difficulty, 6.0% reported Moderate difficulty, 2.4% reported intense difficulty, and 2.4% reported that they cannot perform activities.

Functional Status	Categories	Frequency (%)
Writing	1.No difficulty	170(68)
	2.Little difficulty	60(24)
	3.Moderate difficulty	14(5.6)
	4.Intense difficulty	3(1.2)
	5.Cannot perform activities	3(1.2)
Holding a book while reading	1.No difficulty	164(65.6)
	2.Little difficulty	68(27.2)
	3.Moderate difficulty	10(4)
	4.Intense difficulty	4(1.6)
	5.Cannot perform activities	4(1.6)
Buttoning of clothes	1.No difficulty	198(79.2)
	2.Little difficulty	32(12.8)
	3.Moderate difficulty	13(5.2)
	4.Intense difficulty	1(0.4)
	5.Cannot perform activities	6(2.4)
Household chores	1.No difficulty	154(61.6)
	2.Little difficulty	66(26.4)
	3.Moderate difficulty	14(5.6)
	4.Intense difficulty	8(3.2)
	5.Cannot perform activities	8(3.2)
Carrying of grocery basket	1.No difficulty	137(54.8)
	2.Little difficulty	76(30.4)
	3.Moderate difficulty	21(8.4)
	4.Intense difficulty	7(2.8)
	5.Cannot perform activities	9(3.6)
Bathing and dressing	1.No difficulty	211(84.4)
	2.Little difficulty	23(9.2)
	3.Moderate difficulty	6(2.4)
	4.Intense difficulty	5(2)
	5.Cannot perform activities	5(2)
Gripping of a Phone	1.No difficulty	169(67.6)
	2.Little difficulty	53(21.2)
	3.Moderate difficulty	15(6)
	4.Intense difficulty	7(2.8)
	5.Cannot perform activities	6(2.4)

Table 4: Functional status of the participants (n=250)

DISCUSSION

The results of this study showed that out of 250 subjects, 33.2% were having noticeable symptoms associated with prolong cell phone usage. In 2019 a cross-sectional study was conducted on "Prevalence of Cell phone elbow among young adults". Cell phone elbow was seen in 19.8% subjects. Current study showed higher prevalence than previous study. In 2019 Damodaran et al., conducted study on prevalence of smartphone addiction among medical students and the results were relatively high (60.3%) [15]. Current study showed less prevalence than this study. In this research functional limitations due to production of

symptoms were mentioned. 23.20% individuals faced decreased range of motion of elbow. Activities that include various household chores, opening jars, gripping telephone handle, holding a book while reading, writing, carrying heavy objects and various self-care activities i.e., bathing, dressing, and combing become difficult or limited. Among these tasks, 3.2% individuals could not perform any household activity at all and 3.6% individuals could not carry heavy objects i.e., grocery basket at all. 2% individuals were lacking even basic self-care activities i.e., dressing. Cell Phone Elbow is compression of ulnar nerve in the elbow and is the second most common neuropathy after carpal tunnel syndrome. The results shown by a study in 2019 on "Incidence of Cubital Tunnel Syndrome in the U.S. Military Population reported it affects up to 5.9% of population [16]. In 2018 a cross sectional study reported the prevalence of Cubital Tunnel Syndrome was 6.9% and was higher among the participants with longer length in the job as desk workers [17]. In 2019 a study on mobile phone addiction was conducted with 32.1 points and physical pain based on characteristics of mobile phone usage 1.86 points [18]. According to a study finding, agonizing elbow pain accounts for 27.6% of all elbow pain, and 44.4% of all hand pain, particularly when the hand is bent. According to the study's findings, 33.2% of the 250 participants had symptoms that could be linked to prolonged cell phone use. The results of the current study are better than those of the previously mentioned research. A cross-sectional study on selfie elbow was conducted in 2019 and depicts the strain placed on the elbow as a result of the individual extending (or occasionally bending) the elbow in an extremely strained position during the selfie. Selfie elbow is actually more of an unnatural and repetitive loading of the muscles around the elbow that creates micro ruptures, inflammation, and pain. This eventually cures with scarring, but it still results in recurring pain [19]. A cross-sectional observational study of undergraduate students with iPhone elbow was done in 2016, and the findings revealed that on the VAS scale, 35% of participants occasionally experience pain and 10.2% frequently complain of pain and achiness, suggesting diminished muscle strength. According to Rizvi et al., study, people between the ages of 20 and 21 use smartphones more frequently. It's interesting to note that this study's findings revealed that 67.5% of students make calls and 60.7% utilise video chat, while reading and sending messages accounted for 43.7% and 39.8%, respectively [20]. In current study 65.6% were out of 250 individuals. Male and female ratio was not equivalent in this study. People had different occupations and household activities so symptoms may vary. All the data were collected from Punjab but it should be collected from all over Pakistan for

more generalized results. This study did not investigate posture and body positions during usage of smart phones. Lifestyle modifications, Postural awareness, and educational campaigns are required to decrease cell phone usage health hazards. This study did not cover the treatment protocols so further experimental design is recommended for affected individuals.

CONCLUSIONS

It is concluded that in comparison to earlier studies, the prevalence of mobile phone elbow was higher at 33.2% in the current study. Because this illness can result in functional incapacity if addressed, it should not be disregarded. Therefore, this study advises cell phone users to limit their mobile usage, avoid making lengthy phone calls, alternate between using their hands to reduce strain, and utilize hands-free and earbuds while taking calls.

Conflicts of Interest

The authors declare no conflict of interest.

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