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Research Paper

STUDY TO INVESTIGATE THUMB PAIN AND DISABILITY IN SELECTED AHLIA UNIVERSITY STUDENTS REGARDING CELL PHONE RELATED REPETITIVE STRAIN INJURIES

Shaik Balkhis Banu^{1*}, S Chandini², S Rehana Banu³, Ram Atwani⁴
and Ebrahim Khalil Ebrahim Rajab⁵

*Corresponding Author: Shaik Balkhis Banu ✉ shaikrehana85@gmail.com

This study investigated thumb pain and disability in selected Ahlia University students regarding cellphone related repetitive strain injuries, to determine the clinical presentation of these injuries according to their symptomatology and signs, the extent of hand disability related to these injuries according to thumb range of motion, thumb muscle strength and performance of ADL requiring thumb use, and the possible factors associated with these injuries according personal usage and ergonomic design of mobile phone involved. A survey-using questionnaire was done to obtain the required information about the signs and the symptoms in relation to mobile phone-related RSI injuries among Ahlia students. The information was gathered from 54 Ahlia students. The respondents reported the following as signs and symptoms: thumb pain, radiating pain to wrist, joint stiffness and thumb weakness, tingling sensation, thumb muscles fatigue and thumb numbness, difficulty extending thumb, radiating pain to shoulder, radiating pain to forearm. The extent of hand disability related to these injuries according to range of motion of the thumb, thumb muscle strength and performance of ADL requiring thumb use was found to be insignificant. And the factors associated with these injuries according to personal usage were thumb overuse in texting, number of hours consumed in texting, frequency of text messages and prolonged mobile use, while the ones according to the mobile phone's ergonomic design were keypad size, keys shape, keys texture and material, phone size, and keypad design.

Keywords: Thumb pain, Strain injuries, Ahlia university, Symptomatology

INTRODUCTION

The use of texting or text messaging is the most popular means of sending short text messages

using Short Message Service (SMS) sent from mobile phones. Text messaging refers to the exchange of brief written messages between

¹ Assistant Professor, Ahlia University, Kingdom of Bahrain.

² B.Tech, Global College of Engineering and Technology, Kadapa, Andhra Pradesh, India.

³ Research Scholar (Ph.D), Yogi Vemana University, Kadapa, Andhra Pradesh, India.

⁴ Consultant Surgeon Orthopaedic, King Hamad University Hospital, Bahrain.

⁵ Ph.D., Lecturer in Royal College of Surgeons RCSI.

mobile and portable devices sent through cellular networks. The term was originally limited to messages sent using SMS however this has been extended to include messages containing image, video, and sound content otherwise known as MMS messages. Text messaging has become very popular across the globe between persons since it is viewed as the easiest way to communicate with practically anyone, at any location at any given moment.

With the proliferation and popularity of text messaging through the use of cellular phones, health issues related to its use are beginning to surface. Currently, the impact of text messaging on the lifestyle of people who have habitually become hooked or dependent on this practice has not been extensively studied. Its effect as a result of its prolonged use in the practice of texting has not been studied until this time.

Changes and rapid advancement in mobile phone technology in the last four years have resulted in a substantial increase in the amount of time teenagers and young adults spend with their cellular phones (Karim, 2009). In relation to the increasing numbers of mobile phone users worldwide, rehabilitation medicine related problems are beginning to surface. Most notable are the problems facing issues related to rehabilitation of hand injuries and the signs and symptoms related to Repetitive Strain Injuries (RSI). Karim (2009) also pointed out that with these changes; the prevalence of Repetitive Strain Injury (RSI) also known as Cumulative Trauma Disorders is affected.

Unlike other injuries, RSI tends to develop over an extended period of time. With the popularity of SMS text messaging and the increasing usage of teens who regularly use their mobile phone for

this purpose, the impact of RSI on the hand has not yet been fully documented.

It is obvious that most people use the thumb in texting mobile phone messages. Subsequently, the thumb is not spared in RSI. Karim (2009) noted that the thumb is the least dextrous of all of our fingers. She further added that it is not suited to any repetitive movements required to type on a cellular mobile phone keypad. With the rapid increase in the use of cellular phones for community with text messages, Karim (2009) noted that this has led to an increase in RSI among teenagers including young adults. Contributing to these problems is the desire for people to continuously use their phones. Therefore, majority continue to use these gadgets despite the associated injuries that go with the use of these devices.

Majority of studies involving RSI are cross-sectional and most concentrate on Carpal Tunnel Syndrome (CTS). Generally, the symptomatology of RSI-related cases are primarily those associated with the upper body. Tjepkema (2003) reported that involvement of hand or wrist accounted for 19% of the injuries. The large proportion was due to work-related factors attributed to repetitive and forceful movements (Tjepkema, 2003).

Currently, the description of general symptomatology of RSI is well-documented however any specific symptomatology related to RSI involving the thumb which experts sometimes label as cell phone thumb have not been fully identified. This brings about the question this research intends to answer: "What is the clinical presentation of cellular phone related repetitive strain injuries of the thumb among selected students of Ahlia University according to its symptomatology and its signs?"

With the completion of this research, any information obtained will be very helpful among physiotherapists and clinicians in providing an accurate and clear picture of cell phone thumb-related repetitive strain injuries that will be very helpful in guiding clinicians make the appropriate diagnosis so that the appropriate intervention can be provided.

Significance of the Study

A major significance of this study is to provide baseline information on RSI-related mobile phone injuries. This research is intended to use this information in the field of physiotherapy and other rehabilitative fields related to this issue such as Occupational Therapy for instance. If the purpose and significance of this study was satisfied, the results can be used in further studies and may be used for the description of RSI. Furthermore, physiotherapists will be able to significantly realize their importance in the prevention of soft tissue injuries and the major role they play in preventive rehabilitation.

Secondly, this study will benefit the students of Ahlia University in relation to early identification of RSI. It will enable students identify their condition at its earliest stage. In addition, the study will improve the students' awareness which will positively result in the prevention as the students will be aware of measures that need to be undertaken to reduce the onset of RSI.

Thirdly, mobile phone designers will be aware of features in their respective designs that may promote the occurrence of RSI. Results of the project may be shared with them so that the findings will be taken into consideration in designing the mobile phones which will enable the users to feel more comfortable in using these devices. Thus, the incidence of RSI will be reduced among the users of the mobile phones.

Lastly, the researchers will greatly benefit from this project since it can assist them in continuing the studies regarding this condition. It will encourage other interested researchers to conduct similar studies aimed at fully exploring mobile-phone related RSI conditions so that an evidence-based approach to management can be effectively carried out.

METHODOLOGY

Qualitative research methodology provided the framework for this study. A survey-using questionnaire was done because specific information about the signs and the symptoms in relation to incidence of mobile phone-related RSI injuries among Ahlia students were obtained. The goal of undertaking this survey was to gather information on the clinical presentation of this condition which will serve as a basis for baseline information for future researches and early detection of the condition.

This study was conducted among selected male or female students of Ahlia University who were registered either as full-time or part-time students. The subjects were targeted for this research were students between 17-31 years of age regardless of the college they are enrolled in, gender, civil status, religion. The students must be between first to fourth year levels.

The respondents chosen for this study must use a postpaid mobile phone subscriber and must be complaining of symptoms related to RSI as either localized or diffused. Respondents were also selected regardless of the duration of use of their respective mobiles, the type of mobile usage and the habits related to mobile phone usage. The subjects were conducted randomly from the different colleges of Ahlia University as the following: College of Arts, Science and Education,

College of Business and Finance, College of Information Technology, College of Engineering, and College of Medical and Health Sciences. Ahlia University, it is the first private university in Bahrain, where it is located in Manama City.

Convenience sampling was carried out in obtaining the respondents for this research since subjects were chosen based on their availability for this research. The convenience sampling method is the most appropriate particularly for researchers with restricted time and resources and can legitimately be used provided its limitation were clearly and stated. The target number of respondents intended for the study totaled. The survey was approved for implementation by the President of Ahlia University, the Dean of the College. The whole group distributed the survey on the subjects after assuring them that the survey was approved by the department of physiotherapy. A pilot test was conducted among a similar population which highlights the same characteristics of the target group of this survey. After results of the pilot study were obtained, changes were made to facilitate easier understanding of the survey questionnaire. Minor revisions were made in a few items before the final draft was distributed to the target respondents; Brief information about the content of the survey was administered to the subjects. The questionnaires were collected from the subjects and the data were analyzed and interpreted.

Instrumentation

The format of the different parts of the survey used were based on a 4-part questionnaire that was developed and designed to determine significant demographic information that are perceived to be relevant to signs and symptoms attributed to RSI. The first part of the questionnaire inquired on the

demographic profile of the respondents. Blank spaces were provided after each of the questions in order for the respondents to indicate their answers regarding their respective personal background information. The second part was to obtain information regarding symptoms experienced on the thumb after prolonged mobile usage. A checklist was provided where respondents can provide more than one answer. The third part was formulated to obtain data on the extent of hand disability. Respondents were asked if disabilities were present with the use of a checklist after which blanks were provided to record Range of Motion (ROM) and Manual Muscle Testing Grade (MMT) if there is the presence of limitation of range of motion or muscle strength respectively. Likewise, questions were made as to specific activities related to Activities of Daily Living (ADL). The last part was designed to obtain data regarding the perceived factors associated with thumb injuries according to the students' personal use and ergonomic design of the mobile phone being used. A checklist was provided to obtain data to answer this objective of the research.

Once the questionnaire was finalized, a letter was written to request for approval to conduct the research from the President of Ahlia University. Also, a sample questionnaire was attached to the request letter. Upon approval was received to allow the researcher to conduct the study, the survey was conducted in the university. Questionnaires were distributed to 56 students, and 54 papers were obtained meaning that 96% of respondents were obtained. Retrieved questionnaires from subjects who did not meet the criteria were not included in the data analysis. Questionnaires that were included were coded to indicate their responses in items provided. Data

were recorded manually. Tabulation of the data was provided.

RESULTS AND DISCUSSION

According to the data gathered in this study, 22% of the respondents were aged 16-19 years, from them 18% Females and 4% Males. 67% were aged 20-23 years, 39% of them were females and 28% were males. 7% were aged 24-27 years, in which 5% were females and 2% were males. Only 4% of all respondents were 28-31 y/o, divided equally into 2% for each gender.

92% of the respondents were single, in which 59% of them were females and 33% were males. Only 7% were married, 5% were females, and the males accounted for the remaining 2%.

53% of the respondents were from the Business department in Ahlia University, 33% of them being females and 20% males. 22% of the subjects were from Physiotherapy department, 18% of them were females and only 4% were males. As for the Public Relations department, there were only 2% of respondents, which were males. In addition, there were 16% of the

Demographic		Male		Female		Total	
		n	%	n	%	n	%
Age	16 -19	2	4%	10	18%	12	22%
	20 – 23	15	28%	21	39%	36	67%
	24 – 27	1	2%	3	5%	4	7%
	28 – 31	1	2%	1	2%	2	4%
Civil status	Single	18	33%	32	59%	50	92%
	Married	1	2%	3	5%	4	7%
Department	Business	11	20%	18	33%	29	53%
	Physiotherapy	2	4%	10	18%	12	22%
	Interior design	0	0	0	0	0	0
	Public Relations	1	2%	0	0	1	2%
	IT	5	9%	4	7%	9	16%
	Engineering	0	0	2	4%	2	4%
Year level	1 st	1	2%	5	9%	6	11%
	2 nd	5	9%	9	17%	14	26%
	3 rd	7	13%	12	22%	19	35%
	4 th	6	11%	8	15%	14	26%
Handedness	Right	13	24%	30	56%	43	80%
	Left	6	11%	4	7%	10	18%

respondents from the IT department, from which 7% were females and 9% were males. There were also 4% from the Engineering department, which were all females.

Amongst the respondents, there were 11% 1st yrs, 9% females and 2% males. As for the 2nd yr respondents, they accounted for 26% of the total sample, in which 17% were females and 9% were males. Regarding the 3rd yrs, they accounted for 35% of the respondents, 22% of them being females and 13% being males. Also, 26% of the respondents were 4th yrs, 15% of them were females and 11% were males.

As for the handedness of the subjects, 80% of them were Right handed (56% females and 24% males), and only 18% were Left handed (7% females and 11% males).

According to the literature, one study sampled 320 subjects which were teenagers (Karim,

2009). However, another study included the age group of 17-25 yrs in their study, and they sampled 110 subjects (Balakrishnan and Yeow, 2008).

One study sampled 12 college students, 11 of them being right handed, 11 females and one male, and aged between 19 to 24 years (Peper and Lin, 2009). Al-Otaibi (2001), reported taking the demographic data of patient's age, dominant hand, and previous injuries, which were also mentioned in this study. He also reported taking other data such as previous illnesses and their treatments (e.g., collagen vascular diseases, rheumatoid arthritis, hormonal agents, oophorectomy, diabetes mellitus).

According to the respondents, the most significant signs and symptoms related to mobile phone use are pain in the thumb (78%), radiating pain to the wrist (22%), Joint stiffness (22%) and thumb weakness (20%).

Table 2: Distribution of Respondents According to the Clinical Presentation of Repetitive Strain Injury of the Thumb in Selected Ahlia University Students, 2011-2012 (n = 54)

Clinical Presentation	Male		Female		Total	
	n	%	n	%	n	%
Pain in thumb	10	19%	32	59%	42	78%
Tingling sensation	3	5%	6	11%	9	16%
Joint stiffness	4	7%	8	15%	12	22%
Thumb weakness	5	9%	6	11%	11	20%
Joint swelling	0	0	0	0	0	0
Difficulty in extending thumb	1	2%	5	9%	6	11%
Fatigue of thumb muscles	3	5%	5	9%	8	14%
Numbness of thumb	2	4%	5	9%	8	14%
Radiating pain to wrist	2	4%	10	18%	12	22%
Radiating pain to shoulder	2	4%	3	5%	5	9%
Radiating pain to forearm	1	2%	3	5%	4	7%

Among males, the most significant signs and symptoms related to mobile phone use are pain in the thumb (19%) and thumb weakness (9%). In females, the most significant signs and symptoms related to mobile phone use are pain in the thumb (59%), and radiating pain to the wrist (18%).

According to the literature, the most significant signs and symptoms that related to mobile phone use are the pain and tingling (52.2%) out of the 320 subjects. There were also blisters (39.1%) (Karim, 2009), which was a different finding from the ones in our study. Mitchell (2005) also documented pain, as a symptom, which was mentioned in this study. She also mentioned swelling of the tendons at the base of the thumb and wrist, symptoms not mentioned in this study. Goh and Lim (2008) also mentioned pain.

Another study (Rietveld *et al.*, 2007), also mentioned pain, numbness, weakness in hands, arms, and neck, or shoulders. Al-Otaibi S documented the location, duration, and evolution,

of symptoms, these characteristics were not mentioned in this study. However, he also documented the radiation of symptoms, which was documented in this study. Lacerda *et al.* (2005) reported pain and /or parasthesia.

One of the studies mentioned 83% of the participants having hand and neck pain. Other symptoms were muscle fatigue in the thenar muscles which was also a finding in this study, in addition to headache, impaired concentration, and memory, discomfort, and sleep interruption or disturbance (Peper and Lin, 2009). Tjepkema (2003) reported symptoms being pain, numbness, and tingling (similar to the findings in this study). Silversides (1997) reported pain and altered sensation, symptoms similar to the ones in this study, in addition to swelling and circulatory changes.

Distribution of Participants According to the Movement of the Thumb

According to the participants, there was no significant difference between the two sexes in

Table 3: Distribution of Respondents Based on the Extent of Hand Disability in Selected Ahlia University Students, 2011-2012 (n = 54)

Extent of Hand Disability		Male		Female		Total	
		n	%	n	%	n	%
Movement of thumb	Presence of limitation of thumb movement			1	2%	1	2%
	Absence of limitation of thumb movement	19	35%	31	57%	50	92%
Muscle strength	Presence of muscle weakness	2	4%	6	11%	8	14%
	Absence of muscle weakness	18	33%	25	46%	43	79%
Activities of daily living	Grooming	3	5%	1	2%	4	7%
	Buttoning and unbuttoning	3	5%	11	20%	14	25%
	Opening door knobs	9	17%	12	22%	21	39%
	Chopping vegetables	0	0%	2	4%	2	4%

relation to the movement of the thumb; the percentage of presence of limitation of thumb movement was 0% in males and 2% in females. Moreover, the percentage of absence of thumb movement was 35% in males and 57% in females. This result showed that there was no significance difference between the both genders as majority of participants in both sexes has absence of limitation in the thumb movement.

This result is despite that the percentage of females having absence or presence of limitation in the thumb is more than males.

Distribution of Participants According to the Muscle strength

According to the participants, there was no significant difference between the two sexes in relation to the muscle strength; the percentage of presence of muscle weakness was 4% in males and 11% in females. Moreover, the percentage of absence of muscle weakness was 33% in males and 46% in females. This result shows that there is no significance difference between the both sexes as majority of participants in both sexes has absence of muscle weakness.

This result is despite that the percentage of females having absence or presence of muscle weakness is more than males.

According to literature, Lacerda *et al.* (2005) mentioned the presence of abnormalities in strength, which was found to be insignificant in this study.

Distribution of Participants According to the Activities of Daily Living

According to the participants, there was no significance difference between the two sexes in relation to the ADL, the percentage of grooming being affected was 5% in males and 2% in females. Moreover, the percentage of buttoning and unbuttoning being effected was 5% in males and 20% in females. The percentage of opening the door knobs being affected was 17% in males and 22% in females. The percentage of chopping vegetables being affected was 0% in males and 4% in females. This result shows that there is no significance difference between the both sexes in the mentioned categories as the majority of the participants in all categories were not affected.

Table 4: Distribution of Respondents Based on Perceived Factors Associated with Thumb Injuries According to Your Personal Use in Selected Ahlia University Students, 2011-2012 (n = 54)

Perceived Factors	Male		Female		Total	
	n	%	n	%	n	%
Prolonged mobile use:						
0-1 hr	4	7%	11	20%	15	26%
1-2 hrs	3	5%	12	22%	15	27%
> 2 hrs	5	9%	7	13%	12	22%
Size of thumb in relation to keypad	6	11%	11	20%	17	31%
Improper posture of thumb while texting/mobile use	4	7%	5	9%	9	16%
Over use of thumb in texting	12	22%	21	39%	33	61%
Number of hours	5	9%	24	44%	29	53%
Frequency of text messages	3	5%	15	28%	18	33%

This result is evident despite that the percentage of females being affected is more than males except in grooming where the percentage in males was more.

Goh and Lim (2008), Peper and Lin (2009) and Tjepkema (2003), mentioned the presence of loss of function which is contrary to the findings in this study. Tjepkema (2003) also mentioned work disability and activity limitations.

According to the respondents in this study, the most significant factors that elicit the symptoms are overuse of the thumb (61%), followed by number of hours consumed in texting (53%), frequency of text messages (33%), and prolonged mobile use "0-1 hr (30%), 1-2 hrs (27%), and > 2 hrs (22%)".

For the male respondents, the most significant factors were overuse of the thumb in texting (22%) and size of the thumb in relation to the keypad (11%). As for the female respondents, the most significant factors were the number of hours consumed in texting (44%), followed by over use of thumb in texting (39%), frequency of text messages (28%), size of the thumb in relation to the keypad (20%), and prolonged mobile use "1-2 hrs (22%), 0-1 hr (20%), and > 2 hrs (13%)".

According to the literature, factors that were mentioned as to affect the thumb are thumb size in relation to keypad (Balakrishnan and Yeow 2008), number of hours consumed in texting (Al-Otaibi, 2001; O'Neil *et al.*, 2001; and Mitchell, 2005), frequency of text messages, and improper posture of thumb while texting/mobile use. Another factor that wasn't mentioned in our study is using a tight grip (Mitchell, 2005).

According to the respondents the most significant factors that cause symptoms are the size of keypad and shape of the keys (42%), followed by texture and material of the keys (41%), size of the phone (40%), after that keypad design (34%), finally the arrangement of the keys (22%).

For the male respondents, the most significant factor that causes symptoms is the texture and material of the keys (17%) and the keypad design (14%). However, for the female the most significant factor that causes symptoms is size of the phone and shape of the keys (31%), texture and material of the keys (24%), the size of the keypad (22%) and keypad design (20%).

According to the literature, factors mentioned as affecting the thumb were keypad design, size of keypad, shape of the keys, arrangement of

Table 5: Distribution of Respondents Based on the Perceived Factors Associated with Thumb Injuries According to Ergonomic Design of the Mobile Phone Used in Selected Ahlia University Students, 2011-2012 (n = 54)

Perceived Factors According to Ergonomic Design	Male		Female		Total	
	n	%	n	%	n	%
Keypad design	8	14%	11	20%	19	34%
Size of keypad	11	20%	12	22%	23	42%
Size of phone	5	9%	17	31%	22	40%
Shape of the keys	6	11%	17	31%	23	42%
Arrangement of keys	4	7%	8	15%	12	22%
Texture and material of the keys	9	17%	13	24%	22	41%

keys, and texture and material of the keys. (Balakrishnan and Yeow, 2008).

CONCLUSION

This study was conducted to determine the clinical presentation of mobile-phone related repetitive strain injuries of the thumb among selected students of Ahlia University according to its symptomatology and signs, the extent of hand disability related to these injuries according to range of motion of the thumb, muscle strength of the thumb and performance of ADL requiring the use of the thumb, and the possible factors associated with these injuries according to personal usage and ergonomic design of mobile phone involved. It is concluded that the clinical presentation of mobile phone-related repetitive strain injuries of the thumb among selected students of Ahlia University according to the highly percentage of signs and symptoms of both genders are pain in the thumb, then radiating pain to wrist, after that joint stiffness and thumb weakness, followed by tingling sensation, next fatigue of thumb muscles and numbness of thumb, then difficulty in extending thumb, after that radiating pain to shoulder, followed by radiating pain to forearm. Regarding the extent of hand disability related to these injuries according to range of motion of the thumb, muscle strength of the thumb and performance of ADL requiring the use of the thumb is insignificant. As for the factors associated with these injuries according to personal usage are most likely to be overuse of the thumb in texting, number of hours consumed in texting, frequency of text messages and prolonged mobile use, while the ones according to ergonomic design of mobile phone involved are size of the keypad, shape of the keys, texture and material of the keys, size of the phone, and the keypad design.

RECOMMENDATIONS

Depending on the results of this research, the researchers have concluded that the studies regarding the problems associated with the issue of this research can be highly developed if some points are taken into consideration. In this research, the researchers agree that some circumstances negatively affected their research and can be avoided in the future if other researchers were interested in this topic.

In future studies regarding this topic, it is preferable that the time specified for the research will be expanded. The time specified for this research is considered too short compared to other researches worldwide. The researchers recommend that the time of researching in such issues should be 7-8 months unlike the time of this research which did not exceeded 3 months.

Moreover, this research was confined within the students of Ahlia University. This fact can be a strong detector regarding the limitation of this research. It is recommended that the study would expand to include more individuals from other universities and institutions.

In addition, due to the fact that confining the research within the students of Ahlia University is one of the factors of limitation in this research, the number of males included in this study was less than the number of females. This is because the number of females in Ahlia University is more than the number of males. The researchers recommend that in further studies an equal number of both sexes would be taken. The number of participants who are left handed should also be equal to the number of right handed participants as it is fewer in this research.

An important point that was a limitation factor in this research as well is that the category for

the amount of time using the mobile phone was in range. The study did not include studying the exact amount of time an individual uses his/her mobile phone in. Further studies can do so by excluding the range of time and substituting it with a space for the individual to write the exact amount of time he/she uses his/her mobile phone device in.

The points mentioned above were recommendations for future researches in relation to the limitations that the researchers of this research have faced. Other points related to how this research can be developed in the future regardless the limitations should be taken into consideration.

One of these points that can be emphasized is that that researchers who are interested in this topic can develop more into the research by including different types of devices with different designs that can increase or decrease the thumb symptoms or have more of fewer risks for such symptoms. This is because including different designs of devices in future researches and comparing it with the designs of the devices that were under study in this research is of significance. This is important because many results will be concluded depending on such comparison.

One of the common things nowadays is that many people use more than one mobile phone. This is due to the competition between the mobile phones companies in which they make lots of offers and this thing encourages the people to have more than one mobile phone. Due to this fact, the researchers recommend that in future, researches related to this research can include studying the fact that the use of more than one mobile phone can develop and increase the symptoms.

Finally, it is preferred that the mentioned recommendations will be applied in future researches as this will contribute to the existing information to this project. Adding more ideas would also be beneficial and effective in further researches.

The recommendation for the people who has high usage is to use the touch screen or keyboard mobiles which have these features in order to reduce the repetition of extension and flexion of the thumb to find the correct alphabet. It will be better to use smart phones which have the full dictionary in it. By entering the first or second alphabet the whole word will show up and it will reduce the flexion and extension of thumb to 50%.

The type of the keyboard and its design is very important as well due to the easy access to buttons; it recommends being big buttons so that it reduces the chance of mistakes.

The shape of the mobile must be square which is the most comfortable shape for the thumb and new mobiles which uses the voice command is a new innovation in the technology which can assist in the speed of the action and easy of the usage. In this case using the thumb will reduce its usage to 95% and therefore this will minimize the possible occurrence of repetitive strain injuries.

REFERENCES

1. Al-Otaibi S (2001), "Repetitive Strain Injury", *Saudi Med. J.*, Vol. 22, No. 5, pp. 398-402.
2. Balakrishnan V and Yeow P (2008), "A Study of the Effect of Thumb Sizes on Mobile Phone Texting Satisfaction", *Journal of Usability Studies*, Vol. 3, No. 3.
3. Devereaux J J, Vlachonikolis I G and Buckle P W (2002), "Epidemiological Study to

- Investigate Potential Interaction Between Physical and Psychosocial Factors at Work that May Increase the Risk of Symptoms of Musculoskeletal Disorder of the Neck and Upper Limb”, *Occup Environ Med.*, Vol. 59, No. 4, pp. 269-77 [abstract].
4. Damany S and Bellis J (2001), “It’s Not Carpal Tunnel Syndrome!, RSI Theory & Therapy for Computer Professionals”, Simax, Philadelphia, PA, ISBN: 0-9655109-9-9.
 5. Goh J and Lim C (2008), “Thumb Motion and Typing Forces During Text Messaging on a Mobile Phone”, *ICBME, Proceedings*, Vol. 23, pp. 2095-2098, www.springerlink.com
 6. Jameson T(1998), “Repetitive Strain Injuries: The Complete Guide to Alternative Treatments and Prevention”, Keats Publishing, Inc., New Canaan, CT, ISBN: 0-87983-802-7.
 7. Karim S (2009), “From ‘Playstation Thumb’ to ‘Cellphone Thumb’: The New Epidemic in Teenagers”, *SAMJ*, Vol. 99, No. 3.
 8. Lacerda E, Nácúl L , Augusto L , Olinto M, Rocha D and Wanderley D (2005), “Prevalence and Associations of Symptoms of Upper Extremities, Repetitive Strain Injuries (RSI) and ‘RSI-Like Condition’”, A Cross Sectional Study of Bank Workers in Northeast Brazil, *BMC Public Health*, Vol. 5, p. 107, doi:10.1186/1471-2458-5-107, <http://www.biomedcentral.com/1471-2458/5/107>
 9. Lin I M and Peper E (2009), “Psychophysiological Patterns During Cell Phone Text Messaging: A Preliminary Study”, *Appl. Psychophysiol. Biofeedback*, Vol. 34, pp. 53-57, DOI 10.1007/s10484-009-9078-1.
 10. Mitchell T (2005), “Prisoners of Handhelds: Tips for Avoiding Injuries”, www.workingwell.org/articles/pdf/Handhelds.pdf
 11. O’Neil B, Forsythe M and Stanish W (2001), “Chronic Occupational Repetitive Strain Injury”, *Canadian Family Physician*, Vol. 47, February.
 12. Pascarelli E and Quilter D (1994), “Repetitive Strain Injury: A Computer User’s Guide”, John Wiley & Sons, Inc., New York, ISBN: 0-471-59533-0.
 13. Rietveld S, Beest I V and Kamphuis J H (2007), “Stress-Induced Muscle Effort as a Cause of Repetitive Strain Injury?”, *Ergonomics*, Vol. 50, No. 12, pp. 2049-2058.
 14. Scott C (2010), “Repetitive Strain Injuries”, <http://www.eecs.umich.edu/~cscott/rsi.html>
 15. Silversides A(1997), “Confusion Surrounding Repetitive Strain Injury Highlighted at Conference”, *Can. Med. Assoc.* 71997, Vol. 156, pp. 1459-1460.
 16. Tjepkema M (2003), “Repetitive Strain Injury”, Statistics Canada, Catalogue 82-003, Health Reports, Vol. 14, No. 4.
 17. Van Tulder M, Malmivaara A and Koes B (2007), “Repetitive Strain Injury”, *Lancet.*, Vol. 369, No. 9575, pp. 1815-1822 [abstract].
 18. Verhagen A P, Karels C and Bierma-Zeinstra S M (2006), “Exercise Proves Effective in a Systematic Review of Work-Related Complaints of the Arm, Neck, or Shoulder”, *J. Clin. Epidemiol.*, 2007 February, Vol. 60, No. 2, pp. 110-117, Epub 2006 September 7 [abstract], “Ergonomic and Physiotherapeutic Interventions for Treating Work-Related Complaints of the Arm, Neck or Shoulder in Adults”, *Cochrane. Database Syst. Rev.*, 2006 July, Vol. 19, p. 3, CD003471 [abstract].

APPENDIX

Demographic Data

Name: _____

Gender: _____ Male _____ Female

Age: _____

Civil Status: _____ Single _____ Married _____ Divorced _____

Nationality: _____

Department currently enrolled in Ahlia University: _____

Yr. Level: _____

No. of years using a mobile: _____

Brand of mobile: _____

No. of years using current mobile: _____

Average number of minutes mobile is used continuously:
 _____ 5-10 minutes _____ 16-20 minutes
 _____ 11-15 minute _____ > 20 minutes

History of Trauma in any hand: _____ Yes _____ No

If yes: Which portion of the hand? _____

Was the thumb involved in the trauma? _____ Yes _____ No

How long? _____ days _____ weeks _____ months

Instructions: This self-administered questionnaire is divided into three (3) parts. The first portion of the survey aims to inquire on the symptoms experienced related to the thumb after prolonged mobile use/usage. The second part will obtain information on the presence of limitation of thumb movements, muscle strength and functional activities related to thumb use. The last part of the survey aimed to obtain information on the perceived factors that can contribute to the symptomatology of repetitive strain injuries of the thumb related to personal usage and ergonomic design of the hone being used.

Part I: Clinical Presentation of Repetitive Strain Injury of the Thumb

Instructions: Put a check before each item regarding the symptoms experienced on the thumb after prolonged mobile use/usage: You can answer more than once.

- Pain on thumb (If yes, pls. check below)
- Tingling Sensation
- Joint Stiffness
- Thumb Weakness
- Joint Swelling
- Difficulty in extending thumb
- Fatigue of thumb muscles
- Numbness of thumb

APPENDIX (CONT.)

- Radiating Pain: Wrist
- Shoulder
- Forearm

Part II: Extent of Hand Disability

Indicate with regards to the presence of the following in reference to thumb use. Check whether the following are affected:

A. Movement of thumb:

- Presence of limitation of thumb movement
- Absence of limitation of thumb movement

If presence of limitation is present, allow the researcher to measure the range of motion of the affected thumb

Affected thumb	A	P	Difference
Flex.			
Ext.			
Abd.			
Add.			

B. Muscle Strength

- Presence of muscle weakness
- Absence of muscle weakness

If presence of thumb weakness is present, allow the researcher to conduct MMT of the thumb muscles

- Thumb flexors =
- Thumb extensors =
- Thumb abductors =
- Thumb adductors =

C. Activities of Daily Living

Please check which of the following activities are affected in relation to injuries involving the affected thumb

- Grooming
- Buttoning & unbuttoning
- Opening door knobs
- Chopping vegetables

APPENDIX (CONT.)

Part III

A. Indicate using a check after item for the perceived factors associated with

1. Thumb Injuries according to your personal use

You can select more than one (1) answer. Please check these item/s.

- Prolonged mobile use (> 4 hrs.)
- Size of thumb in relation to keypad
- Improper posture of thumb while texting/mobile use
- Overuse of thumb in texting
- Number of hours consumed in mobile texting _____
- Frequency of text messages _____

B. Indicate using a check after item for the perceived factors associated with

1. Thumb Injuries according to ergonomic design of the mobile phone used

You can select more than one (1) answer. Please check these item/s.

- Keypad design
- Size of keypad
- Size of phone
- Shape of the keys
- Arrangement of keys
- Texture of keys and material of the keys



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Hyderabad, INDIA. Ph: +91-09441351700, 09059645577

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