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RESEARCH ARTICLE

DETERMINATION AND INCIDENCE OF PERSISTENT FINGER JOINT PAIN AMONG MALE COLLEGE STUDENTS DUE TO MOBILE PHONES OVERUSE.

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Keywords:-

Finger Pain, Dominant Hand, Smartphones.

Abstract

Background: Smart devices is the language of modern society and There are some health concerns associated with these technology,
Design: cross sectional study

Method: The measurement of grip and pinch strength grip was taken by dynamometer (hydraulic hand dynamometer) and the measures of pinch strength was by pinch gauge. **Result:** People who have been continuously using their smart devices more than 10 years have a significant decrease in the strength of both grip and pinch compared to those who use it less.

Conclusion: Related to the kind of Handedness, the dominant side grip strength is more than non-dominant side grip strength. There is relationship between the duration of usage smart phone and grip, pinch strength.

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Introduction:-

Cell phones are one such technology. Socially and culturally we are dealing with constant interconnectedness which may be good or bad as well as inconsiderate users who feel they should talk wherever they are regardless of the people around them. But this isn't about etiquette. This is about ergonomics. (1) The cell phone has led to some health conditions, but it wasn't until the invention of a supporting technologies: mobile data, cellular email and the almighty text message; that the repetitive stress became a real problem for most users. Text messages have some great advantages and have changed our culture. But the input method leaves a lot to be desired. Texting Thumb is a **repetitive stress injury** that affects the thumb and wrist. Pain and sometimes a popping sound are present on the outside of the thumb at or near the wrist. There can also be a decrease in grip strength or range of motion.

Cell phones are an indispensable tool in today's society. However, there are some health concerns associated with these tiny pieces of technology. We can spend hours with a phone in our grasp, whether we are talking or texting, and not think twice about what it is doing to our hands. Some of the most common conditions caused by too much cell phone use are trigger finger and 'text thumbs'. smart phone user may complains about Uncomfortable pain even if not sever. (2)

BlackBerry thumb is neologism that refers to a form of repetitive strain injury (RSI) caused by the frequent use of the thumb to press buttons on smart phones, or other mobile devices . The name of the condition comes from the Blackberry , a brand of smartphone debuted in1999. (3)

The medical name for the condition is De Quervain's syndrome and is associated with the tendons connected to the thumb through the wrist. Causes for the condition extend beyond smart phones and gaming consoles to include activities like golf, racket sports, and lifting. (4)

Work-related musculoskeletal disorders (WMSDs) of the upper extremities (UE) are common and potentially disabling, yet preventable. WMSDs comprise a heterogeneous group of diagnoses which include numerous specific clinical entities, including disorders of the muscles, tendons and tendon sheaths, nerve entrapment syndromes, joint disorders, and neurovascular disorders. In 1994, 332,000 musculoskeletal disorders due to repeated trauma were reported in United States workplaces, representing nearly 65% of the occupational disease cases. (4)

The popularity of text messaging or SMS on mobile phones has given rise to a new injury called text Messaging injury. TMI is a form of Repetitive strain injury (RSI) which is described by pain associated with loss of function in a limb resulting from repetitive movement or sustained static loading. TMI is normally caused by overuse of thumb during text messaging on mobile phone. Besides TMI, there are other terms, such as Blackberry thumb and Gamers thumb, to describe RSI related to wire-less hand held and video games devices. The research into the effects of text messaging on the thumb and related fingers has been limited. Most RSI research concentrated on computers since keyboard users or office workers have been identified to have high levels of job discomfort. It has been found that upper extremity musculoskeletal disorder, such as carpal tunnel syndrome CTS are associated with computer keyboard usage. Factors contributing to CTS and job discomfort were found to be related to speed and force of keyboard operation. Text messaging usually involves the use of thumb of one hand to type on phone keypad.

The movement of the thumb covers motion in planes of flexion – extension, abduction –adduction and opposition. These motions occur simultaneously in three dimensions and as a result, it is difficult to determine the kinematics of the thumb. Measurements of thumb motion have been made in earlier researches using marker based optical motion capture system, goniometry and fluoroscopy. TMI is affecting more and more children and young adult due to excessive text messaging. The objective of the study was to determine the thumb motion and typing forces on keypad of mobile phone during text messaging. (5)

The hands are essential for most occupational and daily living activities. Pain and loss of hand movement-related functions decrease the patient's ability to perform manual tasks and diminishes the patient's quality of life. (6-8) Women are more vulnerable than men to the effects of hand problems on their daily activities. (7)

The prevalence of hand pain in the general population varies between 12% and 32%. (7-8) Depending on the definition of the symptoms (severity and duration). The prevalence of hand pain seems to increase with age. (10-12)

The incidence of hand pain was 22% among a group of older adults, and women reported higher incident hand pain than men, with little influence of age on hand pain. (8) Among the other risk factors that may contribute to hand pain are occupational loading and overuse of the hand. (13-14)

The biomechanical factors related to the differential use of the hands and their joints may also play a role in the development of pain. The forces generated by diverse hand activities produce different loads on the finger joints. A biomechanical analysis of finger joint load showed that fine pinch grip resulted in greater loads than power grip. (15)

Previously, we have shown that pain is more common in the right than the left hand, in the thumb, index, and middle fingers compared with the little finger, and in the inter phalangeal (IP) joints compared with the metacarpophalangeal (MCP) joints. (16)

Objectives:-

The purposes of this study was to determine if there is effect of prolonged use of smartphone on hand grip strength and pinch strength and the pain related to overusing of phones. This study aimed at students of the University of Hail.

Methodology:-**Subjects:-****Inclusion criteria:-**

This study was conducted to 120 students from Hail university in KSA participated from various departments aged between 18-27.

Exclusion criteria:-

Cases having past history of fracture or intractable disease of hand and general weakness were removed from this study.

Procedure:-

Type of handedness determination and the Time from Using smart phones was conducted through questionnaire which consisted of a total 16 question items. Grip and pinch strength was measured with dynamometer (hydraulic hand dynamometer), pinch strength was measured using pinch gauge (pinch gauge) and assessed pain by numeric scale. The subjects were seated with their knee flexed 90° and back rested on chair, shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm in neutral position, and wrist 0-20 flexion. The thenar group of muscle is rested on the handle of hand dynamometer.

For each strength test the scores of three successive trials were recorded for each hand.

Equipments:-

The standard, adjustable-handle dynamometer, reported as the most accurate for measuring grip strength, was used. For standardization, it was set at the second handle position for all subjects. The dynamometer was lightly held around the readout dial by the examiner to prevent inadvertent dropping. The pinch gauge, used to measure key pinch was held by the examiner at the distal end to prevent dropping. Scores were read on the needle side of the red readout marker. The calibration of both instruments was tested periodically during the study.

Data analysis:-

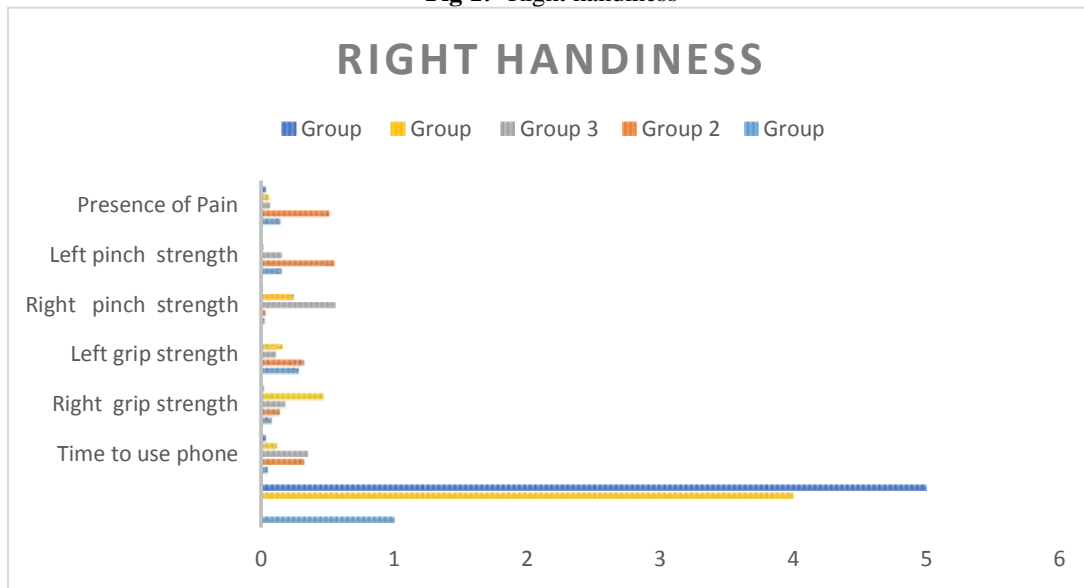
SPSS version 16 was used for data analysis. Descriptive data was calculated, The percentage of type of dominant hand, grip and pinch strength for both right and left hand and pain scale.

Results:-**Table 1:-** Duration of usage:

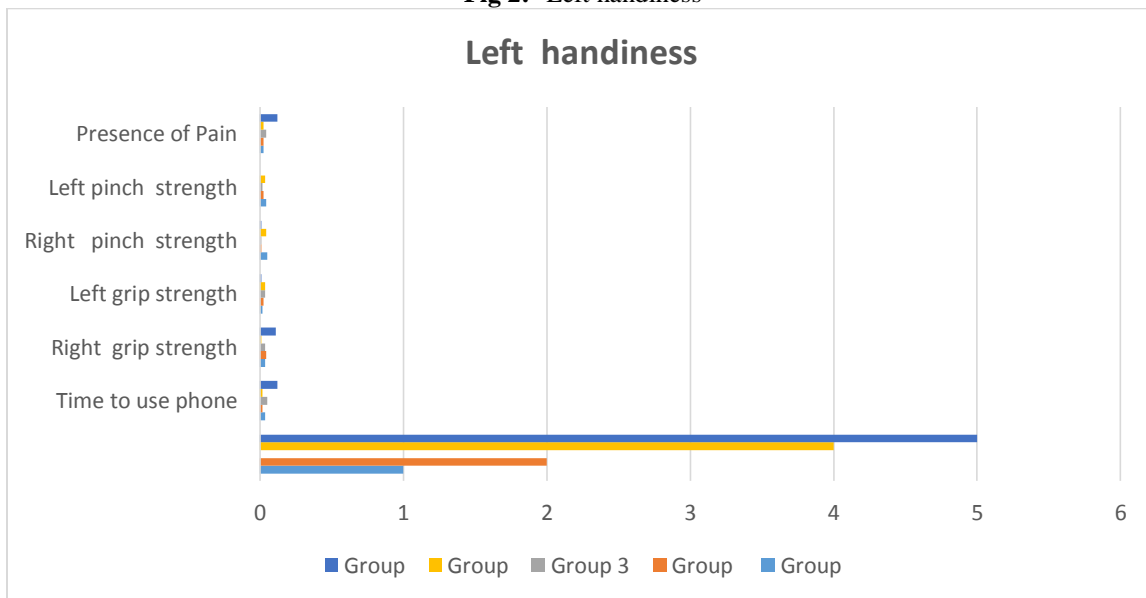
Group 1	1-2 years
Group 2	3-4 years
Group 3	5-6 years
Group 4	7-9 years
Group 5	Up to 10 years

Table 2:- (Right handiness)

Right handiness	Group 1	Group 2	Group 3	Group 4	Group 5
Time to use phone	% 5.13	% 32.48	% 35.04	% 11.97	% 3.42
Right grip strength	% 7.69	% 13.68	% 17.95	% 47.01	% 1.71
Left grip strength	% 28.21	% 32.48	% 11.11	% 16.24	% 0.00
Right pinch strength	% 2.56	% 3.42	% 55.56	% 24.79	% 0.85
Left pinch strength	% 15.38	% 54.70	% 15.38	% 1.71	% 0.00
Presence of Pain	% 14.53	% 51.28	% 6.84	% 5.98	% 3.42

Fig 1:- Right handiness**Table 3:- (Left handiness)**

Left handiness	Group 1	Group 2	Group 3	Group 4	Group 5
Time to use phone	% 3.4	% 1.7	% 5.1	% 1.7	% 12
Right grip strength	% 3.4	% 4.3	% 3.4	% 0.9	% 11.1
Left grip strength	% 1.7	% 2.6	% 3.4	% 3.4	% 0.9
Right pinch strength	% 5.1	% 0.9	% 0.9	% 4.3	% 0.9
Left pinch strength	% 4.3	% 2.6	% 1.7	% 3.4	% 0.00
Presence of Pain	% 2.6	% 2.6	% 4.3	% 2.6	% 12

Fig 2:- Left handiness**In Right Handedness:-**

Highest score of Right grip is 47.01% is 56-70 pounds

Highest score of Right pinch is 55.56% up to 12 pounds

Highest score of Left grip is 32.48% 26-40 pounds

Highest score of Left pinch is 54.70% 6-8 pounds

In Left Handedness:-

Highest score of Left grip is 6.8% represent 41-70 pounds

Highest score of Left pinch is 4.3% represent 3-5 pounds

Highest score of Right grip is 11.1% represent up to 70 pounds

Highest score of Right pinch is 5.1% 3-5 pounds

Discussion:-

Readings in correspondence with duration of usage graph -1:-

People who have used of smart devices for more than 10 years have a significant decrease in the strength of the grip and pinch both compared to those who use it less. The rate of pain in this group is from 3-5 regarding to numeric rating scale and termed as mild to moderate pain. Followed by groups of 3-4 and 5-6 years which were somewhat similar in readings.

The first group from 1-2 years recorded the highest readings, which is the normal range for the strength grip and pinch both.

Related to the kind of Handedness graph -2:-

in this study show people how right-handedness and grip pinch is more powerful compared to those who have left-handedness,

but can cause a number of R handedness in this study represent 105 and L handedness 15 subject only may helped in the incorrect judgment.

Generally, the dominant side grip strength is more strong than non- dominant side grip strength . (19)

There are a dominant side hand have 30% more strong than a non-dominant side hand but normally it is strong about 5-10%. there are a dominant side have 5-7% more strong grip and pinch than a non- dominant side hand in the type of right hand. there are not difference in the type of left hand Be very aware of stiffness, sharp pain or dull ache, numbness or tingling, or poor grip, which may come on after a heavy session on the computer using either the keyboard or the mouse, or when using a pen, or with thumb movements when using a Games Console, or when texting on a mobile phone. (20-21)

Try to take breaks between hand activities, of a few minutes each half-hour or ten minutes each hour. Massage your hands and arms to restore the circulation and refresh the muscles and tendons. Flex your fingers, and stretch your arms out to the side, above your head, then to your sides, keeping your spine straight. This applies at home or at school – if possible Do warm up exercises the same as when you do before. Gentle exercise can only help.

Conclusion:-

We conclude from this study Increased the duration of using of smart devices reduces the grip and pinch strength . Strength of Dominant hand is more than that of Non-dominant hand .

Limitations & Suggestions:-

Recommendations:-

Checklist for Mobile Using Be aware that by using a mobile phone and holding it in one hand, with that hand in a claw position, and when moving the thumb rapidly over the keypad , puts an enormous strain on tendons in the hand and arm.

In between , massage your hand and thumb, and rotate your hands at the wrists, in clockwise and anticlockwise directions. If it already hurts to text, use the fingers of the other hand or the end of a pen to press the keypad, reduce using your phone, and get medical help.

Keep a diary of any aches and pains, and when, and for how long you use the equipment.

But remember – prevention is better than cure – you only have one body & one life.

For Future Researchers:-

Use a larger segment of participants, both males and females and compare between them from different ages. and record the most important differences. And record other combination of differences including examination of various pinches and grasps.

Limitations:-

Due to lack of awareness regarding proper physiotherapy techniques which can avoid the repetitive strain injury RSI the number of participants in this study were 120 only .

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