

Clinical and Ultrasonic Evaluation of the Thumb: Comparison of Young Adults With and Without Thumb Pain With Text Messaging

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ABSTRACT

Objective: The aim of this study was to compare clinical and ultrasound findings of thumb joints in young adults with and without thumb pain associated with text messaging.

Methods: In this case-control study, 117 students with thumb pain associated with text messaging were evaluated clinically and with ultrasound analysis of the thumb. Age- and sex-matched controls received ultrasound evaluation to note any subclinical changes.

Results: Clinical examination in the cases identified tenderness most commonly in the metacarpophalangeal joints, followed by the carpometacarpal joints, and then the interphalangeal joints. Tenderness was noted in the web space and the anatomic snuff box. Hypermobility on the Beighton scale was recorded as 2. Grind tests were positive in 21% of participants. Grip strength did not differ, but lateral and tip pinch strength were significantly reduced in the cases compared with controls. Fluid was detected in the metacarpal joints by ultrasound but not in the carpometacarpal or interphalangeal joints. No changes were detected in the controls.

Conclusion: Clinical examination indicated involvement of all joints of the thumb, but ultrasound evaluation could identify changes only in metacarpal joints, indicating signs of possible subclinical changes taking place in the thumb in these participants as a result of repetitive use. (*J Manipulative Physiol Ther* 2018;41:199-207)

Key Indexing Terms: *Thumb; Metacarpophalangeal Joint; Carpometacarpal Joints*

INTRODUCTION

The increasing use of text messaging on mobile phones has focused concern on possible musculoskeletal disorders for the mobile phone users. The human body is well adapted to repetitive movement, and the upper limbs, although often considered vulnerable in this regard, are no different. This only becomes a potential problem when the repetitive action is continued for overly extended periods, or where

substantial force is applied, or where the activity is carried out with parts of the upper limb in awkward postures. The operation of mobile phone keys is often and usually carried out using just the thumbs of each hand, but these are not as well designed for fine manipulative or dexterous work as are the fingers.¹ With repetitive movement as in text messaging on the mobile phones, both soft tissues and joints can be damaged.^{2,3} It has been reported that high force at the joints is linked with increased flexion at the interphalangeal (IP) and metacarpophalangeal (MCP) joints.⁴ Only 1 study has reported involvement in arthritis or subluxation with excessive use of mobile phone for texting.⁵ These problems of thumb have been recognized by several physiotherapy associations around the world and by mobile phone operators.⁶⁻⁸

Thumb pain has also been reported in manual physical therapists and hand therapists as a result of the pressure applied during various techniques during treatment.⁹⁻¹³ Repetitive movement of the thumb in text messaging can cause thumb pain and cases of thumb pain have been reported,¹⁴⁻²³ but no scientific study has been done to evaluate the joint involvement in participants with thumb pain because of excessive text messaging. The aim of the

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Paper submitted January 6, 2017; in revised form November 2, 2017; accepted November 22, 2017.
0161-4754

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<https://doi.org/10.1016/j.jmpt.2017.11.001>

present study was to evaluate and compare the joints of the thumb in young adults with and without thumb pain with text messaging.

METHODS

Ethics

The case-controlled study was approved by the Institutional Research Committee and the Institutional Ethical Committee of KMC Mangalore, Manipal University, Mangalore, Karnataka, India.

Participants

Students in the age group 18 to 29 years of both sexes using a cell phone were included for a survey to identify those students with symptoms in the upper limb with text messaging on the mobile phones.²⁴ Those who complained of pain in the thumb because of texting were selected for further evaluation of the thumb.

Students who had recent injury (<6 months) to the hand or upper limbs and those experiencing any inflammatory, degenerative, or neuromuscular conditions of upper limbs affecting the usage of limb for activities of daily living were excluded from the survey. Among the students who had thumb pain and were selected as cases, exclusion criteria were established by a personal interview with these students to exclude other causes of thumb pain such as recreational activities involving hand and computer keyboard usage.

Age- and sex-matched controls were selected from the students who were regular users of mobile phones but with no complaint of thumb pain. Participants gave informed consent for the evaluation themselves.

Instrument

A structured questionnaire was specially devised for the study. It included general questions that covered demographic information, the mobile phones used, and the duration of use. Questions were devised to identify the purpose for which the students used the phone frequently—for example, messaging, playing games, surfing the internet—because this could have implications regarding the causative factor. Information was collected regarding thumb pain (site of pain, severity of pain, type of pain, and duration of pain) with mobile phone use.

Procedure

The questionnaire was given to 1500 students to find the prevalence of thumb pain. Sample size was calculated using the formula $4pq/L^2$, where $p = 21$ (prevalence of symptoms from the pilot study), $q = 79$ ($100 - 21$), and $L = 10\%$ of p (90% power of the study). According to this formula, the sample size was calculated as 1504, which was rounded off

to 1500. Of these, 1363 questionnaires were returned. There were 133 students (10%) who reported pain in the thumb that they attributed to excessive mobile phone use. None of the students reported excessive writing, which could have also caused pain. These students were then included, based on the inclusion and exclusion criteria, for clinical and ultrasound evaluation to document the clinical findings and possible clinical or subclinical changes in the thumb. The controls underwent ultrasound evaluation to detect any subclinical changes with excessive use of mobile phone because there were no clinical signs present. No clinical examination was done for the control group.

The cases and the controls were selected from the survey of 1500 students. After the initial survey all the students who complained of thumb pain were contacted and asked to participate in the study for clinical and ultrasound evaluation. A total 117 students consented. An equal number of students who used the mobile phones but did not complain of thumb pain were contacted to participate as controls. Of these 107 students underwent ultrasound evaluation; the other 10 refused ultrasound evaluation.

Measurements

Clinical. The physical examination included inspection for any change in color or localized swelling. We checked for tenderness at the joints of the thumb²⁵ and recorded active and passive movements of thumb. The Beighton 9-point scale for hypermobility measured the generalized ligament laxity. Special tests like the grind test were done to identify carpometacarpal (CMC) joint involvement.²⁵ Handgrip strength for both dominant and nondominant hands was measured with a JAMAR Adjustable Hand Dynamometer (Sammons Preston, Bolingbrook, Illinois) with the patient seated, shoulder adducted, and elbow flexed to 90° at position number 2 in the dynamometer.²⁶ A JAMAR Hydraulic Pinch Gauge (Sammons Preston) measured lateral and tip pinch bilaterally between thumb and index finger.²⁷ A Disabilities of the Arms, Shoulder, and Hand (DASH) questionnaire measured manual functions of the participants. Pain was recorded using the Numeric Pain Rating Scale (NPRS). The NPRS is an 11-point scale from 0 to 10 where 0 = no pain and 10 = the most intense pain imaginable. Students verbally selected a value most in line with the intensity of pain they have experienced. The NPRS has good sensitivity while producing data that can be statistically analyzed.²⁸

Ultrasound Evaluation. Ultrasound evaluation was done for all the cases and the controls. A radiologist with special interest in musculoskeletal imaging carried out ultrasound evaluation by using a Voluson 730 Expert Series ultrasound machine (with 3-dimensional and 4-dimensional capabilities) with a high-frequency probe of 12 MHz for dedicated muscular skeletal imaging of the small joints of the thumb for any initial involvement of the joints.²⁹

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