Matrix Rhythm Therapy on Forearm pain in excessive smartphone users

Dr. Tushar J. Palekar¹, Maithili K. Kothimbire²
¹Professor & Principal, ²Post-Graduate Student
Dr. D. Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune, India

Received: 10 May  Revised: 18 May  Accepted: 26 May

Abstract

Background: Matrix Rhythm Therapy is a new concept which claims to be effective in pain management and musculoskeletal disorders by restoring normal physiological cell functions by oscillating at a rhythmic of 8-12 Hz frequency, working at the cell structural level causing tissue relaxation by improving micro circulation and oxygen supply.

Introduction: In modern society, smartphones are one of the necessities but excessive use of smartphone is a potential risk factor that would threaten the health of the musculoskeletal system. Incidence of hand and forearm pathologies in the younger population has increased due to the extensive use of smart phones. Leading to thenar eminence, extensor pollicis longus, brachioradialis, extensor carpi radialis longus and brevis muscle pain.

Methodology & Results: 125 samples were screened using smartphone addiction scale – short version and “my addictometer app” out of which 32 samples were conveniently selected according to inclusion criteria. These participants were given matrix rhythm therapy on the extensor compartment of forearm and thenar eminence of thumb for 3 sessions in a week on alternate day. Pre-& post outcome measures were taken using visual analog pain scale (VAS) and pressure pain threshold algometer. Results showed significant improvement in pre-& post measures of VAS on activity (p<0.001), pressure pain threshold of thenar eminence, extensor pollicis longus, brachioradialis, extensor carpi radialis longus and brevis (p<0.001).

Conclusion: Matrix rhythm therapy has proven to be effective in reducing myofascial pain in students using excessive smartphone. It is found to be statistically highly significant, showing improvement in the pain outcomes measured by VAS and pressure algometer.

Key Words: Smartphone, Texting, Matrix Rhythm Therapy, Forearm and thumb pain.

Introduction

In modern society, smartphones are one of the necessities for many people. (2) Texting is the most widely used activity for socializing, with 74% of all smartphone users worldwide being active users of it. (2) Research reports an adverse effect on the physical health of the users of smartphone. (2,3) The incidence of musculoskeletal disorders of hand, wrist joint, forearm, arm and neck has been increasing all over the world due to prolonged, forceful, low amplitude, repetitive use of smartphones. (2,4,5) Sustained gripping and repetitive movements with the thumb and fingers have all been identified as risk factors which may lead to musculoskeletal disorders of the thumb and thumb musculature in the forearm. (2) Static loading by constant holding of the phone and an overuse of the hand muscles leads to myofascial pain syndrome of
hand and forearm muscles. (2,4) The forearm muscles are closely related to the position and movement of the thumb, and these muscles are continuously stimulated during the use of smartphones. (1)

In a diseased or injured state, the muscles have reduced tissue mobility, which leads to increase in contraction of the muscle fibers. This leads to disruption in the oscillating frequency of the cells. In an injured state the cells have less space to oscillate which leads to an energy crisis at the cellular level, which means there is less amount of oxygen and nutrients reaching the cell. The increase in metabolites causes the pH level of the extra cellular matrix to become acidic. Due to the accumulation of metabolite and acidic pH the muscle becomes taut and goes into a state of spasm.

Matrix rhythm therapy (MaRhyThe) is a therapy to restore normal physiological cell functions to enhance healing in musculoskeletal problems. Matrixmobil is a specially designed resonator to produce mechanical-magnetic pulsations. These pulsations gently and harmoniously induce the cells to accept again their own analogue oscillations, i.e. a frequency ranging between 8-12 Hz, resulting in improved supply of oxygenated blood and nutrition through extra cellular matrix. Elimination of waste products, acids and gases takes place. Improved active cellular transportation results in production of energy in the form of ATP henceforth healing and regeneration is set in motion. (7) A few studies and clinical experience indicate the effectiveness of MaRhyThe. However, the level of evidence of these studies is low. To explain the therapeutic effectiveness of MaRhyThe, its effect on pain in forearm in excessive smartphone users should be investigated. (8)

**Methodology**

This was an experimental study conducted at Dr. D. Y. Patil College of Physiotherapy OPD, Pimpri, Pune after receiving the ethical approval from the institutional ethical committee. The procedure, benefits and potential risks of study were explained to the subjects. Written Informed consent was taken from the participant meeting the inclusion criteria and the willingness to participate. Inclusion criteria: unilateral pain in forearm, dominant and non-dominant hand, age 19 to 30 years, both males and females, using smartphone for more than 3 hours per day, short version of smartphone addiction score >25. Exclusion criteria: any surgical procedures done on treatment upper limb, any bone related pathology in the upper limb, metal implants in the upper limb, wound, ulcer, skin sensitivity, any other neurological deficit. 125 participants were screened on basis of Smartphone Addiction Scale: Short Version to assess the addiction towards smartphone. The participants having the score more than 25/60 were included in the further study which turned out to be 75 participants. These participants were told to install My Addictometer application in their smartphone, the participants using their smartphone for more than 3 hours per day were further screened for forearm and thumb pain on palpation. The participants having forearm or thumb pain were included for further intervention. 32 participants including dropouts were given the intervention. Outcome measures were pain using visual analog scale at rest and on activity, pain threshold using pressure algometer. There was no blinding done, the assessment and the intervention was performed by the same investigator. Participants were comfortably positioned on the treatment plinth with treatment hand placed over the pillow with elbow flexed to 90 degrees and forearm in prone for extensor group of muscles followed by forearm in mid-prone position for brachioradialis muscle keeping the wrist in neutral position; and forearm in supinated position to treat the thenar eminence. Pre-intervention readings were taken using the above outcome measures. Powder was applied to avoid friction and smoothen the movement between the head of matrixmobil and skin. After which patients received matrix rhythm therapy.
in a perpendicular direction of the muscle fibers with small amount of pressure applied on the vibrator head and rotating the apparatus so as to modulate the intensity and depth of treatment area; for 20-30 minutes as per the patient’s pain severity, covering proximal forearm muscles (targeting brachioradialis, extensor carpi radialis longus and brevis, extensor pollicis longus) and thenar muscles. Post- intervention readings were taken using the same outcome measures. Intervention was given for 3 sessions on alternate day basis for a week.

**Statistical analysis**

The data collected was entered in Excel sheet and statistical analysis was done using Winpepi software (Version 11.65) and Primer software (Version 7.0). Parametric Paired t-test was used to compare quantitative outcomes for normally distributed data. Non-Parametric Wilcoxon Signed Rank test was used to compare quantitative outcomes for not normally distributed data.

1. **Mean difference in intensity of pain at rest and on activity, pre and post treatment using visual analog scale.**

<table>
<thead>
<tr>
<th>VAS</th>
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<th>p-value</th>
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<td>POST</td>
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<td>0.00</td>
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<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>DIFF</td>
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<td>2.10</td>
<td>2.09</td>
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**Table no.1:** Shows that there was statistically no significance (p<0.062) in intensity of pain at rest and there was significant (p<0.001) decrease in intensity of pain on activity.

**Graph no.1** Shows decrease in the level of pain at rest and on activity.

2. **MEAN DIFFERENCE IN PRESSURE PAIN THRESHOLD OF THENAR EMINENCE, EXTSNOR POLLCIS LONGUS, BRACHIORADIALIS, EXTENSOR CARPI RADIALIS LONGUS AND BREVIS**
**Table No. 2.1:** Mean Difference in Pressure Pain Threshold of Thenar Eminence, Extensor Pollicis Longus

<table>
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**Table No. 2.2:** Mean Difference in Pressure Pain Threshold of Brachioradialis, Extensor Carpi Radialis Longus and Brevis

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<tr>
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</table>

**Table No. 2.1 & 2.2** Shows significant (p<0.001) improvement in the pressure pain threshold of thenar eminence, extensor pollicis longus, brachioradialis, extensor carpi radialis longus and brevis.

**Graph No. 2** Shows significant (p<0.001) improvement in the pressure pain threshold of thenar eminence, extensor pollicis longus, brachioradialis, extensor carpi radialis longus and brevis.
Results
There were total 32 participants, which included 25 females and 7 males having mean age 23.28 of the total participants. Out of 32 participants, 27 had right hand pain and 5 had left hand pain. The My addictometer app reviewed on weekly basis gave the following readings of 31 hours, 12 minutes of mean and median was 30 hours, 23 minutes having maximum 46 hours, 34 minutes and minimum 23 hours 40 minutes usage of the smartphone. The app on daily basis reviewed 1 hour, 51 minutes being the least smartphone usage and 9 hours, 7 minutes being the maximum usage of the smartphone. The Smartphone Addiction Scale – Short Version reviewed 36.44 mean score and median was 37 score having maximum 53 score and minimum 25 score out of 60 score.

As shown in above tables and graphs, the readings were statistically highly significant (p<0.001), in reducing the pain on activity; increasing the pressure pain threshold of thenar eminence, extensor pollicis longus, brachioradialis, extensor carpi radialis longus and brevis muscles. Reduction in the intensity of pain at rest was not statistically significant (p<0.062).

Discussion
The current study investigated the effect of matrix rhythm therapy on forearm pain in excessive smartphone users which revealed maximum participants were present in between the age group of 22-23 years. There were maximum participants with right hand pain, which was similarly investigated in previous studies. (6) A previous study showed forearm and thumb pain causing symptoms within just an hour usage per day of the mobile phone. A previous study also concluded that there was a significant positive correlation between dominant hand and musculoskeletal disorder occurring in the upper extremity. (2)

In current study there was a highly significant reduction in the intensity of pain on activity, measured by visual analog scale. The pain pressure threshold has increased in its readings having a highly significant effect on the muscles pressure pain tolerance level. The study revealed highly significant reduction in pain intensity which may be due to relaxation of the contracted or taut muscles.

Matrix rhythm therapy was compared with the conservative treatment which involved thermal therapy, exercise therapy and electrotherapy in many studies and the results revealed matrix rhythm therapy to be superior than the conservative treatment in pain reduction. Randoll and Hennig proved that matrix rhythm therapy is effective in reduction of pain by restoring physiological cell frequency. (30,32)

The My addictometer app was learned to review the addiction of smartphone in younger population. This application showed high addiction of smartphone in the young age group. The Smartphone Addiction Scale – Short Version reviewed 36.44 mean score having maximum 53 score and minimum 25 score out of 60 score. The study reviewed there is smartphone addiction in young population leading to musculoskeletal pain which is found to be effective with matrix rhythm therapy treatment giving a positive effect on reducing the pain by releasing the myofascial tissues.

Conclusion
Current study of Matrix rhythm therapy has proven to be effective in reducing myofascial pain. It is found to be statistically highly significant (p<0.005), in reducing the pain on activity and increasing the pressure pain threshold; in students using excessive smartphone.

Clinical implications
The statistical results of the study have proved matrix rhythm therapy to be effective in reducing the intensity of pain. Hence, this therapy can be used in the clinical setup for myofascial pain syndrome and
different musculoskeletal conditions where muscles are prone to become taut and go into tightness and spasm. There is no interest of conflict in the study.

**Future scope**

The effect of Matrix rhythm therapy on grip and pinch strength can be assessed after releasing the myofascial pain of forearm and thumb. The effect of MaRhyThe on musculoskeletal conditions like neck pain, caused by excessive use of smartphone can be studied. Long term effect of MaRhyThe can be assessed. Strengthening exercise protocol can be added in the intervention in further studies.

**FUNDING:** No source of funding for the study.

**Acknowledgement**

The authors are thankful to the scholars of the articles cited and used as reference throughout the study. Authors also acknowledge, the participants for the co-operation throughout the study.

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Corresponding Author: Dr. Maithili K. Kothimbire  
Post-Graduate Student, Dr. D. Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Pune 411018.  
E-mail address: maithili11594@gmail.com