Clinical features of musculoskeletal disorders due to hand-held devices

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1. Introduction

The use of hand held devices (HHD) such as mobile phones, game controls, tablets, portable media players and personal digital assistants have increased dramatically in past decade. Mobile phone users are able to communicate other than by voice by a wide range of text button usage by means of SMS (short message service), whatsapp, viber, line, BBM (blackberry messenger) and social networking applications like facebook, twitter and skype. The incidence of musculoskeletal disorders (MSD) of hand, wrist, forearm, arm and neck has been increasing all over the world due to prolonged, forceful, low amplitude, repetitive use of hand held devices. Few studies in the recent years have reported about this growing problem that has a large impact globally. Hence, this study was conducted to describe the risk factors and clinical features of the MSD's due to usage of HHD and to evaluate the effectiveness of a sequenced rehabilitation programme.

2. Methodology

It is a retrospective report analysis study. Reports of 70 subjects between the ages of 5 to 56 years, who were diagnosed to have a MSD affecting the upper extremities were analysed. Reports of a tertiary level rehabilitation centre in Bangalore, India between the years of 2005 to 2013 were reviewed for the subjects reporting musculoskeletal pain in their upper extremities following extensive usage of HHD like mobile phones, game controls and tablets. The collected reports were analysed. The subjects with symptoms were all clinically examined and diagnosed by a single orthopaedic and rehabilitation physician. A subjective questionnaire was used to collect details about hand dominance, type of HHD used, total hours of usage per day and type of activity predominantly done using the HHD. The inclusion criteria was sending a minimum of 25 text messages or emails per day, browsing the Internet or playing games for more than 1 hour per day using the HHD, which was followed by the onset of symptoms. After the diagnosis and assessment, all the patients underwent rehabilitation for 2 to 4 weeks using a sequenced protocol.

Visual Analog Scale (VAS) was used to assess the pain levels of study subjects before and after the rehabilitation. Descriptive statistics like frequency, percentage values were used to analyse the population characteristics. Sample T test was used to evaluate the effectiveness of the sequenced rehabilitation protocol. Correlation coefficient was used to describe the correlation between variables.

3. Results

Among the 70 participants, 55 were male and 15 were female. The mean age was 34.18 years. Various demographic details of the participants were presented in Table 1. Most of the subjects were using Blackberry (52.85%), followed by ordinary mobile phone (18.57%), iPhone (12.85%) and other smart phones (10%). 35.67% of the users who were diagnosed to have MSD in the present study were primary level managers and 32.85% of the subjects were senior executives of major multi-national companies.

Clinical assessment showed that for majority of the individuals, right side was more commonly affected (61%) when compared to the left side and bilateral involvement. The common symptoms reported by the subjects during examination were pain in the thumb and forearm with associated burning, numbness and tingling around the thenar aspect of the hand with stiffness of wrist and hand.

All the subjects (n=70) were diagnosed to have tendinosis of extensor pollicis longus and myofascial pain syndrome affecting the 1st interossei, thenar group of muscles and extensor digitorum communis. The commonest associated co-morbidities were myofascial pain syndrome of neck and upper back (70.37%) and thoracic outlet syndrome (51.85%). The co-morbidities are presented in Table 1.

A significant positive correlation was found between the hand dominance and occurrence of upper extremity MSDs in the studied individuals using HHD (p<0.01). After the rehabilitation following a sequenced protocol the VAS scale showed significant reduction in pain levels (p<0.01).
Table 1. Associated co-morbidities reported among the subjects

<table>
<thead>
<tr>
<th>Associated Disorder</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myofascial pain syndrome of neck and upper back</td>
<td>48</td>
<td>69</td>
</tr>
<tr>
<td>Thoracic outlet syndrome</td>
<td>34</td>
<td>49</td>
</tr>
<tr>
<td>Fibromyalgia syndrome</td>
<td>07</td>
<td>10</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>02</td>
<td>2.9</td>
</tr>
<tr>
<td>Extensor wrist tendinosis</td>
<td>04</td>
<td>5.7</td>
</tr>
<tr>
<td>De Quervain’s tenosynovitis</td>
<td>02</td>
<td>2.9</td>
</tr>
</tbody>
</table>

4. Discussion

The study found tendinosis of extensor pollicis longus, myofascial pain syndrome of adductor pollicis, 1st interossei and extensor digitorum communis in all the subjects. The posture of the thumb working near the extreme range of motion was perhaps the main triggering factor for the development of tendinosis of extensor pollicis longus as reported in our study.

References