Comparison of Development of Upper Trapezius Trigger Point in Computer Operators with or without Forearm Support

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ABSTRACT

Background: Computer work often involves both physical and mental demands. The physical demands are characterized by low-force exertions and static postures that are sustained for long durations. Elevated shoulder postures, prolonged static contractions and the task duration have been identified as computer-related risk factors for neck and shoulder problems, so this is responsible for development of trigger points particularly in the upper trapezius muscles in forearm-unsupported computer operators as compared to forearm-supported. The upper trapezius (UT) is designated as a postural muscle and is highly suspected of overuse because it works constantly against gravity to maintain an erect head and neck position. This study aims to identify upper trapezius trigger points (TrPs) developed with or without forearm support (FS) in computer operators.

Materials and Methods: The study took place in the worksite of computer operators in Nagpur, Maharashtra for 1.5 year. With a power of 90 and significance error of 1%, a total of 40 patients were taken according to the convenient sampling and divided into two categories computer operators Group A: with FS and Group B: without FS, following signs and symptoms like Trigger point, posterolateral neck and upper back pain most common in which group assessed by using, VAS (Visual Analogue Scale) for measuring pain intensity, Trigger Point Rating Scale is used for myofascial screening. Neck Disability Index for assessing the neck-related disability due to pain taken.

Result: The study was conducted on 40 people, in which 20 people with forearm support and 20 people with forearm unsupported. The result is that forearm support reduces the load on the UT and also reduces the risk of development of upper trapezius TrPs as compared to the forearm unsupported.

Conclusion: Based on the results of these studies, it has been concluded that the development of UT TrPs in computer operators without FS is more common as compared to FS.

Keywords: MTrPs (Myofascial trigger point), Trigger point rating scale, VAS (Visual analogue scale), NDI (Neck disability index)

INTRODUCTION

Myofascial Trigger Point MTrPs (Clinical definition of a Central trigger point): A hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. The spot is painful on compression and gives rise to characteristics of referred pain, referred tenderness, motor dysfunction and autonomic phenomena. TrPs are divided into two categories: Active and latent Trigger points. Latent TrPs do not cause local or referred pain until direct pressure is applied. They do not cause persistent pain; however, they restrict movement, induce early fatigue and cause loss of tissue. Active TrPs cause persistent pain even without direct manual pressure. It can result in movement.
restriction and in turns may reduce muscle strength, activity and tonicity. Latent TrPs may spontaneously become active.

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**Jump sign:** A general pain response of the patient, who winces, may cry out, and may withdraw in response to pressure applied on a trigger point. This term has been used erroneously to describe the local twitch response of muscle fibres to trigger stimulation.1

Simons et al 2 hypothesised that palpable taut bands in the affected muscles are due to excessive acetylcholine release at the neuromuscular junction (motor endplate). In this situation, continuous contraction of the muscle fibres, which is accompanied by increased metabolism and local ischaemia leads to increased secretion of sensitising substances and can subsequently cause pain and autonomic reactions such as increased sweating, vasoconstriction or vasodilation, and pilomotor activity in the muscle.3,4

Some chemical changes, such as increased levels of bradykinin, substance P, and calcitonin gene-related peptide and lowered pH, have been reported in MTrPs. Investigators established that the local oxygen saturation at an MTrP site is less than 5% of normal. Hypoxia leads to a drop in tissue pH and the release of Several nociceptive chemicals, including bradykinin, calcitonin gene-related peptide, and substance P. Local tenderness and referred pain is common with MTrPs as muscle nociceptors are stimulated in response to reduced oxygen levels lowered pH and increased inflammatory chemicals. Histologic studies have confirmed the presence of extreme sarcomere contractions, resulting in localized tissue hypoxia.5,6

MTrPs are most commonly found in the upper trapezius (UT) muscle.7

UT is designated as a postural muscle and is highly suspected of overuse8 because it works constantly against gravity to maintain an erect head and neck position.9 Any TrPs in the upper trapezius can cause neck stiffness, restricted cervical rotation and lateral flexion, shoulder elevation, neck pain and headache.10

Computer work involves physical demands, and physical demands of a job increase sustained muscle tension, particularly in the trapezius muscles such as developed myofascial pain syndrome.11

While doing work with the forearm support it generally reduces the load on the trapezius muscle, which decreases the risk of development of UT TrPs. While doing work with forearm unsupport it enhances the risk of development of upper trapezius TrPs.12

Upper trapezius TrPs consistently refer pain unilaterally upward along the posterolateral aspect of the neck to the mastoid process and are a major source of “tension neckache”. When referred pain from upper trapezius TrPs in other muscles (namely the sternocleidomastoid, Suboccipital and temporalis muscles), the resulting overlap can produce a typical tension-type headache.11

**MATERIALS AND METHOD**

The study took place in the worksite of computer operators in Nagpur, Maharashtra for 1.5 year. With a power of 90 and a significance error of 1%, a total of 40 patients were taken according to the convenient sampling and divided into two categories of computer operators Group A: with FS and Group B: without FS.

**Inclusion criteria:** Patients do work for >6 hours, work with forearm support and unsupport and those who work for prolonged periods without an interval.
Exclusion criteria: patients who recently got soft tissue injury due to trauma or another cause, have hypersensitive skin, are not willing to participate and have working experience of <6 months.

Following signs and symptoms like Trigger point, posterolateral neck and upper back pain most common in which groups for the outcome measure used was the Visual analogue scale [ICC = 0.97(0.96 to 0.98)] for measuring intensity of pain, Trigger point rating scale [ICC = 0.7 to 0.96] is used for myofascial screening and neck disability index [ICC = 0.88; (0.63 to 0.95)] for assessing the neck-related disability due to pain.

FINDING

The study was conducted on 40 people, of which 20 people were of forearm support and 20 of forearm unsupported (FUS) computer operators. The result shows that forearm support (FS) reduces the load on the UT and also reduces the risk of development of upper trapezius TrPs as compared to the forearm unsupported.

The evaluation is done by using the Trigger Point Rating Scale, Visual Analogue Scale and Neck Disability Index.

When we compared Table 1 and Table 2 Trigger Point Rating Scale of forearm support versus forearm unsupported, the minimum value recorded was 0.0 score in forearm support and 0.1 score in forearm unsupported while the maximum score recorded 5.0 in both the parameters. When we compared with the statistical analysis by using an unpaired T-test mean value of the Trigger Point Rating Scale versus forearm support was noted to be 1.2±1.3 while in the forearm unsupported it was 3.4±1.1. When it said the statistically significant difference was observed with the P value = <0.0001 hence it is statistically significant. It is noted that the Trigger Point Rating Scale value has increased in Forearm unsupported significantly as compared to forearm support, as shown in Table 1 and Table 2.

<table>
<thead>
<tr>
<th>Table 1: Data of forearm-supported computer operators</th>
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<td>Forearm Support</td>
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<td>Number of values</td>
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<tr>
<td>Minimum</td>
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<td>75% Percentile</td>
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<td>Mean</td>
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<td>Std. Deviation</td>
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<td>Std. Error</td>
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<th>Table 2: Data of forearm unsupported computer operators</th>
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<tr>
<td>Forearm Unsupported</td>
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<td>Number of values</td>
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Table 1 shows that forearm-supported computer operators are evaluated with a mean age of 41±12 years, with mean working hours of 9±1.6 hours and the mean work experience of 14±12 years. Table 2 shows that forearm-unsupported operators are evaluated with a mean age of 39±9.5 years, with mean working hours of 8.3±1.5 hours and a mean work experience of 13±9.6 years.

**DISCUSSION**

This study showed that TrPs can develop in the UT during the type of low exertions found in computer work. It was expected that high postural demands would lead to the development of trigger points due to working tasks that involve continuous arm movements always generating a static load component on these muscles, the principal muscle to carry this load is the trapezius [11]. The result shows that the development of upper trapezius trigger point in computer operators in forearm unsupported is common as compared to forearm support. However, the unsupported condition increases the load on the upper trapezius muscle, which can lead to a sustained increase in tension or over-contraction of the upper trapezius muscles. In the supported condition there is reduces the load on the upper trapezius muscles also reduces the discomfort.

The aetiology of myofascial trigger points are discussed with a detailed and comprehensive review of the most common mechanics, including low-level muscle contractions, uneven intramuscular pressure distribution, direct trauma, unaccustomed eccentric contractions, eccentric contractions in unconditioned muscle and maximal or submaximal concentric contractions.[13]

The evaluation of trigger points by using the Trigger Point Rating Scale, pain threshold by Visual Analogue Scale and Neck Disability Index to find out whether there is a presence of neck disability due to trigger point.

The studies found in the literature did not investigate the development of upper trapezius trigger points in computer operators without forearm support. Besides this, few studies have examined muscle activity at different angles of arm flexion and abduction. Some studies identified increased muscle activity in the upper trapezius and anterior deltoid muscles due to the increased angles in unsupported conditions and other studies also identified effect of forearm support and shoulder posture on the upper trapezius and anterior deltoid activity.

Some studies assessed muscle activity while using the forearm support and wrist in computer users and also showed decreased activation with the use of forearm support.

The result of this study indicates that the forearm support decreased the upper trapezius
load and also reduced the risk of development of the upper trapezius trigger point.

These results highlight the importance of ergonomic interventions to minimize neck/shoulder muscle activation. In addition, the result allows us to suggest the design of future studies, with a longitudinal design, with the evaluation of the use of forearm support during the work to verify its effect on reducing the risk of musculoskeletal disorders and also design future studies on the importance of the ergonomic advice in the same condition[16].

Thus, a practical and ergonomic suggestion to reduce muscle work for people while keeping your arm close by your side. Hold your elbow at 100° to 110° angle. Keep your wrist in a straight or neutral position. Light supporting your forearm on your desk.

CONCLUSION

Based on the results of these studies it has been concluded that the development of upper trapezius trigger points in computer operators without forearm support is more common as compared to forearm support.

Conflict of interest: None

Source of Funding: Self

Ethical Clearance: Taken from the ethics committee for research related to human beings of the center where the investigation was conducted.

REFERENCES


