MEASUREMENT OF LATERAL CERVICAL ALIGNMENT IN EGYPTIAN PHYSIOTHERAPIST WITH MECHANICAL NECK PAIN IN GREAT CAIRO

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ABSTRACT

Purpose: The goal of this study was to compare three cervical angles, as well as AHT and pain pressure threshold (PPT) of the upper trapezius in physiotherapists with mechanical neck pain (MNP) versus pain-free physiotherapists.

Methods: A total of 38 participants were recruited in this study, including 19 physiotherapists complaining of neck discomfort caused by mechanical forces and 19 individuals who are not in any pain. Three cervical angles were used as outcome metrics (Oc-C2, C1-C2 and C2-C7) using X-ray imaging measurements. Additionally, Anterior head translation (AHT), pain pressure threshold (PPT) and neck disability index.

Results: There was a significant effect of mechanical neck pain on the dependent variables (F = 2.47, p = 0.03). The research group's PPT of the right trapezius decreased significantly compared with that of the control groups (p = 0.0001). There was a significant decrease in the PPT of left trapezius of the study group compared with that of the control groups (p = 0.0001). The NDI showed no statistically significant difference between the study and control groups (p = 0.08). The Occipt-C2 angle did not differ significantly between the study and control groups (p = 0.7).

The C1-C2 angle did not differ significantly between the study and control groups (p = 0.79). There was no significant difference in the C2-C7 angle between the study and control groups (p = 0.5). There was no significant difference in the C2-C7 angle between the study and control groups (p = 0.13).

Conclusion: Relative to study group of physiotherapists, MNP Egyptian physiotherapists had increased PPT relative to control group

Key words: Mechanical neck pain, cervical angles, musculoskeletal disorder, Anterior Head Translation (AHT), Myofacial trigger point.

I. INTRODUCTION

Musculoskeletal disorders at work are a major source of lost productivity, increased expenditures, human injuries, and fatigue. According to the International Labor Organization, approximately 160 million work-related diseases occur worldwide each year, with musculoskeletal problems being the most common.(1)

Working MSDS in child care employees may be prevalent, given that staff often move children and perform physical duties in improper postures, which may have an adverse effect on absence days. (2) Furthermore, repetitive work, constant bending, and awkward sustained postures, (3) putting healthcare providers at risk of musculoskeletal injury (4)

Musculoskeletal disorders occur more frequently than any other occupational or work-related disease. (5) Which have a deleterious effect on a person's reputation and represent a significant societal expense (6)
Musculoskeletal issues are identified as the most important issue by around 60% of all workers with work-related health problems. (7)

At practice, physiotherapists are composed of a wide range of challenges. Musculoskeletal complaints might result from awkward positions when giving therapies such as massages or moving immobile patients. This has an effect on work organizational productivity to continue in the profession. (8) Workers with MSDS are more likely to be absent from work than others. Workers with MSDS experience headaches, eye strain, general weariness, and sleeping problems. (7)

Neck pain can result in activity limitations including reduced neck range of motion, sitting tolerance, sleep disturbance, reduced quality of life (QoL) and is associated with work absenteeism (9). Structural cervical ache is an argument assumes, with a generation talent and point prevalence approximately equal to that of lbp, leading to substantial deterioration and disbursements. (10)

In terms of biomechanical dysfunction, there is a rising interest in the significance of aberrant, asymmetrical posture, which is thought to be a major etiological component for cervical diseases. The maintenance of an efficient energy erect position without discomfort calls for good global sagittal alignment and harmony. (11)

Several methods for determining the sagittal alignment of the cervical spine have been published. (11); (12); (13); (14); (15); (16); (17).

Work-related or recreational activities that result in repetitive stress on or microtears in a specific muscle or group of musculature produce chronic tension in muscle fibres, which leads to the establishment of trigger points (18).

Myofacial trigger points are characterised as "skeletonally highly irritable sites with a hypersensitive nodule in a tight band” in skeletal muscles. Upon palpation, it can be in one of two states depending on whether it reproduces the patient complaints (activated TP) or not present (latent TP). (19) Other characteristics shared by the two states include a sensitive patch, transmitted pain and a local Twitch reaction inside a tight tense band. (20)

Trapezius myalgia (TM) is a complaint of upper trapezius muscular pain, stiffness, and tightness. It is distinguished by acute or chronic neck-shoulder pain. (18); (21) There may be a link between mechanical neck pain and the involvement of TP in the UT muscle in patients. (22); (23)

There is a scarcity of data on the prevalence of WRMDs among PTs in Egypt. (24) A study of the literature indicated that just a few research have looked into the relationship between curvature of cervical spine and neck soreness. (11); (25); (26) Also the measurements of cervical angles and TP of UTM in physiotherapists who had MNP have not previously been studied.

II. METHODS

This research was a cross-sectional observer study. This trial was conducted in public hospitals, during the period of Jan 2020 to Jun 2020.

Participants: Thirty eight physio therapists with mechanical neck pain will be assigned in two equal groups based on VAS ((27).

study group: Nineteen physio therapists with mechanical neck pain

control group: Nineteen asymptomatic physiotherapists. A total of thirty eight physio therapists. Their ages ranged from 28 to 37 years (28). There BMI ranged from 18.5 to 30 (29) They had worked in paediatric rehabilitation for at least two years. (30) Also working in paediatric rehabilitation for at least four hours per day. (30)

The subjects will be eligible to participate in the study under specific criteria:
Participants were evaluated one shot, for cervical angles and AHT using x rays. Pressure algometer for trigger points.

Study participants who had cervical spine disorders were excluded (cervical disc disease, cervical spondylitis, cervical myelopathy). Participants with musculoskeletal conditions. Pregnant women. Also People with congenital postural deformities. Moreover, participants who had a definite visual disability.

Assessment of inclusion criteria:

1-Pain assessment: A visual analogue scale (VAS): is a measuring device that attempts to quantify a feature or attitude that is thought to vary across a range of values and cannot be easily measured directly (Turnbull A et al, 2020). In addition, the pain VAS is easy to administer and score, it is reliable and valid.

Instrumentation:

1-X rays: Imaging of cervical curvature

Since X-rays are extremely penetrating, ionising radiation, they are used to photograph dense tissues such as bones. This is due to the fact that bones contain more radiation than less dense soft tissue. Lighter shades of grey (closer to white) appear in areas where radiation is absorbed. TOSHIBA was the unit used in this analysis. Manufactured rotande unit model DRX3724HD.

The following angles were measured using radiographs:

1. Cervical angles measurement using X-ray Imaging:

Adequate lateral cervical radiographs with right shoulder against the cabinet was attained in all cases and average 182.9 cm pipe length (72 inches). Prior to the X-ray lateral, both participants are neutral lateral cervical posture has been requested, look straight ahead, with their eyes open, and not move.

Radiographs were used to calculate angles: (a) Occipital to 2nd cervical (Oc-C2): The angle of Oc-C2 has been established as the angle between the lines from McGregor to the bottom part of the axis (b) Angle of the first and second cervical (C1-C2) created by the lower atlas and axis aspect. (c) 2nd to 7th cervical vertebrae alignment of the sagittal (C2-C7): angle of the posterior side of the C2 and C7 vertebrales.
Using the posterior tangent process, a cervical lordosis absolute rotation angle (ARA) was identified at the back of C2 and C7 vertebrae spinal body borders. With a little mean absolute difference in observation measurement this approach has a good intra- and inter-examiner dependability. (38)

Fig.2: X-ray picture using corle Draw software to measure cervical angles. A:Oc-C1 angle-B:C1-C2 angle.C:C2-C7 angle.

2) Pressure paint threshold assessment:
The Pressure algometer is an appliance for which determining the threshold of pressure pain for both localised and broad musculoskeletal pain (39)

As compared to force plate readings, The tested algometer was very reliable and valid. We used WANGER force dial with 1cm² rubber tip- Replacement (FDK/RT) and accuracy verification Hook replacement (FDK/HK0 made in China. This backs up previous studies by several researchers (40); (41); (42); (39)

Pressure Pain Threshold (PPT) assessment: To measure PPT and tenderness in the upper trapezius muscle, we measured 3 trigger points on upper fiber of trapezius muscle right and,(43) Trigger point 1 is in the base of the neck,Trigger point 2 is in half way between the end of the shoulder and bignning of the neck ,Trigger point 3 is in the base of the skull ,(43) The power was turned on after the transducer probe tip was applied perpendicularly over the myofascial trigger points.
Fig (4) Using Pressure Pain Algometer against trigger point 1 of upper fibers of trapezius.

2-Disability assessment: The NDI became one of the most used questionnaire method used for neck pain evaluation and weakness is the neck disability index (NDI). It is a valid and reliable method in the measurement of neck functioning (44).

III. STATISTICAL ANALYSIS

Unpaired t-test was designed for comparing the age of the individuals between the two groups was carried out. For comparison of sex distribution between groups, the chi squared test was performed. Using Shapiro–Wilk, the normality of the data was controlled. To assess the homogeneity between groups, Levene's test was employed. The influence of MNP was investigated in a multivariate analysis of the variance (MANOVA) on PPT, NDI and cervical alignment. The results were followed by univariate analysis to determine which variable had a significant difference between groups. The significance threshold was chosen at p < 0.05 for all statistical tests. All statistical analysis has been carried out using Windows version 25 SPSS (Social Studies Statistical Package) (IBM SPSS, Chicago, IL, USA).

IV. RESULTS

Characteristics of subject:

The subject properties of the study and control groups have been shown in Table (1). In the mean age and sex distribution, there was no significant difference between the two groups (p>0.05).

Table 1. Difference between study and control group of subject characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Mean±SD</th>
<th>MD</th>
<th>value of t</th>
<th>value of p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (by years)</td>
<td>Study group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.78 ± 2.97</td>
<td>31.57 ± 2.69</td>
<td>0.21</td>
<td>0.22</td>
</tr>
<tr>
<td>Females/males</td>
<td>12/7</td>
<td>15/4</td>
<td>(χ², 1.15)</td>
<td>0.28</td>
</tr>
</tbody>
</table>

(SD) Standard deviation; (MD) Mean difference; χ², value of Chi squared; value of p, probability value

Measuring effect of mechanical neck pain on PPT, NDI and cervical alignment

We found a significant group effect \((F(7,30) = 2.47, \ p = 0.03, \ \text{Partial eta squared} = 0.36)\). Table 2 provides PPT, NDI and cervical alignments descriptive data together with a significant degree of comparability.

The PPT of the control group right and left has significantly increased when compared with the control group \((p<0.001)\), while NDI differences were not present in the group \((p>0.05)\). The PPT of the control group was significantly increased.

 Oc-C2, C1-C2 and C2-C7 angles and control groups \((p > 0.05)\) had no significant difference.
Table 2. Mean PPT, NDI and cervical alignment of the study group and control one.

<table>
<thead>
<tr>
<th></th>
<th>Study group</th>
<th>Control group</th>
<th>MD (95% CI)</th>
<th>F value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right trapezius</td>
<td>5.58 ± 1.54</td>
<td>7.97 ± 2.05</td>
<td>-2.39 (-3.6,-1.2)</td>
<td>16.42</td>
<td>0.001</td>
</tr>
<tr>
<td>Left trapezius</td>
<td>5.2 ± 1.6</td>
<td>7.75 ± 2.39</td>
<td>-2.55 (-3.88,-1.2)</td>
<td>14.77</td>
<td>0.001</td>
</tr>
<tr>
<td>NDI</td>
<td>4.15 ± 1.97</td>
<td>3.1 ± 1.62</td>
<td>1.05 (-0.14, 2.24)</td>
<td>3.2</td>
<td>0.08</td>
</tr>
<tr>
<td>Cervical alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oc-C2 angle (degrees)</td>
<td>20.24 ± 5.24</td>
<td>19.28 ± 9.77</td>
<td>0.96 (-4.2,6.11)</td>
<td>0.14</td>
<td>0.7</td>
</tr>
<tr>
<td>C1-C2 angle (degrees)</td>
<td>19.19 ± 5.96</td>
<td>18.66 ± 6.34</td>
<td>0.53 (-3.5, 4.6)</td>
<td>0.07</td>
<td>0.79</td>
</tr>
<tr>
<td>C2-C7 angle (degrees)</td>
<td>22.8 ± 8.72</td>
<td>24.43 ± 6.05</td>
<td>-1.63 (-6.58, 3.3)</td>
<td>0.45</td>
<td>0.5</td>
</tr>
<tr>
<td>AHT (mm)</td>
<td>33.71 ± 11.51</td>
<td>27.33 ± 13.72</td>
<td>6.38 (-1.96,14.71)</td>
<td>2.4</td>
<td>0.13</td>
</tr>
</tbody>
</table>

(SD) standard deviation; (MD) mean difference; (CI) confidence interval; (p value) probability value

V. DISCUSSION

In the interests of authors, this research was the first test to deal with the Occipt –C2, c1c2and c2c7 in physiotherapists with mechanical neck pain and also measurement of AHT and PPT of trapezius muscle in that group with a comparison to control one. The findings of the study showed that related to control group, Mechanical pain physiotherapists had a lower angle of C2-C7 and greater muscle activation.

Among the current study, with regard to cervical angles, the mean Angle C2-C7 in physiotherapists with mechanical pain in the neck was less than 22.8 which was smaller than the corresponding angles for the control group 24.4°. That although flattening of the cervical spinal column was not significant, cervical Kyphosis or abnormal lordosis was suggested to produce the structural overload and muscular imbalance and discomfort. In addition aberrant strains in intervertebral discs (IVD) and vertebras leading to arthritis and IVD. In the present study, the angle of OC-C2 was increased to 20.2° (in relation to normal value14) in order to offset the adequate decline in the angle of C2-C7 and therapy established neutrality in the cervical area.

Nevertheless, the OC-C2 angle or the C1-C2 angle between the MNP group and the control of a physical therapist did not vary. This conclusion has been ascribed to manual exercise therapy to pediatrics with different weight and different diagnosis. Prior studies had indicated that prolonged sitting with leaning forward as sitting on mat to make manual therapy to the child or the computer used mostly for extended periods of time were correlated to uncomfortable postural features such as head and neck bending or front posture of the head, which involved a combination upper cervical lordosis and lower cervical kyphosis.

Regarding muscle activity, increase of the activity of TM in physiotherapists who had MNP relative to control group. These results were entirely compatible with those described by numerous writers, and there was significant evidence that cervical muscle activity in physiotherapists with CMNP was increased.

A combination of several variables resulted in an enhanced activity in the UT muscle reported in the current investigation. These causes may include1- persistent muscular activity-induced pain,2-neural tissue sensitization,3- Motor changes. 4-Direct effect of nociception on motor neuron output and 5-Changes in motor planning.

Source of Support: None. For research, authorship and/or publishing this paper received no funding.

Conflicting Interests: No conflict of interest is declared by authors.

Ethical Approval: Cairo University, Non-In-terventional Clinical Researches Ethics Board approved the study (Approved date, Approved number.)
Informed Consent: Participants were provided with a signed informed consent form. All participants have signed an informed consent statement.

Peer-Review: The authors will comply with the editor's decision on this matter.

Author Contributions: Concept-pediatric physiotherapists in public hospitals; Design-Cross Sectional Study; Supervisors – Prof. Dr. Mohsen Sayyad; Dr. Mariam Omran Grase Faculty of Physical Therapy, University of Cairo, Department of Basic Science, Egypt. Haidy Fouad Samweel pediatric physiotherapist in public hospital in Helwan; Resources and Financial Support—None; Materials—Cowrel Draw programme, Pressure Algometer, X-ray machine; NDI and VAS. Narakas types of cases were determined by Mohsen Sayyad Prof Dr, Mariam Omran Grase lecturer in Faculty of Physical Therapy, University of Cairo, Department of Basic Science, Egypt. Haidy Fouad Samweel pediatric physiotherapists. Analysis and/or Interpretation—Statical part of the study was analysed by Dr. Haidy. All authors contributed to interpret data. Literature Research—The literature was reviewed by Mohsen Sayyad and Mariam Omran. Writing Manuscript—Haidy Fouad wrote the first draft of the manuscript from her Master thesis and all authors contributed in writing of manuscript. Critical Review—Revision of the manuscript were completed by Mohsen Sayyad Prof. Dr and Mariam Omran lecturer together.

Acknowledgements: All participants are should be thanked by the writers.

Background and Objective: Neck pain is one of the common physiotherapists' complaints in clinical practice. It is estimated that 70% of the population suffers from neck pain in their lives...

Statistical analysis was performed using one sample T-test and Pearson correlation methods.

Citation: Haidy Fouad Samweel, Mariam Omran Gras, Mohsen Mouhamed Elsyad, 2021. Measurement of Segmental and global cervical alignment in physiotherapists with mechanical neck pain in great Cairo.

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VI. CONCLUSION

Within this study, Egyptian physiotherapists with mechanical neck pain exhibited higher activity of right and left trapezius than pain free ones.

Significance statement

This study revealed that there was increase in activity of cervical muscles in Egyptian physiotherapists with mechanical neck pain. This investigation was the first trial to adress the Oc-C2, C1-C2, C2-C7 and AHT in Egyptian physiotherapists with mechanical neck pain and the relations between these angles and muscles activity which many researchers were not able to explore. Thus, best theory on it may be arrived at.

REFERENCES:

7. EU-OSHA: "Work related musculoskeletal disorders :prevalence , costs and demographic in the EU, 2020."


