

IMPACT OF MASSAGE AND CERVICAL TRACTION ON STUDENTS OF SPORT SCIENCE COLLEGE WITH CHRONIC NONSPECIFIC NECK PAIN

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Abstract

This study aimed to identify the impact of massage and cervical traction on students of sport science collage with chronic nonspecific neck pain, the experimental approach was used due to its suitability to the nature and objectives of the study, on a sample consisting of (9) students with chronic nonspecific neck pain- muscular origin were chosen in a deliberate manner and voluntarily subjected to the proposed program, the researcher used Wilcoxon analysis to compare the pre and post measurements. The results showed that there were statistically significant differences between the pre and post measurements in favor of the post measurement on cervical range motion: forward, backward, bending to the right and left, axial range of motion using Goniometer, pain degree using pain score and daily ability using daily ability questionnaire. The researcher concluded that the use of Massage and Cervical Traction had a positive effect on students with chronic nonspecific neck pain. The researcher recommends conducting more similar studies on larger samples and other age groups.

Keywords: Massage. Cervical traction. Nonspecific neck pain

Introduction

A person is often exposed, during the nature of his work or practicing sports activities in the wrong way, to some motor and health problems that hinder him from fulfilling the requirements of the job or the sport he practices or even practicing his life normally, Spinal injuries are one of the most common of these problems due to their multiple causes, such as exposure to direct trauma to the vertebrae or surrounding muscles, the occurrence of sprains or muscle weakness, which lead to pain of different duration and severity (Al-Faqeer, 2015), and this may be due, according to (Al-Bashiti, 2023), (Garg, 2019) to unhealthy motor behavioral habits such as excessive use associated with the nature of work and wrong sitting while using smart phones and personal computers.

The spine in general and the cervical vertebrae area in particular are considered one of the most vulnerable areas of the body to injury, which in modern times people are constantly complaining of pain in the cervical region. However, cervical region pain is very common and in some cases lasts for long periods until the pain becomes chronic with limited mobility of the cervical region as a result of weakness of the muscles working on it and loss of flexibility between the vertebrae, from a physical and functional point of view, there is a deficiency and deficit in the individual's ability to carry out daily activities and meet the requirements of life, but

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psychologically, feelings of anxiety and fear increase, and if the pain persists for long periods, it may lead to feelings of despair and depression (Mutawa, 2017), (Jumaa, 2015) and (Peilin, 2010) as indicated by (Helmy Helmy, 2009) "that the pain of the cervical region of myogenic origin in practitioners of sports activity begins in the form of functional and then structural changes, where it begins with muscle tension caused by fatigue and stress and affects the muscle group working on the superficial, medium and even deep cervical vertebrae, then due to constant pain and lack of use those muscles weaken and then atrophy".

The injury in the cervical region in this sensitive part of the spine is considered one of the most serious injuries because it is one of the most complex areas in anatomical terms and nerves and muscles abound in a large way, as it can affect the spinal cord and thus negatively affect the functional efficiency of the human being as the tremendous technological development in various fields, it led to poor functional competence of the human being and the weakness of his muscles, as a result of lack of movement, or it may occur as a result of improper conditions of the vertebrae, and when the head and vertebrae are in an improper position, the shoulders and head suffer from forward bending, and thus the load on the neck increases, and this load is on the joints and muscles, so the muscles shrink, pain occurs, and the problem becomes more complicated. (Abd al-Rahman, 2014), (Daoud, 2004) and (Zahran & Mukhtar, 2016).

The problem of study and its importance

Cervical region pain is considered one of the most common health problems facing humans in the current era, and this pain is a widespread condition among all age groups, social classes and even athletes, studies and scientific research have proven that people with chronic nonspecific neck pain can recover by resorting to various physiotherapy methods, as they work to relieve pain, level of disability and improve the range of motion of the neck (Garg, 2019) ,As he sees (Takala et al, 1994) "that these pains may be rare in some sports, but they are common among floor gymnasts, for example, and individuals suffering from cervical region pain, especially chronic ones, need special health and physiological care when performing any type of rehabilitation in a way that suits their health and disease condition.

Many medical methods and means are used for pain caused by muscle tension, such as rest and prescribing pain-relieving and muscle-relaxing drugs, but if the condition of muscle tension worsens and the pain increases, patients

are referred to the physiotherapy unit, the opinions of (Garg, 2019), (Borman et al, 2003) and (Takala et al, 1994) that if there are risk factors such as physical exertion, carrying weights and playing sports such as floor gymnastics, for example, these risk factors may lead to the development of the condition to mechanical pains such as a herniated disc, which may threaten the end of the sports career, the method of pulling (traction) can be used in general as a means of muscle lengthening".

According to (Borman et al, 2003) "cervical traction can be described as the process of pulling (traction) the head and neck along its longitudinal axis away from the center of the body, which mechanically separates the vertebrae from each other, and leads to positive structural and functional changes in the components of the spine temporarily or long-term. It can also be seen that it causes a forced elongation of all the muscles of the deep cervical vertebrae". Where all cervical vertebrae are subjected to the same amount of distancing, this is indicated by (Garg, 2019), (Afzal et al, 2019) and (Khan et al, 2017).

The problem of the study is that although the cervical traction method is not commonly used in cases of chronic nonspecific neck pain- muscular origin in general, it remains a direct way to lengthen the deep muscle group, the researcher reviewed many scientific studies and researches conducted using the cervical pulling (traction) method with its various methods on cervical herniated disc Patients, such as (Garg, 2019), (Khan et al, 2017) and (Afzal et al, 2019) and through the work of a researcher in the field of physical rehabilitation, as far as the researcher was aware, it turned out that massage and traction method were not used together on Patients with chronic nonspecific neck pain at the local level, so the researcher decided to study the effect of using massage and cervical traction method using a hand-controlled cervical traction device, in order to cause prolongations in the deep muscle group in the cervical region. It is considered a safe, easy to perform, and economical method and patients can do it even at home. The importance of the study is also evidenced by highlighting the importance of using massage and the pulling method in lengthening the deep muscle group affected by muscle tension in the cervical region and gradually by increasing the distance between the vertebrae as a safe means before reaching the stage of cervical herniated disc, especially in cases of using physical effort and direct loads on the head and neck, as in the case of students of sports science faculties. It can also be an effective rehabilitation treatment method for people with chronic cervical region muscle pain to return to their normal and sports life as before.

Study hypotheses

1. There are statistically significant differences ($\alpha \geq 0.05$) between the pre- and post-measurements of the use of massage and cervical traction on patients with chronic nonspecific neck pain regarding the variable of cervical vertebrae range of motion, including forward, backward, bending to the right and left, and axial range of motion to the right and left.
2. There are statistically significant differences ($\alpha \geq 0.05$) between the pre- and post-measurements of the use of massage and cervical traction on patients with chronic nonspecific neck pain regarding the variable of pain and daily ability

Study Methodology

Study method: the researcher used the experimental method using the single group and monitoring the variables using the method of pre-and post-measurement and comparison between them.

Community and study sample: the community and study sample consists of all sport science college students in Mutah University- Jordan who registered Gymnastic1 and Gymnastic2 course and were diagnosed with chronic nonspecific neck pain during second semester 2021-2022.

Table (1) shows the description of the sample according to its variables (Table 1). The data of Table no. (1) show the arithmetic averages and standard deviations of the study variables (age, height, mass, range of motion of the cervical vertebrae: forward, backward, bending to the right and to the left, axial range of motion to the right and to the left, pain, daily ability).

Validity of the tools: The used tests were verified by looking at a set of previous studies (Garg, 2019), (Afzal et al, 2019) and (Khan et al, 2014) and then it was presented to a number of academic specialists to take their opinions, and the authenticity of the content was calculated using the (Lawshe Content Validity ratio) method, where it amounted to (0.855).

Sample selection conditions:

1. Subjects should be diagnosed with chronic nonspecific neck pain continuously for at least three months.
2. The desire to undergo experience.
3. Commitment to the proposed program for the duration of the experiment.
4. Not to use any drugs that affects the results of the experiment.
5. Not to undergo other rehabilitation programs.

Protocol for using the cervical pulling (traction) device

The researcher used the proposed program consisting of massage of the cervical region and then cervical pulling (traction) using a mobile medical cervical traction device with standard pneumatic blowing technology of the (NTD-500 class) for (6) weeks with (3) sessions per week as follows:

1. Lying on the bed from prone position, then the neck and upper shoulders are massaged by gentle massage technique for 5 minutes and kneading massage technique for 10 minutes.
2. The cervical pulling (traction) device is installed around the neck, from the supine position the patient's head lies upright on the longitudinal axis of the spine, and the cavities of the device are filled with such parts of the head as the chin, the angle of the lower jaw.
3. The device is inflated manually gradually, so that the air pressure inside the device reaches (15 psi) and then gradually to (22 psi), which is the

degree that indicates the maximum permissible extension of the deep muscles working on the neck, and then the time calculation starts to (10) full minutes. (Al-Jazzazi & Al-Qudah, 2021)

4. Then the air is gradually discharged from the device by a special spring to reach a degree (0.00 psi) (Figure 1).

Study procedures

1. The researcher identified the study sample by using an orthopedic specialist.
2. The researcher adjusted the variables of the pre-and post-tests by ensuring the readiness of the tools used.
3. The researcher met with the study sample where he clarified the tests for the sample and the nature of the procedures.
4. The researcher, in the presence of a physiotherapist, measured the pre measurements (variables: range of motion: forward, backward, bending to the right and to the left, axial range of motion to the right and to the left, pain score and daily ability).
5. The subjects applied the proposed program of massage (gentle for 5 minutes, kneading for 10 minutes) and cervical traction for 10 minutes for each séance, three times a week for 6 weeks.
6. The researcher conducted the post tests for each of the sample members after 6 weeks, and compared the pre and post results.
7. The researcher conducted the appropriate statistics to extract the results.

Study variables

Independent variables: the proposed program consisting of massage and pulling of the neck- using Cervical mechanical constant Traction method (Cervical mechanical Sustained Traction), for (6) weeks with (3) sessions per week.

Dependent variables

1. Neck forward range of motion (degree)
2. Neck backward range of motion (degree)
3. Neck bending to the right (degree)
4. Neck bending to the left (degree)
5. Axial range of motion to the right (degree)



Figure 1: Cervical pulling (traction) device.

Table 1: Arithmetic averages and standard deviations of the research sample (N=9) depending on its variables.

Variable	Less value	Highest value	Arithmetic average	Standard deviation
Age (years)	19.00	21.00	19.7778	.66667
Height (CM)	171.00	180.00	176.3333	3.12250
Mass (kg)	76.00	83.00	78.1111	2.42097
Neck forward range of motion (degree)	9.00	13.00	11.0000	1.58114
Neck backward range of motion (degree)	12.00	18.00	14.5556	2.00693
Neck bending to the right (degree)	8.00	12.00	10.0000	1.73205
Neck bending to the left (degree)	8.00	13.00	10.0000	1.87083
Axial range of motion to the right (degree)	39.00	41.00	40.3333	.70711
Axial range of motion to the left (degree)	38.00	41.00	39.3333	1.00000
Pain (degree)	7.00	8.00	7.2222	.44096
Daily Ability (degree)	.00	1.00	.2222	.44096

- 6. Axial range of motion to the left (degree)
- 7. Pain score (0-10) (degree)
- 8. Daily Ability (degree)

Cervical Range of motion tests of the entire cervical region were performed from a standing position, using a digital Goniometer instrument for measurement. Pain score (Ps): a graduated pain scale was used to measure the degree of pain (Pain Rating Scale): (0-10) degrees where: (zero= no pain, 1-3= mild pain, 4-6= moderate pain, 7-9= severe pain. 10= very sharp, unbearable pain). While Daily Ability to do daily activities (DA): the ascending triple scale (Zero, 1, 2) scores were used where: (zero= inability, 1= average ability, 2= normal ability) (Al-Qudah & Bani Hani, 2013).

Statistical methods

The statistical packet program (spss) was used to analyze the results where:

- 1. Arithmetic averages standard deviation.
- 2. Use the Wilcoxon test.

Results

This chapter includes the presentation of the results of the current study, which aimed to identify the impact of massage and cervical traction on Patients with chronic cervical region muscle pain, and the results of the study will be presented by testing its hypotheses:

First: the results related to the first hypothesis: There are statistically significant differences ($\alpha \geq 0.05$) between the pre- and post-measurements of the use of massage and cervical traction on patients with chronic nonspecific neck pain regarding the variable of cervical vertebrae range of motion, including forward, backward, bending to the right and left, and axial range of motion to the right and left.

To verify the hypothesis of the study, the Wilcoxon test and effect size of the pre and post measurements were used, and Table No. 2 shows the results of this (Table 2).

Table (2) shows the results of the z value and the level of significance accompanying it, there are significant differences between the pre and post measurement of the individuals of the study sample In addition, the effect size ranged from (0.804) to (0.843) and According to Cohen (1988) criteria. 2 = Small Effect, .5 = Medium Effect, and .8 = Large Effect. In this scenario, the effect size is large in variables (cervical vertebrae range of motion: forward, backward, bending to the right and left, axial range of motion to the right and left) and in favor of telemetry, which indicates the positive effect of the use of massage and the method of cervical traction on patients with chronic cervical region muscle pain.

The researcher can attribute the improvement between pre-and post-measurement and in favor of post-measurement at the level of study variables to the fact that the use of massage has multiple physiological effects, and it has a direct effect on the body, which leads to a rise in the local temperature of the massaged part, which leads to a feeling of relief and warmth and to the widening of blood vessels. This method also helps to reduce the sensation of lethargy, invigorates and improves the Vitality, elasticity and elasticity of the skin, muscle fibers, increase nervous stimulation and improve blood circulation. This is indicated by (Al-Aroud, 2007) as for the use of the fixed mechanical cervical traction method in a way that moves the head away from the shoulders, it has increased the length of all the muscles affected by the muscle tension working directly on the cervical vertebrae in a forced way for the superficial and deep muscles, after suffering from a short length. The traction device which was used on the study sample pulls the vertebrae of

the cervical region and moves them away from each other after the massage and under the influence of the force of air pressure inside the pulling device, which means restoring the normal length of those muscles. Although the deep muscles in particular, according to (Borman et al, 2003) "they have a strong, highly resistant fibrous structure and differ from the nature of the superficial muscles in the body, except that they regain their normal length".

For the first and second variables-the cervical range of motion: forward and backward, as the length of the target muscles improves, the improvement can be explained by the level of the range of motion of the cervical region forward. Until the process of bending the neck forward begins with the contraction of the left and right parts of the Sternocleidmastoid muscle as anterior-lateral superficial, and the scalene muscle group as a middle muscular layer. This means that its superficial and deep posterior muscles which are located on the longitudinal axis of the neck have performed better longitudinal muscle contraction (Eccentric Contraction) than before, indicating an improvement in forward range of motion after the end of the proposed program such as the trapezius quadratus muscle (Trapezius-superior), and the deep muscle group (Splenius: Cptis & Cervicis), and this confirms the improvement of the elasticity and elasticity of those muscles, in addition to their recovery of their natural length due to the massage effect and the method of static mechanical pulling. This may explain the improved range of motion of the cervical region forward. As both David Roylance and Pierce Salguero point out (Arnold, 2007), (David & Pierce, 2001), (Weerapong et al, 2005) and (Richard, 2021) showed that massage increases the temperature at the point being massaged it increases the speed of lymph circulation and reduces swelling, It improves muscle strength and neuromuscular tone, reduces excess muscle tension, removes metabolic residues from muscle mass, relaxes tendons and enhances their elasticity, increases mobility and flexibility of joints, stimulates and improves nerve activity and sensation while reducing the effects of pain, reduces inflammation and sprain of muscles and joints, reduces stiffness of joints and muscles, increases range of motion, range of motion and smoothness of movement, reduces the condition of muscle stiffness and accelerates the recovery process.

On the other hand, the researcher believes that the use of the cervical pull method has removed the mechanical barrier that hinders the performance of the normal range of motion, namely the short length of the deep muscles contracting. Thus, the removal of this mechanical barrier may be the same reason that allowed the muscles of the deep cervical region to contract freely and achieve a normal range of motion to the back.

As for the third and fourth variables- cervical_range_of motion bending to the right and left, the researcher believes that the process of cervical bending to the right or left side needs the involvement of a group of superficial, medium and deep muscles, where we can find that the anterior-lateral superficial muscles such as the Sternocleidmastoid muscle with its two heads, and the upper part of the (trapezius-superior) quadratus muscle, the triple muscle group (Scalene) of the middle muscular layer, and the deep muscle group (Splenius) of its two halves (Splenius Cptis & Cervicis), all participate in the process of cervical bending to the side. The right parts of them contract, for example, to bend the cervical vertebrae to the right side, and vice versa. It seems clearly that its contraction is (concentric contraction) type in the direction of contraction, whether during bending to the right or to the left. The muscles that have accomplished better contractile muscle contraction, indicates an improvement in range of motion during bending to both sides after the end of the proposed program, and emphasizes the improvement of the contractile ability of these muscles, their flexibility and elasticity, in addition to recovering their

normal length due to the impact of the static mechanical pulling process. This may explain the improved cervical range of motion during bending to the right and left.

Table 2: Wilcoxon test, effect size between the pre and post measurements of the study variables (range of motion).

Variable	pre measurement		post measurement		Z	sig	Effect Size
	Arithmetic average	Standard deviation	Arithmetic average	Standard deviation			
Neck forward range of motion (degree)	11.0000	1.58114	40.6667	1.22474	-2.716	.007*	0.820
Neck backward range of motion (degree)	14.5556	2.00693	41.6667	1.32288	-2.699	.007*	0.809
Neck bending to the right (degree)	10.0000	1.73205	41.5556	1.87824	-2.751	.006*	0.841
Neck bending to the left (degree)	10.0000	1.87083	42.0000	1.80278	-2.754	.006*	0.843
Axial range of motion to the right (degree)	40.3333	.70711	76.3333	1.65831	-2.692	.007*	0.805
Axial range of motion to the left (degree)	39.3333	1.00000	74.4444	1.87824	-2.694	.007*	0.806

Table 3: Wilcoxon test, effect size between the pre and post measurements of the study variables (pain, daily ability).

Variable	pre measurement		post measurement		Z	sig	Effect Size
	Average	Standard deviation	Average	Standard deviation			
Pain (degree)	7.2222	0.44096	2.5556	0.52705	-2.762	.006*	0.848
Daily Ability (degree)	0.2222	0.44096	1.7778	0.44096	-2.646	.008*	0.778

As for the fifth and sixth variables axial range of motion to the right and left, the researcher believes that the process of rotation of the cervical vertebrae axially to the right and left requires the involvement of superficial, medial and deep muscle groups, where we can find that the anterior lateral superficial muscles such as the (Sternocleidomastoid) muscle with its head, The triple muscle group (Scalene) of the middle muscle layer, and the deep muscle group (Splenius) with its two sides (Splenius Cpitis & Cervicis), all participate in the process of neck rotation axially to one of the two sides. Where the right parts of it contract, for example, to rotate the cervical vertebrae axially to the right side, and vice versa, it seems clearly that its contraction is (concentric contraction) type in the direction of contraction, whether during axial rotation to the right or to the left, the muscles that have accomplished better contractile muscle contraction, indicates improvement of the axial motor range during rotation after the end of the proposed program period, confirms the improvement of the contractile ability of these muscles, their flexibility and elasticity, in addition to their recovery of their normal length due to the effect of the static mechanical pulling process as mentioned earlier. This may explain the improvement of cervical axial range of motion during axial rotation to the right and left.

Further to the interpretation of the above results, (Bernstetter, 2016), (Cavagnaro et al, 2014), and (Borman et al, 2003), however, the superficial muscle needs to be extended continuously and steadily for (34-60) seconds in order to obtain a new length, while in the case of acute muscle spasm in the deep muscle group working on the spine during cervical region pain, it may need a longer time at least (4) minutes and steadily. This is what makes the time (10) minutes to pull up after the massage sufficient to achieve statistically significant results in the above-mentioned variables, the results of this study were in agreement with the study of (Garg, 2019), (Afzal et al, 2019) where they found that the use of the cervical traction method by gravity or the traditional static mechanical method improves the cervical range of motion: forward, backward, bending to the right and left, axial range of motion: to the right and left, statistically significant in Patients with cervical radiculopathy due to the presence of herniated disc. The extent of the significant difference between the nature of the samples and the sample of the current study is clear. This result also agreed with the study of (Al-Bashiti, 2023) the study of (Mazhar & Ahmed, 2022) the study of (Atta et al, 2022) and the study of (Hamza, 2014).

Second: the results related to the second hypothesis: There are statistically significant differences ($\alpha \geq 0.05$) between the pre- and post-measurements of the use of massage and cervical traction on patients with chronic nonspecific neck pain regarding the variable of pain and daily ability. To verify the hypothesis of the study, the Wilcoxon test and effect size of the pre and post measurements were used, and Table No. 3 shows the results of this (Table 3). Table (3) shows the results of the z value and the level of significance accompanying it, there are significant differences between the pre and post measurement of the individuals of the study sample In addition, the effect size ranged from (0.778) to (0.848) and According to Cohen (1988) criteria .2 = Small Effect, .5 = Medium Effect, and .8 = Large Effect. In this scenario, the effect size is medium to large in the variables (of pain degree, daily) between the pre and post measurements, which indicates the positive effect of the use of massage and the method of cervical traction on Patients with chronic cervical region muscle pain.

As for the variable pain degree, the researcher believes that the fact that Patients with chronic nonspecific neck pain suffer from spasm in the muscles working on the cervical region, especially the deep muscles, therefore, muscle spasm may lead to pressure on the vertebrae, which leads to the occurrence of straightening of the cervical vertebrae, This is confirmed by (Tadano et al, 2019) and (Enoka, 1988) that this pressure can lead to a clear change in the curves of the neck, which may cause increased pain. But through the use of massage and cervical pulling, most of these negative effects may gradually decrease and pain could be reduced. This is confirmed by (Muhammad, 2009) and (Al-Saadi, 2007) that massage increases the sensitivity of the excitability of the muscles, which leads to muscle stretching and re-oxidation and accelerates the isolation of metabolic products and the absorption of harmful substances and relieve the sensation of pain, Massage also increases the secretion of endorphins, which acts as a natural anesthetic, which helps to relieve pain, massage also has an important role in muscle relaxation, which relieves pressure on the nerves, which leads to pain relief, and this is confirmed (Mazhar & Ahmed, 2022).

This result was in agreement with the study of (Garg, 2019), (Afzal et al, 2019)

in terms of the fact that cervical pulling (traction), whether by gravity or mechanical, relieves the degree of pain sensation. This result also agreed with the study of (Al-Bashiti, 2023) the study of (Mazhar & Ahmed, 2022), the study of (Atta et al, 2022) and the study of (Hamza, 2014).

As for the variable of the daily ability, the researcher believes that this result is natural because it is directly associated with range of motion improvement and pain reduction, as the individual's ability to carry out the requirements of his daily life improves when range of motion improves and pain decreases due to the use of massage and the method of cervical traction which is worked to increase the length of all affected muscles by muscle spasm working on the cervical vertebrae forcibly, whether superficial or deep, The researcher believes that these positive changes that have occurred in the range of motion and the level of pain are a major reason for improving the daily ability to do activities through the ability of patients to perform movements at a normal level and without pain.

Limitations

Ostensibly, this work looks like to have some weak points. In experimental trials, nine subject is too little for have an objective and significant results, but author would like to insure that the community of this criteria: chronic nonspecific neck pain (not acute) (n=9) is equal with the sample (n=9). Even thus, author included subjects only with official chronic nonspecific neck pain diagnosis. From other side, the combination of massage with cervical traction seems to be unusual in chronic nonspecific neck pain treatment. Finally, the specific electronic equipment's for measuring neck range of motion were not existing in the laboratory neither in physiotherapy unit.

Conclusions

1. The use of massage and the method of cervical traction has a positive effect on cervical range of motion: forward, backward, binding to the right and left, and axial range of motion on students of sport science college in Mutah University with chronic nonspecific neck pain.
2. As a result of the use of massage and the method of cervical traction, pain degree and the daily ability were improved in sport science college in Mutah University with chronic nonspecific neck pain.

Recommendations

1. The necessary to conduct more similar studies on other larger samples.
2. Conducting more similar studies on other age groups.
3. The necessary to pay more attention to the method of cervical traction and conduct more similar studies on cases of non-myogenic neck pain.

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