

Assessment of the effects of manual techniques on neck pain

Ocena wpływu technik manualnych na dolegliwości bólowe odcinka szyjnego kręgosłupa

A – preparing concepts
B – formulating methods
C – conducting research
D – processing results
E – interpretation and conclusions
F – editing the final version

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Abstract

Introduction: The research focused on assessing the effects of a set of manual techniques applied in the anterior neck region on pain and ability to perform everyday activities by the study participants. The aim of the study was to assess the influence of selected manual techniques on tissues located in the anterior region of the neck and on an index of disability caused by neck pain.

Material and methods: The study included 31 individuals (26 females and 5 males) aged 23-53 (mean=35 years) who were randomly divided into 2 groups, i.e. the study group (n=16, 13 females, 3 males) and the control group (n=15, 13 females, 2 males). The participants from the study group underwent a procedure which included five techniques performed on the anterior neck, i.e. superficial cervical fascia stretch, infrahyoid muscle stretch – pretracheal fascia, carotid sheath stretch, deep cervical fascia stretch, suspensory ligament of pleural cupula stretch. The participants from the control group underwent laser therapy on the cervical and thoracic spine with the device switched off. The treatment effectiveness was assessed with the use of the Neck Disability Index (NDI). The measurements were made before and five days after the therapy.

Results: Compared to the control group, the mean total score in the NDI increased significantly by 8.5 points (17%) ($p>0.05$) in the study group.

Conclusions: The study results indicated that performing osteopathic procedures in the anterior neck region reduces neck pain and disability level in patients.

Key words: neck pain, musculoskeletal manipulations, fascia, cervicalgia

Streszczenie

Wstęp: Badanie przeprowadzone do oceny wpływu zestawu technik manualnych wykonanych na przedni rejon odcinka szyjnego kręgosłupa na odczucia bólowe badanych i zdolność wykonywania codziennych czynności. Celem badania była ocena wybranych technik manualnych na tkanki znajdujące się po stronie brzusznej odcinka szyjnego kręgosłupa oraz ich wpływ na wskaźnik niepełnosprawności spowodowanej dolegliwościami bólowymi odcinka szyjnego kręgosłupa.

Material i metody: Badaniem objęto 31 osób (26 kobiet i 5 mężczyzn) w wieku od 23 do 53 lat (\bar{x} = 35 lat), które na drodze losowania zostały podzielone na 2 grupy:

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eksperymentalną (n= 16, 13 kobiet, 3 mężczyzn) oraz porównawczą (n=15, 13 kobiet, 2 mężczyzn). U badanych z grupy eksperymentalnej przeprowadzono zabieg składający się z pięciu technik dla przedniej części szyi: rozciąganie powięzi powierzchownej szyi, rozciąganie mięśni podgnykowych – blaszka przedtchawicza powięzi, rozciągnięcie pochewki naczyń szyjnych, rozciąganie powięzi szyjnej głębokiej, rozciąganie więzadła wieszadłowatego osklepka opłucnej. W grupie porównawczej wykonano zabieg laseroterapii na odcinek szyjny i piersiowy kręgosłupa przy wyłączonym urządzeniu. Do oceny skuteczności leczenia wykorzystano kwestionariusz NDI (Neck Disability Index). Pomiar został wykonany przed i po pięciu dniach trwania terapii.

Wyniki: W grupie eksperymentalnej, w odniesieniu do grupy porównawczej, nastąpiła istotna statystycznie poprawa średnich wartości sumy punktów wskaźnika niepełnosprawności NDI o 8,5 punktu (17%) ($p>0,05$).

Wnioski: Wyniki badania sugerują, iż wykonanie zabiegów osteopatycznych w obrębie przedniej części szyi wpływa na zmniejszenie dolegliwości bólowych odcinka szyjnego kręgosłupa, zmniejszając stopień niepełnosprawności pacjentów.

Słowa kluczowe:

ból szyi, manipulacje mięśniowo-szkieletowe, powięź, ból odcinka szyjnego kręgosłupa

Introduction

Neck pain is a common complaint and, when untreated, it may lead to disability. It is estimated that from 22% to 70% of the population experience neck pain in their life. Moreover, it is predicted that this problem will grow more severe with time. Its prevalence increases with age and usually concerns women around fifty years of age [1].

In 2005, the European Foundation for the Improvement of Living and Working Conditions carried out research which revealed that musculoskeletal complaints constitute the most common health problem related to work. Back pain is the most frequent of these complaints [2].

Neck pain is one of the most common reasons why patients visit physiotherapists or osteopaths. The majority of the therapies aimed at eliminating neck pain are focused on assessing the effects of therapeutic techniques on anatomical structures related to the spine. As one of medical sciences, osteopathy examines relationships between particular systems and also focuses on anterior structures of the neck [3]. According to the concept of osteopathy, soft tissue located in front of the cervical spine may also affect its function and mobility, since this structure determines its proper function and constitutes a sort of scaffolding for anatomically significant structures such as nerves, vessels, organs or glands [4-7].

The so-called myofascial trigger points (TrPs) in sternocleidomastoid muscle (in the clavicular part), digastric muscle and in medial pterygoid muscle

may be responsible for complaints regarding an anterior part of the neck and throat [8].

The aim of the study was to verify the correlation between the effects of the application of osteopathic techniques on soft tissues located in the anterior neck and pain and ability to perform everyday activities.

Material and methods

The research was carried on patients referred by a doctor to undergo a rehabilitation cycle conducted in the rehabilitation clinic in Wrocław.

The study included 31 individuals (26 females and 5 males) aged 23-53 who were randomly divided into two groups, i.e. the study group and the control group. The study group included 16 individuals (13 females and 3 males), while the control group consisted of 15 patients (13 females and 2 males).

The study inclusion criteria were as follows:

- age between 20 and 55,
- patients with a doctor's referral to manual therapy of the cervical spine,
- patients without neck or head injury (either recent or in the past),
- complaints lasting a minimum of 6 months,
- persons who did not have any neck or head surgeries,
- individuals who were not victims of mugging (hitting in the neck and head area, strangling),
- not pregnant women,
- patients who were not diagnosed with systemic or heart disease.

The control group underwent laser therapy on the cervical and thoracic spine performed with the use of POLARIS 2 laser. Each of the participants had been informed that the laser was working; however, it was not switched on. The participants were informed about the aim of the procedure as well as about indications and contraindications. After completing the procedure in the control group, each patient underwent manual treatment in order to benefit from the therapy.

In the study group, each patient was informed about the course of the therapy. Prior to the application of each technique, the patient was informed about its meaning, the therapist's position and the position of hands as well as about procedures which were going to be performed. The patient knew that in case discomfort occurred, the therapy could be stopped at any time and he or she could resign from the participation in the study. For every study participant both in the study and in the control group, each procedure lasted 20 minutes. The measurements were made before and five days after the therapy.

Five specific techniques were applied in the following order:

- Superficial cervical fascia stretch
- Infrahyoid muscle stretch – pretracheal fascia
- Carotid sheath stretch
- Deep cervical fascia stretch
- Suspensory ligament of pleural cupula stretch

The examination procedure involved the following:

- recruitment (questionnaire)
- instructions form
- reading and signing an informed consent and ensuring a possibility to ask questions
- “Neck Disability Index” (NDI) questionnaire
- randomisation by drawing lots
- laser therapy or osteopathic treatment

In order to assess the level of disability caused by neck pain, a Polish version of the Neck Disability Index (NDI-PL) was applied. The questionnaire includes 10 items regarding pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. There are six possible answers in each section. The study participants marked statements which best reflected their situation and could receive 0 to 5 points for each of them. The level of disability is assessed on the basis of a point scale (0 to 50 points) or a percentage result (0 to 100%):

- 0 – 4 points – no disability;
- 5 – 14 points – mild disability;
- 15 – 24 points – moderate disability;
- 25 – 34 points – severe disability;
- 35 – 50 points – complete disability.

The obtained results were analysed statistically with the use of Statistica 13.1. software (StatSoft, Poland). The analysis aimed at comparing two dependent groups included descriptive statistics, Shapiro-Wilk test and Wilcoxon test. The significance of differences was set at the level of $p=0.05$.

Results

The total scores obtained in the NDI questionnaire in the study group (T1) and control group (T2) before and after the therapy were analysed (tab.1).

Tab. 1. Comparison of the point values obtained by the study and control group in the NDI questionnaire

Total score in the NDI		n	Mean	Min	Max	SD	p
T1 group	Before the therapy	16	31.3	14	44	8.01	0.006
	After the therapy	16	22.8	7	29	5.23	
T2 group	Before the therapy	15	32.6	13	40	6.9	0.379
	After the therapy	15	28.1	12	41	7.2	

In the study group, a statistically significant ($p<0.05$) decrease in the mean score was noted, which indicated an improvement in the level of disability. In the control group, mean values improved by 4.5 points; however, this improvement was statistically insignificant ($p>0.05$).

Moreover, the influence of the applied therapies on the level of pain in both groups was evaluated according to the benchmarks in the questionnaire and the percentage of individuals in each group was presented (tab.2).

The obtained results indicate that in the study group prior to the therapy, there were 22.5% more study participants who were qualified to the group with severe disability and 21.6% fewer subjects who were qualified to the group with complete disability than in the control group. After the therapy, the percentage of the participants from the study group

qualified to the moderate disability group increased by 48.75%, while the percentage of the participants qualified to the severe disability group and complete disability group decreased by 35% and 20%, respectively, compared to the control group.

Tab. 2. The percentage of the study participants in each group of disability before and after the therapy

		No disability	Mild disability	Moderate disability	Severe disability	Complete disability
Before the therapy	T1 group	0% of the study participants	6.25% of the study participants	6.25% of the study participants	62.50% of the study participants	25.0% of the study participants
	T2 group	0% of the study participants	6.67% of the study participants	6.67% of the study participants	40.0% of the study participants	46.67% of the study participants
After the therapy	T1 group	0% of the study participants	6.25% of the study participants	68.75% of the study participants	25.0% of the study participants	0% of the study participants
	T2 group	0% of the study participants	0% of the study participants	20.0% of the study participants	60.0% of the study participants	20% of the study participants

Tab. 3. Total scores in the study group (T1) before and after the therapy according to the NDI

Total score of T1 group in the NDI	N	Mean	Min	Max	SD
Before the therapy	16	31.3	14	44	8.01
After the therapy	16	22.8	7	29	5.23

Table 3 shows that mean total scores improved by 8.5 points in the study group. A graphic representation of the results is presented in figure 1.

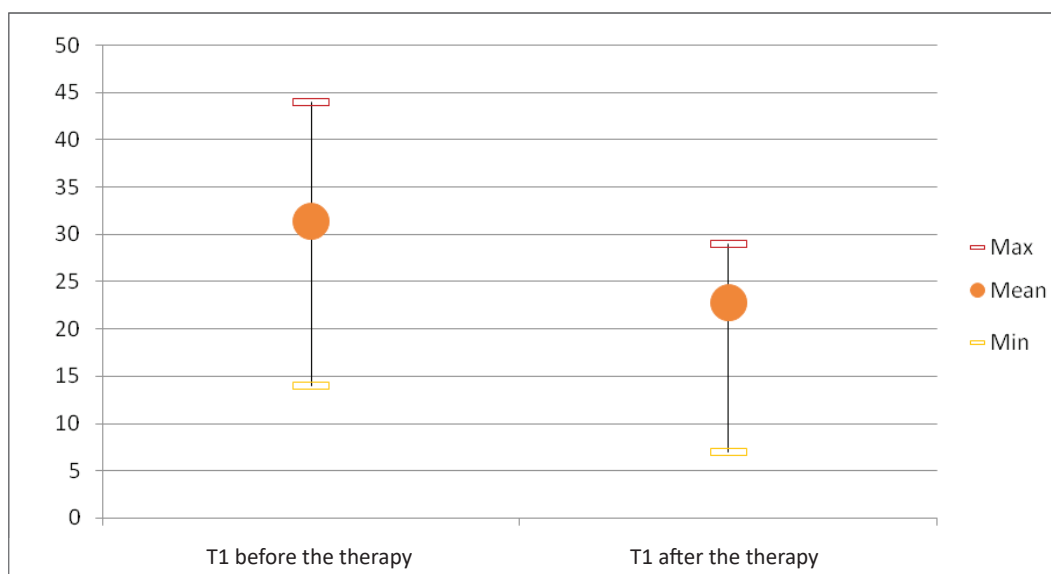


Fig. 1. Total scores in the study group before and after the therapy

Table 4 shows that mean values improved by 4.5 points in the control group. Neither minimum values, maximum values nor standard deviations revealed any bigger changes. A graphic representation of the results is presented in figure 2.

Tab. 4. Total scores in the control group (T2) before and after the therapy according to the NDI

Total score of T2 group in the NDI	N	Mean	Min	Max	SD
Before the therapy	15	32.6	13	40	6.9
After the therapy	15	28.1	12	41	7.2

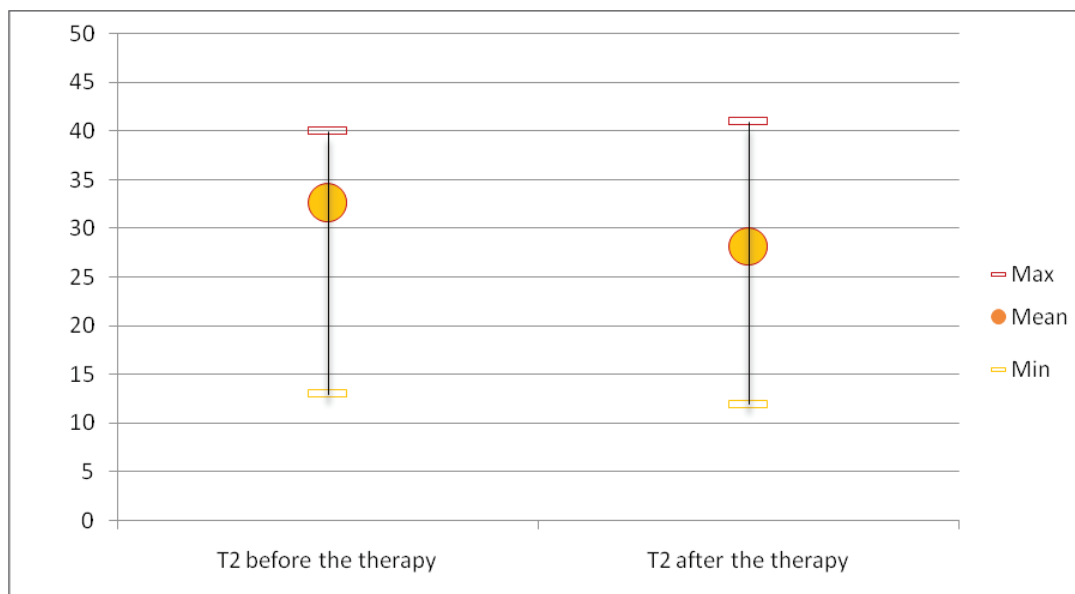


Figure 2. Total scores in the control group before and after the therapy

Discussion

The aim of the study was to assess the influence of selected manual techniques on tissues located in the anterior region of the neck and on an index of disability caused by neck pain.

A statistically significant decrease in pain as well as an ability to perform everyday activities was noted in the study group. However, the difference noted in the control group was not statistically significant. The selection of the techniques applied in the study was based on our own experience.

The mean total score increased by 8.5 points (SD 5.23) in the study group, and by 4.5 points (SD 7.2) in the control group. The results presented in table 1 indicate that mean total scores after the therapy decreased in both groups. Several studies showed that manual therapy on fascia modulates the hyperactivity of the sympathetic nervous system by improving numerous fascial and psychosomatic functions with regard to hemodynamic function [9] and heart rate variability [10]. Majchrzycki et al. [11] concluded that osteopathic approach to treating neck pain both in acute and in chronic states gives positive results. Osteopaths apply techniques which are safe, non-invasive and atraumatic. They include functional, reflexive (making use of neuromuscular reactions) and drainage techniques (which drain body areas affected by inflammation). Therefore, systemic and cardiovascular diseases in areas where the techniques were applied served as indicators

when establishing the study criteria. Performing these techniques on the anterior part of the neck may presumably increase blood pressure, so the authors did not want to cause sternum compression. Individual physiotherapeutic and osteopathic help also involves recommending properly selected exercises which patients may perform independently. At the same time, it will reduce negative effects of musculoskeletal system overloads connected with work, improper posture or work-related stress [13]. Rubin et al. [13] revealed that in the case of patients with a long slim neck, experienced manual therapists or osteopaths are able to palpate arytenoid cartilage and crico-arytenoid joints or examine and compare tension and tenderness of interarytenoid folds and posterior crico-arytenoid muscles. However, this examination may be uncomfortable for a patient. While performing manual manipulations in the larynx area, particular attention should be paid to unintended effects in the form of pressure put on carotid artery and carotid sinus. It is worth noting that in this way, pressure and heartbeat may be changed, particularly in elderly individuals. There is also a risk of damaging atherosclerotic plaques in carotid arteries. Stepnik and Klukowski [14] revealed a statistically significant increase in the range of motion in the cervical spine both after performing post-isometric relaxation and after classical stretch without a significant difference between these two techniques. In his work concerning dizziness, Marszałek [15] revealed that

blood supply dysfunctions caused by blood flow dysfunctions in vertebral arteries are the reason for dizziness described by various authors. It may be caused by degenerative changes in the area of facet joints [15]. A therapist cannot reverse structural changes in bones but may normalize the tension and function of soft tissues which surround the areas affected by the degenerative process [15]. In this case, the therapy should be very gentle. It is recommended that myofascial release and trigger points therapy should be applied at anterior and posterior neck muscles and temporomandibular joint muscles. These recommendations stem from our own experience. Dizziness is frequently caused by the so-called subclavian steal syndrome. It may result from a pressure put on subclavian artery and vertebral artery by shortened anterior scalene muscle, prevertebral layer of cervical fascia and longus colli muscle at the thoracic outlet level.

Leaver et al. [16] compared the effects of 2-week treatment performed in 4 sessions in a group of 182 patients with non-specific recent onset neck pain. They compared the effectiveness of manipulation and mobilization. Similar effectiveness and a similar number of days needed for recovery

were noted in both groups. Mandara et al. [17] compared osteopathic manipulative treatment with standard healthcare in 28 patients with chronic neck pain. They revealed a statistically significant improvement in the group treated with osteopathic techniques measured with VAS and NDI.

It is worth noting that the percentage of individuals with complete disability in the control group decreased by over 26% after the therapy, which may indicate a strong placebo effect.

To sum up, performing osteopathic techniques in the anterior region of the neck reduces pain connected with performing everyday activities. However, particular attention should be paid to the patient's safety and potential cardiovascular diseases.

Conclusions

The research results indicate that performing osteopathic procedures in the anterior region of the neck reduces neck pain and disability level in patients.

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