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The Effect of Physiotherapy on Daily Activities in Patients With Non-specific Neck Pain

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Summary

Objective: The aim of this study was to assess the effectiveness of physiotherapy in the management of non-specific neck pain.

Design: The prospective clinical study.

Participants: 30 patients with non-specific neck pain aged 21 to 60 years.

Methods: Patients underwent kinesiotherapy using prenatal and postnatal autoreflex positions, applied in 12 sessions held twice a week for 6 weeks, each lasting 30 minutes.

Results: The average clinical improvement of participants was 54%. The Neck Disability Index (NDI) score was significantly reduced, from 19.5 points before to 9.4 points after treatment (p = <0.001, r = 0.93).

Conclusion: Physical therapy has been shown to be an effective method for the relief of non-specific neck pain, and the therapy resulted in significant clinical improvement and reduced disability among participants. Further research is needed to examine the long-term effects and to analyze their impact on active range of motion, muscle strength, proprioception, and psychosocial factors.

Keywords Non-specific neck pain. Physiotherapy. Kinesiotherapy. Autoreflex positions. Neck Disability Index.

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Introduction

Definition and Importance of the Topic

Globally, cervical pain has been assessed as the fourth most common cause of work disability and ranked twenty-first in terms of total burden on society. The cervical spine is defined as the area between the superior nuchal line and the level of the spina scapulae (1). We can also talk about pain between the occipital bone and the thoracic vertebrae, which can spread towards the shoulder joint (2). Spinal pain is highly important as it is prevalent, particularly in economically developed countries, as it belongs to the group of civilization-related diseases associated with lifestyle. Moreover, its incidence increases with the aging of the population (3). Although, unlike epidemic infectious diseases, spinal pain does not lead to mass mortality (4), it is far from a rare occurrence (5). Instead, as a chronic condition affecting individuals, particularly in older age, it has emerged as a significant social issue in aging societies. Like many similar problems, it places a burden on the limited resources of the state (6), its healthcare system, and individual medical professionals (7). However, it generally does not reach the severity requiring institutional long-term care (8). Furthermore, unlike epidemic infectious diseases, effective prevention of spinal pain syndromes cannot be achieved through a single medical procedure (9). Instead, it necessitates the development of long-term habits that support a healthy lifestyle and the adoption of health-promoting behaviors over decades. In this case, there is also no widespread fear of the disease, which, in other circumstances, may serve as a motivating factor for early preventive actions (10). Cervical spine pain tends to persist or recur,

significantly reducing quality of life and posing a risk of complications (11). While modern medicine offers a variety of widely accessible treatment options (12), these approaches do not always need to be as aggressive as those used for many other conditions, particularly in contrast to oncological diseases (13) and their associated pain (14). A major limiting factor in treatment effectiveness is the necessity of sustained therapeutic interventions, including physical exercises, over extended periods. This requirement significantly hampers patient adherence (15) and necessitates accurate documentation of the patient's condition (16). Additionally, it demands efficient communication and information exchange between multiple institutions and individual healthcare professionals (17), often facilitated through modern teleinformatics systems (18).

In most cases of cervical pain, the causes are unclear. Most often, these causes are described as non-specific or mechanical (19). This pain can be caused by changes caused by degenerative processes in the area, long-term overload, or compensation of another part of the musculoskeletal system by the cervical spine area (2, 20).

Diagnosis of non-specific cervical spine pain consists of taking anamnesis, physical examination, and possible imaging examinations to clarify structural pathologies and exclude red flags. We pay attention to the type of work, bio-psycho-social factors, level of physical activity, and other possible comorbidities. We evaluate the active and passive range of motion of the cervical spine and adjacent regions, the presence of pain, and limitations. We examine muscle strength, positivity of stretching maneuvers in the upper limb, and palpation sensitivity of soft structures (21, 22, 23).

Other assessment options are questionnaires such as the Extended Aberdeen Spine Pain Scale, the Bournemouth Questionnaire, the Cervical Spine Outcome Questionnaire, the Current Perceived Health 42 Profile, the Neck Disability Index, the Northwick Park Neck Pain Questionnaire, and the Neck Pain and Disability Scale (19, 24).

The most commonly used forms of therapy include spinal manipulation, acupuncture, massage, active exercise, traction techniques, soft cervical collar, physical therapy, pharmacological treatment, education about ergonomic principles, and bio-psycho-social factors of pain (21, 25). Alternative forms of treatment include kinesiotape and cupping (2, 26).

The APPP® concept is based on the psychomotor development of a person from prenatal, i.e. sperm movement, to postnatal and bipedal locomotion. The patient assumes a therapeutic position under the guidance of a therapist, in which conscious isometric contraction of the skeletal muscles occurs. This position results in the brain receiving stimuli and subsequently activating the patient's natural and innate abilities. In this way, the relevant motor pattern is equipped. Upon repetition, activation of the impaired motor pattern and stereotype is assumed. The patient should be able to spontaneously include this motor pattern in his motor expression, without the need for further conscious learning (27, 28, 29).

These movement patterns are "required" by each individual throughout their life. The advantage of the concept is the automatic autoreflexive involvement of muscles, including deep stabilizers. The patient's active cooperation in setting and activating the position is important. After a certain period of time, the patient switches to a home self-therapy regimen, when he performs the therapy without the guidance of a therapist (28, 29).

Research Section

Objective of the work

The aim of the research is to verify the therapeutic efficacy of autoreflexive prenatal and postnatal positions in the kinesiotherapy treatment of non-specific cervical spine pain.

Research questions

Q1: Will the application of physiotherapy affect patients with non-specific cervical spine pain?

Q2: Will gender, age, and total duration of therapy affect the effect of physiotherapy on non-specific cervical spine pain?

Methods:

Study Design

The study was conducted as a prospective clinical trial. Patients underwent a clinical examination before starting therapy and after the end of therapy. At the beginning of each week, they provided

information about the duration of self-therapy they performed at home during the previous week. All patients signed an informed consent. A questionnaire form was used to obtain data.

Participants

30 patients with non-specific cervical spine pain were selected by purposive sampling between the ages of 21 and 60; the sample consisted of 14 men and 16 women. The average age of the patients was 36.7 years.

Inclusion criteria: age from 18 to 60 years, diagnosis of non-specific cervical spine pain, active occupation, consent to therapy and inclusion in the study, and agreed to anonymous data processing, with a duration of pain for at least four weeks.

Exclusion criteria: failure to complete therapy; interruption of therapy for more than three weeks; traumatic injury during the duration of therapy that could affect the result; occurrence of other changes in health status, pain of inflammatory, tumor nature, pain lasting less than four weeks.

Intervention/therapy

Patients underwent 12 therapies twice a week, with a total duration of six weeks. The duration of therapy was 30 minutes. The therapy included kinesiotherapy in the form of prenatal and postnatal autoreflex positions. Autoreflex prenatal and postnatal therapeutic positions were included in the form of kinesiotherapy, which patients performed under the supervision of a therapist as well as in the home environment independently according to the therapist's instructions and indications. Autoreflex prenatal and postnatal positions are primarily focused on isometric contractions in positions derived from the ontogenetic development of a person. They are characterized by low intensity of contraction and a focus on the quality of its execution, i.e. on control over the performed movement. Patients were instructed about possible lifestyle risk factors, stereotypes of cervical spine use, and its postural load during daily activities. In accordance with these instructions, patients underwent training in adjusting the performance of daily activities according to the specific criteria of individual patients.

Methodology

Patients assessed their condition using the Neck Disability Index (NDI) questionnaire (Musilová et. al. 2020), which they filled out before and after the end of the therapy, which lasted 6 weeks. We used the specialized statistical computer program Statistical Package for the Social Sciences (SPSS) to process the obtained data. In this computer program, we subsequently performed the evaluation with a paired T-test and a non-parametric Mann-Whitney U-test and correlation analyses.

Results

The age range of the patients was from 21 to 60 years. The average age of the respondents was 37 years (SD= 12.603). The group consisted of 16 women (53.33% of N=30) and 14 men (46.66% of N=30). The female group had a mean age of 40.06 years (SD= 14.154), with the lowest age being 21 years and the highest being 60 years. In the male group, the mean age was 33.50 (SD= 9.921) and ranged from 21 years to 53 years.

All patients showed a statistically significant decrease in NDI score ($p = <0.001$, $r = 0.93$). Gender ($U = 110$, $p = 0.951$), age ($r = -0.302$, $p = 0.104$) and total duration of therapy ($r = -0.093$, $p = 0.627$) had no significant effect on the change in NDI score.

Statistical data analysis

Research question O1: Will the application of physiotherapy affect patients with non-specific cervical spine pain?

Table 1 Paired T-test of NDI scores

NDI	N	Median	Range	SD	t	p	r
Before	**30**	**19,5**	**21**	**5,257**	**19,699**	**<0,001**	**0,93**
After	30	10	17	4,731			

Two-way significance test

Based on the comparison of the results, we can conclude that the raw score of the NDI questionnaire before therapy (Mdn = 19.5) is significantly higher than in the questionnaire completed after completing therapy (Mdn = 9.4). Based on the results of the paired T-test ($T = 19.699$, $p = <0.001$) we can conclude that this

difference is statistically significant and the differences are very pronounced (r = 0.93).

Research Question O2: Will gender, age and total duration of therapy affect the effect of physiotherapy on non-specific cervical spine pain?

Table 2 Mann-Whitney U-test effect in men and women

Percentage improvement	N	Median	Range	SD	U	p
Women	**16**	**50**	**58,10**	**16,905**	**110**	**0,951**
men	14	54,15	45,4	14,205		

Two-tailed significance test

Based on the comparison of the results, we can conclude that the overall improvement in women (Mdn = 50) is almost the same as in men (Mdn = 54.15). Based on the results of the Mann-Whitney U-test (U = 110, p = 0.951), we can conclude that there is no significant difference between the groups.

Table 3 Correlation analysis coefficient of age

Variables	Age
Overall improvement	**-0,302**

Two-tailed significance test

Based on the above results, we can conclude that the age group does not have a significant relationship with the overall improvement in the clinical condition of the respondents (r= -0.302, p= 0.104) Based on these results, we answer question O3

Table 4 Correlation analysis coefficient of the duration of therapy

Variables	Age
Duration of therapy	**-0,093**

Two-tailed significance test

Based on the above results, we can conclude that the duration of the total therapy does not have a significant relationship with the overall improvement in the clinical condition of the respondents ntov (r= -0.093, p= 0.627) Based on these results, we answer question O4.

Discussion

The aim of the study was to evaluate the impact of the application of aureflex prenatal and postnatal positions on the health status of patients with non-specific cervical spine pain. The research sample consisted of 30 patients, 14 men and 16 women, who independently assessed their health status using the Neck Disability Index questionnaire. Patients completed this questionnaire before and after the end of therapy. At the beginning of each week, patients provided information about the duration of self-therapy they performed at home during the previous week. We noted an improvement in their health status to varying degrees in all patients.

The Neck Disability Index was chosen based on international consensus on its effectiveness and use in cervical spine pain. The NDI provides sufficient utility and effectiveness in the assessment of cervical spine pain (30). The NDI is often translated and used abroad, as confirmed by the study of the use of the Dutch version. After evaluating the results, the author concludes that the NDI is a valid option for self-assessment of disability associated with cervical spine pain (19).

We were unable to demonstrate the influence of age, gender, or duration of self-therapy on the eventual differential outcome of therapy. The professional literature describes the period of six weeks from the onset of symptoms as a period when spontaneous resolution of symptoms and almost complete return to full health often occur (31).

This was confirmed by Vos et. al. (32) in their study, where patients were referred to physiotherapy or a “wait and see” approach was adopted in their treatment. All patients underwent evaluations after one year. Patients who were referred to physiotherapy had a 75% success rate, and patients who were not had a 79% success rate. We can therefore conclude that in this case there is no significant difference between these groups (32). Since our patients were followed for six weeks. It is also necessary to mention that there is a frequent recurrence of similar or identical problems (31). Therefore, it could be interesting to see what results we would observe in further follow-up of patients.

Another possible cause of neck pain is depressive or anxiety disorders, which are difficult for a

physiotherapist to influence. Based on this information, it is therefore necessary, for the success of therapy, to diagnose the causes of the subjective difficulties in patients as accurately as possible and differentiate them from each other (33). These claims were further supported by the findings of Elbinoune et. al. from 2016. They state, based on the results of observation of 80 patients, that there is a connection between the finding of cervical spine pain and the prevalence of depression and anxiety among these patients (34). This claim was also supported by the results of an investigation of the relationship and prevalence of depression/anxiety and the occurrence of cervical spine pain (35). Since we did not monitor these parameters in our entry or exit examination, it is difficult to say whether they had an impact and whether they occurred in patients.

Dusuncell et. al. compared the effectiveness of therapy in three groups of patients who were divided based on the therapy provided. Group 1 underwent therapy: transcutaneous electrical stimulation, continuous ultrasound application, and infrared irradiation. Group 2 underwent therapy that included: physical therapy in combination with stretching and isometric exercises. Group 3: physical therapy in combination with stabilization exercises. Patients were evaluated based on the dose of indicated paracetamol, NDI results, Beck Depression Scale, and range of motion in the frontal plane. Patients were evaluated after 1, 3, 6, and 12 months. All groups showed improvement in health status for a period of six months (36). Based on these findings, we can conclude that the success of therapy, by applying autoreflex prenatal and postnatal therapeutic positions in combination with manual treatment, was similar to that of all other groups. Our patients were evaluated only after 6 weeks, and we cannot compare further results. These results confirm the application of physical therapy as a supportive therapy for cervical spine pain.

Another option for supportive treatment is cupping and kinesiotape. Lauche et. al. studied the effect of cupping, specifically one application, on pain and disability. Based on their results, they concluded that cupping is an effective option for supportive therapy (2). Ay et. al. studied the effect of kinesiotape on range of motion, pain, and disability. They applied therapy in the form of kinesiotape and kinesiotherapy in the home environment to patients. Patients showed improvement in all parameters except rotation, lateroflexion, and disability. The results show that kinesiotaping can be used as a supportive form of therapy (26).

Jandvahen et. al. conducted a study on a sample of 72 patients with cervical spine pain. They examined the differences in the effectiveness of therapy when applying scapular exercises and scapular exercises in combination with functional cognitive therapy. The patients' condition was evaluated after 6 weeks. Patients assessed their condition on a visual analog scale of pain and secondary kinesiophobia and muscle activity. The group of patients who underwent combined therapy showed greater pain reduction and improvement in kinesiophobia and muscle activity (37). Therapy in the form of scapular training shows similarities with the principles of autoreflex prenatal and postnatal positions. Since there is activation of muscle chains in the scapula area and its subsequent stabilization. If we want to compare the results with our research, we will encounter the problem of different evaluation methods. We can state that in both cases there was an improvement in health status.

Khan et. al. compared the effect of isometric exercises in comparison with therapy focused on active movements and active range of motion. Both groups consisted of 34 patients. Both groups showed an improvement in the values of the visual analogue scale of pain and the Nortwick Park Neck Pain Questionnaire. However, the groups focusing on isometric exercises showed a more significant improvement in these values (38). The concept of autoreflex prenatal and postnatal therapeutic positions is largely based on long-term isometric contraction in specific positions, which aim to induce a spontaneous autoreflex response of the organism. We can therefore assume that the isometric contraction component will be beneficial in the therapy of non-specific cervical spine pain.

Another therapy option is neuromuscular control exercise. The effectiveness of this method was compared with two other groups. 44 patients were divided into three groups according to the type of therapy. Group 1 applied neuromuscular control exercises, group 2 applied stretching, and group 3

applied stabilization exercises. Pain level, range of motion, and proprioception level were measured before and after the end of therapy. Group 1 showed the greatest improvement in perceived pain when measuring proprioception. The increase in range of motion was the same in all groups (39). The concept of autoreflexive prenatal and postnatal positions has the described effect of improving proprioception and control of the segments that are therapeutically affected in therapy. The results of the above study indicate a positive impact of these elements on the therapy of patients with cervical spine pain. Tunwattanapong et. al. (25) compared the effectiveness of specific stretching of the cervical spine and a control group. Ninety-six patients with cervical spine pain participated in this research. All participants received information brochures that focused on the principles of ergonomic positions in the work environment. The therapeutic group was instructed and educated on performing stretching in the home environment. The patients were to perform this stretching twice a day, five days a week, for four weeks. The group that performed stretching showed significantly greater improvement in the dimensions of pain and quality of life. Compared with patients who exercised <3 times a week, those who exercised ≥3 times a week brought a significantly greater improvement in cervical spine function and quality of life scores.

Limitations of the Study

The biggest limitation of this research was the size of the observed sample and the length of the observation itself. Also, a control group and random selection of patients are absent.

Conclusion:

The aim of this work was to evaluate the effect of the application of autoreflex prenatal and postnatal therapeutic positions in patients with non-specific cervical spine pain.

We investigated the impact on the overall condition of patients before and after the end of therapy, as well as the correlation between the results of therapy and the gender or age of our patient sample. After statistical evaluation of the results, we can conclude that the overall condition of patients improved. We were unable to prove a significant correlation between the age, gender, or duration of therapy of patients and their resulting improvement in health status.

Based on these results, we can conclude that patients who underwent physiotherapy showed a significant improvement in their health status based on their own assessment.

Suggestions for further research

Implementation of a control group and random selection to increase the reliability of the evaluated data. Further detailed research is needed to determine the impact on the active range of motion, the influence of muscle strength, proprioception, the occurrence of psychological factors, and other factors. It would also be appropriate to focus on the long-term effect of therapy in the future, as well as differentiate between individual stages of non-specific cervical spine pain.

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