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THE INFLUENCE OF PHYSICAL THERAPY ON THE FUNCTIONAL STATUS OF PATIENTS SUFFERING FROM SPINAL OSTEOARTHRITIS OF THE CERVICAL SPINE

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Abstract: *Neck pain is one of the 4 most reported musculoskeletal disorders in the medical field. This condition can lead to functional limitations and can have negative economic and social impacts on the patient's life in addition to the medical repercussions. Approximately half of the population experiences cervical pain or cervicobrachial syndrome at some point in their lives, making it a common complaint. This study was conducted on a total of 10 participants who had been diagnosed with cervical disc disease and consecutive neck pain in the subacute or chronic phase of the disease. The patients selected for this study were assigned to a single group and underwent a complex rehabilitation treatment including physical-kinetic therapy (medical gymnastics, kinesio-prophylaxis, electrotherapy, massage, thermotherapy). The treatment protocol was adapted and individualized for each patient. The statistical results obtained from the study emphasize the importance and effectiveness of the physio-kinesiotherapy protocol in improving the clinical status, functional abilities and consequently the quality of life of patients with cervical pain caused by cervical disease.*

Key words: *neck pain, spinal osteoarthritis, kinesiotherapy*

1. Introduction

Osteoarthritis is a common joint disorder characterized by joint cartilage erosion, osteophyte formation, subchondral sclerosis, and a series of biochemical and morphological changes in the synovium and joint cavity whose incidence is gradually increasing due to an ageing population, unhealthy eating habits, lifestyle changes and increasing obesity [1].

Occupational cervico-brachial syndromes form an important group of rheumatic diseases, caused by degenerative changes of the cervical spine [5]. Cervical radicular syndrome is a complex pathology that

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causes severe radiating pain in the arm and/or hand, which may be accompanied by motor and/or sensory deficits. In most cases, painful radiation involves a cervical nerve root, manifesting as a well-defined mono-radiculalgia, while in others, the painful radiation in the upper limb does not show well-defined clinical features for a definite radicular involvement, evolving with incomplete symptoms [10].

Cervical disc herniation associated with radiculopathy is one of the most common conditions presenting in the clinical picture with cervical or radiating pain in the upper limb [4].

Chronic neck pain is one of the major musculoskeletal conditions in the adult population, with a wide variation in prevalence worldwide, affecting approximately 30% to 50% of the total population [3]. After low back pain, it is the second most prevalent pathology associated with spinal dysfunction, being present in every sector of the population. Cervical spine pain is considered the fourth leading cause of inefficiency [12].

The incidence of neck pain is significantly higher in women than in men. It has been estimated that more than 65% of the world's population experience neck pain at some stage of life [6].

Approximately 60% of people over the age of 40 have degenerative changes and decreases in the height of a cervical intervertebral disc. The degenerative changes in the intervertebral disc led to a reduction in its height and volume because of dehydration, changes in its chemical composition and viscoelastic properties, and cracking of the annulus fibrosus, resulting in the cervical lordosis effacement, which will result in altered biomechanics of the cervical spine [11].

The incidence of neck pain is very common, especially in people who work in prolonged, vicious positions of the cervical spine. Work-related musculoskeletal pain is highly prevalent in both developed and developing countries [1], [7].

Most studies have found that neck pain is associated with a reduced quality of life for people who perform static, desk-based work. Absenteeism from work has also been reported among these people due to pain or tenderness in the cervical region, disrupting their ability to perform their work activities [9].

Therefore, both environmental factors, such as prolonged or vicious static postures, repetitive movements, and physical factors, such as low muscular endurance, incorrect postural alignment or lack of functional ability to maintain correct posture (muscle imbalances - between flexors and extensors of the cervical spine, muscle fatigue) contribute to the development of work-related neck pain [8].

2. Material and Methods

The main aim of this theoretical and practical research was to evaluate the consequences of performing a multilateral physiotherapy and medical rehabilitation program in patients with neck pain diagnosed with cervical disc disease and to argue its effectiveness in decreasing pain intensity, improving functional status and improving quality of life of the patients.

Cervical disc disease is a condition that significantly diminishes the quality of life of the patient, both by the existence of pain and by the resulting functional disability. In other words, this suffering has a negative influence on the patient's complex biopsychosocial model. It is also important to mention the extremely disabling potential that this pathology ultimately presents,

namely the possibility of tetraplegia [2]. Thus, we started from the hypothesis that the application of physiotherapy programs in the case of cervical disc pathology contributes to the improvement of symptoms and to the acceleration of the healing and recovery process from a biopsychosocial point of view.

The research consisted of a prospective study in a medical rehabilitation clinic. It was carried out over a period of 3 weeks and contained a total of 10 participants (7 female and 3 male patients), who came for rehabilitation with the diagnosis of cervical disc disease and consecutive neck pain, in the subacute or chronic phase of the disease. The patients received 10 physiotherapy sessions as part of the treatment.

The patients chosen for this study were assigned to a single group and underwent a complex three-week rehabilitation treatment including physical-kinetic therapy (medical gymnastics, kintetoprophylaxis, electrotherapy, massage, thermotherapy). The treatment protocol was adapted and individualized for each patient.

The examination of the patients was carried out immediately upon their arrival, before the beginning of the complex program of physio-kinesiotherapy and medical recovery, as well as after the end of this period of therapy, at the end of the 10 treatment sessions, i.e.: after 3 weeks.

Data collection for each patient selected to participate in this study was carried out by means of anamnesis, clinical tests and assessments, questionnaires and scales, as well as consultation of treatment records and accompanying medical documents.

3. Results and Discussion

3.1. Demographics and clinical status

Distribution of patients by age

The age distribution of the subjects included in this research is represented in Table 1. As can be seen, most of the patients, i.e.: 5 in number, were in the age range of 51-60 years, while 2 others were between 41 and 50 years.

Only 2 patients were in the over 60 age group, and only one participant was in the 21-40 age group.

Distribution of patients by age group Table 1

Age groups	21-40 years	41-50 years	51-60 years	>60 years
Number of patients	1	2	5	2
Percentage	10%	20%	50%	20%

Distribution of patients by exercise

Patients were divided into two groups according to the degree of physical exertion performed by the patients in their usual physical activity, whether it was in their household activities, at work or during recreation, play:

- ✓ the active group, which included subjects who are physically exerted at work, in household chores or during leisure time.
- ✓ The inactive group, which includes patients who are not required to do physical labour, are forced to work in unbalanced positions for rachis, maintaining various vicious positions and who do not lead an active life, do not move the rest of the time.

The analysis of table no. 2 shows that 5 patients were included in the active category, representing 50% in percentages, and in the second category, the inactive one, the other half, the remaining 5 participants in the study, so there was a balance from this point of view.

Distribution of patients by degree of effort Table 2

Degree of effort	Active group	Inactive group
Number of patients	5	5
Percentage	50%	50%

Distribution of patients by their injury degree

As shown in Table 3, the most important lesion is found at C5-C6 (in 5 of the patients), followed by C4-C5, more precisely 4 of the patients were in this situation.

The last of the 10 participants in the research group was interested in the C6-C7 segment

Distribution of patients by injury degree Table 3

Injury degree	C4-C5	C5-C6	C6-C7
Number of patients	4	5	1
Percentage	40%	50%	10%

3.2. Comparison of clinical and functional status evolution

Muscle balance

The initial assessment of cervical flexor strength using the MRC scale revealed the following ratings: strength 2 for one patient, strength 3 for 60% of the patients (the most important percentage) and strength 4 for 30% of the patients. It is noted that no subject showed the maximum force, i.e. 5.

We then notice an improvement in the scores: 3 patients reached or remained at force 3, 4 subjects maintained or reached force 4, and the remaining 3 patients reached the maximum force, i.e.: 5. The disappearance of the 2 rating at the end of the study is thus observed, so the toning program for the flexor musculature of the cervical spine had positive results.

Distribution of subjects by cervical flexor strength Table 4

Cervical flexors muscle strength	Strength 2	Strength 3	Strength 4	Strength 5
Number of patients before therapy	1	6	3	0
Percentage	10%	60%	30%	0%
Number of patients after therapy	0	3	4	3
Percentage	0%	30%	40%	30%

As for the rating of the extensor force at the cervical spine, initially the following force values were obtained: 30% had force 2, 40% force 3 and the remaining 30% had force 4.

At the end of the research an

improvement in this point of view is emphasized so that all the patients presented a rated muscle strength of at least grade 3. Specifically, 4 patients recorded strength 3, 4 patients showed strength 4 and the last 2 subjects had a normal strength rating of 5.

Distribution of subjects by cervical extensor strength Table 5

Extensors muscle strength	Strength 2	Strength 3	Strength 4	Strength 5
Number of patients before therapy	3	4	3	0
Percentage	30%	40%	30%	0%
Number of patients after therapy	0	4	4	2
Percentage	0%	40%	40%	20%

Pain intensity

The change in pain intensity was assessed using the VAS scale before the start of therapy, and after 3 weeks.

The initial pain rating before treatment is shown in Table 6. It should be noted that at the first pain assessment, most patients rated their algic symptoms as 7 (40%) and 8 (30%) respectively. It should also be noted that there were no ratings below 7, which may be due to patient subjectivity. The average pain intensity recorded was 8.

Distribution of patients by initial pain intensity Table 6

Pain intensity	10	9	8	7
Number of patients	1	2	3	4
Percentage	10%	20%	30%	40%

The rating of the degree of pain by the 10 subjects included in the research, at the end of the recovery program, is shown in Table 7. It is noted that at the final examination most of the patients had a good evolution following the therapy and reduced their pain. Most of the patients, 4 in number, reported pain scores of 5, while 3 other patients reported pain scores of 4. It is also noted that the maximum rating limits (9 and 10) are missing, but their subjectivity in pain assessment should not be forgotten. Thus, the mean pain intensity was 4.8 at the end of therapy.

Distribution of patients by pain intensity at the end of therapy Table 7

Pain scale grading	8	6	5	4	2
Number of patients	1	1	4	3	1
Percentage	10%	10%	40%	30%	10%

Static stability of spinal cord syndrome

Table 8 shows the presence of static spinal syndrome before the beginning of the recovery program and after the completion of this treatment protocol. 60% of the 10 patients included in the research group presented this syndrome.

After the completion of the therapy, the percentage was reduced by half, i.e.: to 30%, so that only they clinically showed head forward projection, cervical scoliosis, decreased cervical lordosis or side tilt, which highlights the effectiveness of physiotherapy.

Table 8

Distribution of patients according to the presence of static stability of spinal cord syndrome

Presence of static stability of spinal fluid syndrome	Before therapy	After therapy
Number of patients	6	3
Percentage	60%	30%

Dynamic stability of spinal cord syndrome

Table no. 9 below shows the existence of dynamic spinal syndrome before the initiation of physiotherapeutic treatment and at its completion. As can be seen, the majority of the subjects, i.e.: 8 out of the 10 participants included in the research group, presented this clinical sign initially. Afterwards, the percentage was reduced to 30%, so only 3 of the patients still had pain during cervical spine movements, a sign that the recovery program was effective.

Table 9

Distribution of patients according to the presence of dynamic stability of spinal cord syndrome

Presence of dynamic s stability of spinal fluid syndrome	Before therapy	After therapy
Number of patients	8	3
Percentage	80%	30%

Dural injury

After analysing table no. 10, it can be said that only 40% of the subjects followed in the study initially showed dural injury until the beginning of physical therapy. After the end of the physical therapy program, the number was reduced by half, so only 2 patients showed this syndrome. The difference is not statistically significant.

Distribution of patients by presence of dural injury Table 10

Presence of dural injury	Before therapy	After therapy
Number of patients	4	2
Percentage	40%	20%

Neural radiculo-neuronal syndrome

The prevalence of radiculo-neuronal syndrome in the subjects included in the research was 70% on arrival, before starting the therapy program. After the end of the program, the radiculo-neuronal syndrome persisted in only 2 of the patients, which proves the usefulness of the treatment. The data is further illustrated in Table 11.

Distribution of patients by presence of radiculo-neuronal syndrome Table 11

Presence of radiculo-neuronal syndrome	Before treatment	After treatment
Number of patients	7	2
Percentage	70%	20%

Neuropsychiatric syndrome

The existence of neuropsychiatric syndrome was identified at the initial assessment in 5 of the patients followed up in the research

At the final evaluation, it was concluded that the improvement of the patients' clinical and functional status was accompanied by a reduction or even disappearance of mental symptoms at three weeks post-treatment. Thus, at the end of the study, none of the 10 patients had an associated neuropsychiatric syndrome, a significant reduction of up to 0%, shown in Table 12.

So, we can say that the neuropsychic syndrome is in connection with the physical-functional status, and a well-selected physiotherapeutic therapy can influence both dimensions in a favourable way.

Distribution of patients by presence of neuropsychiatric syndrome Table 12

Presence of psychological syndrome	Before therapy	After therapy
Number of patients	5	0
Percentage	50%	0%

3.3. Quality of life analysis

The quality of life of the subjects in the study group was assessed using the RAND 36-Item Health Survey 1.0 questionnaire, which was administered both before and after the start of the recovery protocol.

Results' analysis revealed an improvement in the quality of life of the patients in general and of certain parameters in particular: physical functionality, body pain, limitation of activities due to physical health problems, impairment of daily tasks due to personal/emotional problems, emotional well-being, social functioning, vitality/obnoxiousness, perception of general condition and changes in health.

As shown in Table 13, initially half of the patients had a score between 40 and 65, while later 90% of them had a score between 66 and 100, so the quality of life was significantly improved.

This data highlights the positive influence that medical rehabilitation programs have on an individual's quality of life.

Distribution of patients by quality-of-life Table 13

RAND-36 Score	40-49	50-65	66-79	80-100
Patients initially	2	3	4	1
Percentage	20%	30%	40%	10%
Post-therapy patients	0	1	4	5
Percentage	0%	10%	40%	50%

4. Conclusions

Cervical vertebral discopathy accompanied by consecutive cervicalgia is a condition that can occur in any age group, but according to this study, the pathology occurs predominantly in professionally active individuals, as 80% of cases were in the 21-60 age group.

This condition causes a complex clinical picture, the patient may present in addition to pain and radicular symptoms, static and dynamic stability of rachidial syndromes, negative emotional profile, all these elements together contributing to the patient's decreased quality of life.

The aim of this prospective research was to evaluate the importance of physio-kinesiotherapy and medical rehabilitation programs applied to patients with neck pain, diagnosed with cervical vertebral disc disease, subacute or chronic, who received treatment at a rehabilitation clinic for a duration of 3 weeks.

The evaluation of the effectiveness of the physical-kinetic programs was based on the evolution of the clinical and functional status and quality of life of the patients 3 weeks after the initiation of the rehabilitation program.

Regarding pain, it was monitored by means of the VAS scale, and the results showed a significant improvement in pain intensity in the study group followed by reduced VAS scores (if the mean pain intensity at the patients' arrival was 8, after the 10 therapy sessions the mean pain intensity decreased to 4.8).

The statistical analysis showed a decrease in the incidence of clinical syndromes in the study group, especially for the dynamic spinal, radiculo-neural, musculo-ligamentous and neuropsychic syndromes, except for the dural injury where the difference was not remarkable. Even so, the differences were some important, so the remedial therapeutic intervention was successful.

In terms of the subjects' quality of life, a significant percentage improvement is emphasized. If before the therapy 50% of the patients had a score between 40 and 65, at the end of the recovery program 90% of the patients had obviously higher scores, between 66 and 100, so physiotherapy influenced the quality of life of the research participants in a positive sense.

Thus, all patients showed an improvement in their health after following the established treatment, which included not only medical gymnastics but also electrotherapy, hydro-thermal therapy, massage, possibly associated with the notions of kinetoprophylaxis from the principles of the school of back.

The major limitations of this research were the small number of patients (only 10), the short time interval for treatment and follow-up (only 3 weeks) and the subjectivity of the patients in the assessment of pain, clinical-functional status and quality of life.

In conclusion, conservative treatment in general and physio-kinesio-therapeutic treatment in particular are current concepts, basic for the management of patients with cervical vertebral disc disease presenting with consecutive cervicalgia.

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