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DYNAMIC MONITORING OF THE EFFECT OF SPECIAL KINESITHERAPEUTIC PROGRAM ON PAIN INTENSITY IN PATIENTS WITH CHRONIC LUMBALGY

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Abstract

Objective: To assess the effect of a kinesitherapeutic program of special exercises for treatment of pain intensity and endurance of the extensor trunk muscles in patients with chronic lumbalgy.

Methods: The study included 110 patients with chronic lumbalgy, equally distributed in two treatment groups. Participants in the experimental group performed the recommended special exercises 3 times a week at home, while those in the control group only followed the guidelines of a physician. At the beginning of the study and 12 months later, the pain intensity of all the participants was assessed by means of Visual Analog Scale.

Results: In contrast to the participants in the control group, those in the experimental group at the end of observation were reported to experience a significant reduction in pain intensity.

Conclusions: Treatment with specific exercises proved more effective in terms of pain complaints in patients with chronic lumbalgy.

Key words: **pain intensity, special exercises, chronic lumbalgy**

I. INTRODUCTION

Chronic low back pain remains today a major health problem. Despite a multitude of rehabilitation program, it remains difficult to control. Strengthening in the chronic low back pain is not easy because the image of this symptom is multifactorial and requires taking into consideration the profile of each and fixing with him, clear objectives. Strength training must be tailored to the objectives set for a return to work in a sustainable manner. [1].

Recommending exercise as a conservative treatment for chronic lumbalgy has often appeared to be effective by the results of some studies, but there is no evidence which exercises are more appropriate [2, 3].

Durocher et al. (2013) have proven that the application of a functional program in patients with chronic lumbalgy results in a significant improvement of muscle power and cardiovascular functions [4]. Coudeyre et al. 2006 have found a significant reduction of functional dysfunctions and improvement of knowledge about physical activities in people who were informed about exercises for low back pain [5].

Given the social importance of this disease, for the first time in Bulgaria, there was carried out a prospective study of pain intensity and extensional features of the trunk muscles before and after the application of a kinesitherapeutic program of special exercises at home in patients with chronic lumbalgy.

II. AIMS OF THE STUDY

The aims of this study is to take into account the effect of a kinesitherapeutic program of special exercises for treatment of pain intensity in patients with chronic lumbalgy.

III. PATIENTS AND METHODS

The study is representative, prospective, with test-retest design and tracking, with questionnaires to fill out at the beginning and end of the observation (12 months). It was carried out with the participation of a representative sample of 110 patients with chronic low back pain, distributed equally into two treatment groups (experimental and control) of uniform age and gender. The selection of patients was done according to their appearance in the consulting room of the physiotherapy diagnosis and counseling center in Stambolijski by involving all those who met the inclusion criteria. They were each diagnosed and were undergoing therapy at the time, having been referred to the center by a general practitioner after consultation with a neurologist.

All procedures related to the study were performed in accordance with the guidelines of good clinical practices. Prior to procedures, each patient was familiarized with the design of the study and signed an informed consent form.

The following inclusion criteria for the study were used: a signed informed consent, age 30 to 60 years; presence of X-ray of the lumbar spine and consultation with a neurologist; diagnosed chronic low back pain; lack of a herniated disc, tumor, trauma, inflammation of the spine and osteoporosis, etiologically related to low back pain; lack of focal neurological deficit - motor, sensory, pelvic reservoir violations; lack of accompanying psychiatric disorders with a view to a better cooperation. 135 consecutive patients with chronic low back pain were initially screened, 25 of which were not included in the survey due to non-compliance with the inclusion criteria. Of 110 patients included in the final stage of the study, a total of 51 patients dropped out (22 of the experimental group due to a temporary improvement or social commitments and 29 in the control group due to lack of motivation).

Patient information was obtained by taking a history and focused review of available medical records of the therapist and neurologist. The experimental group was trained to perform special exercises 3 times a week at home, and participants in the control group followed the recommendations of a physician for medical treatment. Patients' follow-up lasted for a year.

At the beginning and end of the study, there were applied visual analog scale (VAS).

Assessment of pain intensity by visual analog scale (VAS) was done by the patient's moving a marker on a line

10 cm long, divided on one side by 5 types of faces - from calm and cheerful, to varying degrees of expression of pain and grimacing, and on the other side - of 10 degrees and with identifying words at both ends of the state "no pain" and "pain as bad as could be." The scale allowed comparison of the perceived pain intensity at the beginning and end of the study. Thus, a patient was able to demonstrate a typical level of pain, as well as the strongest and weakest pain [6].

The kinesitherapeutic program applied in patients with chronic lumbalgy in the experimental group included five types of training:

1. Training for mobility: supplying in flexion position, supplying in extensional position, abductor muscle active tension, adductor muscle active tension, active tension of the ischiocrural muscle group.

2. Flexor workout: exercise for strengthening the abdominal muscles from side leg positions, co-contraction trainingfor the anterior oblique system involving the anterior abdominal fascia, dynamic strength training m.obliquus abdominis externus and m.obliquus abdominis internus

3. Training for lumbar stability: elevation of the pelvis to maintain neutral position, axial withdrawal during co-contraction, maintaining co-contraction with elevation of one foot and abduction of the upper limb.

4. Extensors workout: exercises for extension of the spine from aproneposition with hands support and holding for 30 sec in extensional position; co-contraction for strength of m.gluteusmaximus and m.latissimusdorsi.

5. Training for sensory-motor reprogramming: exercises for thetrunk rotators, exercises for upper limb flexion and extension of homolateral lower limbs fromside leg position on a Swiss-ball, exercises to maintain the neutral position by moving the Swiss-ball on the wall.

Monitoring and evaluation of the results of kinesitherapeutic program was carried out by an experienced physiotherapist.

The collected primary information was checked, encoded, and entered into a computer database for statistical analysis. Data were processed using SPSS 13.0. Results for quantitative variables were expressed as mean ± SE (standard error) and results for qualitative variables as percentages.

IV. RESULTS

Table 1. shows the characteristics of the individuals in the two groups in terms of age, gender, pre-existing risk factors for chronic lumbalgy. The described risk factors include: strenuous physical activity, repetitive motion with rotations of the body, spinal column burdening in upright and seated position, being overweight.

Table 1. Age, gender and presence of risk factors in patients from the experimental and control groups at the beginning and end of the study

Indicator	Experimental Group		Control Group	
	At the beginning of study	At the end of study	At the beginning of study	At the end of study
Mean age (yr.) (mean ± SE)	43.31 ± 1.11	44.24 ± 1.35	43.90 ± 0.87	44.57 ± 0.55
Gender /N (p%)/				
- male	26 (47.27%)	11 (39.39 %)	24 (43.63%)	8 (30.76 %)
- female	29 (52.73%)	20 (60.61 %)	31 (56.37%)	18 (69.24 %)
Risk factors				
- yes	33 (60.00%)	19 (57.57 %)	32 (58.18 %)	15 (57.69 %)
- no	22 (40.00%)	14 (42.43 %)	33 (41.82%)	11 (42.31 %)

At the beginning of the study there were ascertained no significant differences between the participants in the experimental and control groups in terms of mean age $P > 0.05$ ($u = 0.41$), gender $P > 0.05$ ($\chi 2 = 0.15$) and present risk factors, $P > 0.05$ ($\chi 2 = 0.04$). No correlation was found between the participants' gender and the presence of risk factors $P > 0.05$ ($\chi 2 = 3.51$) as well as between age and the presence of risk factors $P > 0.05$ ($\chi 2 = 2.81$).

Figure 1. demonstrates the results from the VAS in participants from both the experimental and control groups at the beginning and end of the study.

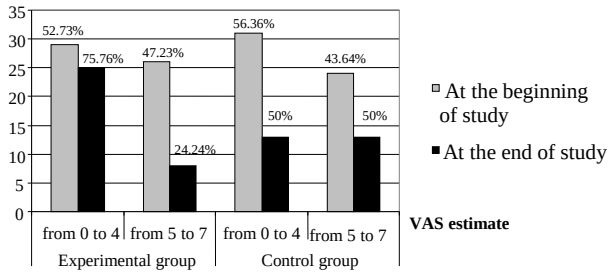

Figure 1. Pain intensity (VAS) of participants from the experimental and control groups at the beginning and end of study.

In studying the dynamics of the pain intensity in the experimental group there was found a small but statistically significant change after 12 months of implementation of the special kinesitherapeutic program – the average pain intensity was reduced by one half (from 4.24 ± 0.20 at the start of monitoring to 3.76 ± 0.24 at the end) $P < 0.01$ ($u = 2.97$), while in the control group no such change was observed $P > 0.05$. At the end of this study there was found a significant difference between the intensity of the pain of the patients from the experimental (3.76 ± 0.24) and those from the control group (4.62 ± 0.28) - control patients had more severe pain by nearly a whole unit $P < 0.05$ ($u = 2.33$).

The pain intensity in participants from the experimental group at baseline correlated with age, $P < 0.01$ ($r = 0.61$). The mean results of pain intensity in patients aged over 50 years (4.50 ± 0.27) was significantly higher than that of other participants (3.89 ± 0.46 in the age to 39, and 2.92 ± 0.29 at age 40-49 years) $P < 0.01$ ($F = 9.40$). Such a relationship was established also at the end of the study $P < 0.01$ ($F = 5.11$).

No gender correlation of the pain intensity was found in the participants in the study P > 0.05 (u = 0.64).

The mean pain intensity in patients from the experimental group at baseline with no risk factors for chronic lumbalgy was 3.68 ± 0.19, while in those with pre-existing risk factors it was significantly higher - 4.94 ± 0.17 P <0.001 (u = 4.14), i.e. - the presence of risk factors correlated with pain P < 0.001 (r = 0.56).

V. DISCUSSION

The purpose of this study is to take into account the effect of a kinesitherapeutic program of special exercises for treatment of pain intensity in patients with chronic lumbalgy.

With regards to pain intensity reduction our study results are similar to those of other studies [7-11]. After 12 months of gymnastics we found some reduction in pain intensity in 75.76% of the participants in the experimental group. We observed in the control group some aggravation of the painful symptoms at the end of the study. This result can be explained by the application of the described stabilization exercises, endurance exercises, and exercises for sensory-motor reprogramming in the experimental group. This contributes to enhancing the dynamic stability of the lumbar spine and restoring the functionality of the spine on the basis of an improved neuro-muscular protection. In the literature we found confirmation of our results in the study of Sullivan et al. (1997), who found that the specific stabilizing exercises are effective in reducing pain and disability in chronic but not acute low back pain [12].

Danneels et al. (2001) compared the results after the stabilizing treatment (one session per week for 10 weeks) in patients with chronic lumbalgy, and those resulting from manual therapy. The stabilizing treatment led to slight differences with respect to both the difficult performance of the daily activities and the quality of life; a significant difference was observed only in terms of pain intensity [13]. In another study, McGill (1998) also demonstrated that by endurance training,a reduction of pain [14] is achieved. In the literature we found evidence to support the claim that the application of exercises for sensory-motor reprogramming in patients with chronic lumbalgy helps reduce pain ful symptoms. From the study of Mayer et al. (1984) it becomes clear that the techniques used for sensory-motor programming affect proprioreception and coordination between the short and the long muscles of the body and are effective in reducing pain for a longer period of time and increasing the functionality in patiens with chronic lumbalgy [15].

The results of our study indicate that an increase in pain intensity correlates with an increase in age. This is explained by chronic complaints, since the attacks of low back pain are usually the result of degenerative changes in the joint system of the spine, muscle and ligament damage, lumbosacral radiculitis, blockages, abdominal and lumbar imbalance - states with increasing frequency in the elderly. According to Mayer et al. (1987) aging is also associated with pain and physical constraints that are predictive of disabling [16].

Greater pain intensity correlates with the presence of risk factors for chronic lumbalgy. The results of the survey of Lehman et al. (1993) support our conclusion that the intensity of low back pain is relatively higher among people sitting or standing for a prolonged time, additionally burdening the spine [17]. In the psycho-social aspect, if the risk factors in these patients are not eliminated, the latter's condition may deteriorate, leading to a more difficult performance of their professional duties, problems with employment, low self-esteem and frustration.

VI. CONCLUSION

The application of specific exercises in patients with chronic lumbalgy proved extremely useful in view of the obtained information, so as to effectively recover aspects of motor control. The reported positive effect of the kinesitherapeutic program consists in the reduction of pain intensity. Non-implementation of such a program is associated with worsening of the functional status of patients. Our results may motivate the introduction and implementation of the described kinesitherapeutic program in the clinical practice in Bulgaria to improve the quality of life and reduce disability in people with chronic lumbalgy.

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