Efficiency of selected physiotherapeutic treatments for low back pain

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ABSTRACT

Purpose: Low back pain (LBP) occurs among approximately 60-80% of the population, gradually contributing to long-term or recurring disability. We aimed to evaluate the efficiency of two physiotherapeutic treatments (namely, Träbert current and kinesiotherapy) among patients with LBP.

Material and methods: Comprised of function tests and scales of pain and functionality, clinical tests were performed according to a prospective method in a regional hospital in Lomza. Forty patients randomly distributed into two groups: one group a subject to physical therapy with Träbert currents, the other group to kinesiotherapy following a proprietary programme. Physiotherapy was performed from Monday to Friday for two weeks in a series of ten treatments.

Results: The treatment used in both groups significantly decreased pain and increased functionality of patients, evaluated by Laitinen's survey, the Oswestry Disability Index (ODI), and the Roland Morris Disability Questionnaire. Results of the Schober's and "fingertip-to-floor" tests also showed increased improvement.

Conclusions: The physiotherapy facilitated a significant decrease in pain, an increase in the mobility in lumbosacral segment of the spine and a decrease in disability among patients with LBP.

Key words: Low back pain, degenerative lesions, physiotherapy, kinesiotherapy, physical therapy

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INTRODUCTION

Low back pain (LBP) occurs among approximately 60-80% of population, gradually contributing to long-term or recurring disability [1]. A degenerative joint disease is the most frequent disease of joint, and in developed countries it is the most frequent reason of pain, loss of functions and disability of a motor system [2].

A degenerative disease is the main reason of occurring ailments among a big number of people. The disease is a heterogenic group of chronic illnesses comprising all elements of joints and periarticular connective tissues [3]. It may affect patients at every age, but its incidence increases between 40th and 50th year of age. After 65th year of age it is the most frequently described among lesions in an organ of movement in radiological assessment, and it occurs among over 80% of patients over 75 years of age [4].

Chronic pain and progressing lesions within the spinal joints influence the deterioration of the quality of life, lack of acceptance of a disease, often lead to mood depression and even to depression [5].

A precisely conducted inquiry and a physical examination are particularly important in a diagnosis. A standard X-ray is helpful in confirming a diagnosis and eliminating other chronic illnesses.

The treatment comprises pharmaco-therapy, physiotherapy, spa-treatment, and education [6].

Physical exercises play an important role in the prevention and treatment of back pain. These exercises mostly aim at breaking an erroneous pain circle by decreasing a reflex intensified tension of paraspinal muscles, improvement in stability of a lumbar segment as a result of increasing abdominal press, as well as restoration of a muscular balance, which prevents a recurrence of ailments [7].

Dynamic stabilisation exercises lead to the creation of an adequate muscular control in lower segment of spine, which causes the decrease of recurring micro traumas of spine components [8].

Träbert currents are used among physical methods in patients with degenerative lesions. The effect of these currents is based on analgesic effect, decrease of muscular tension and circulation improvement. Analgesic effect is based on modulation of nociceptive information in a spinal cord and higher parts of a nervous system, as well as on stimulation to secrete opioid peptides.

Currents cause the reduction of muscle tension through the induction of tetanus spasms and lead to the reduction of sympathetic system activity. Influencing the autonomic nervous system, currents cause vasodilation which leads to the increase of blood flow. The important element of the procedure is proper arrangement of electrodes which simultaneously ensures influence on sensory, motor and autonomic nervous system. [9-15].

The purpose of this paper was to evaluate the efficiency of physiotherapeutic treatments evaluation (Träbert currents and kinesiotherapy) in patients with low back pain. The influence of aforementioned procedures on pain, patients physical condition and everyday activities has been evaluated as well as the influence of the therapy on spine mobility.

MATERIALS AND METHODS

The tests were conducted in regional hospital in Lomza (Outpatient Rehabilitation Clinic), after obtaining a consent of the bioethics committee. The group consisted of 40 patients with LBP in a course of degenerative lesions. Two groups were isolated at random. The first group was a subject to physical therapy – treatments with the use of Träbert currents. The second group was subject to kinesiotherapy – in accordance with a proprietary programme. The mean age of the examined patients was 55.3 years (Tab 1).

Table 1. Demographical data

Variable	Group	Mean	n	Min	Max
Age	I	56	20	33	72
Age	II	53	20	20	65
Gender/ Women	I	56	18	41	72
Gender/ Men	II	49	2	33	65
Gender/ Women	I	52	13	20	59
Gender/ Men	II	58	7	43	65

The duration of pain ranged from 1 month to 20 years. Most of the patients had degenerative lesions - II° - 64%.

Criteria for patients inclusion to the study:

- RTG examination confirming degenerative changes in spine and allowing evaluation of disease severity,
- Patient's written consent for participation in the study

Criteria for patients exclusion from the study:

- Lack of pain
- Presence of root symptoms (concurrent with discopathy); all patients underwent tests excluding root symptoms: Hoover's sign, stretching tests for sciatic, femoral and lateral femoral cutaneous nerves: neuromobilization

according to G. Sozanskiej, J. Szpryngera, Lasègue's sign.

Also tests excluding hip joint dysfunction have been performed: Thomas test and Drehmann sign.

- other, like for instance: pregnancy, pacemaker, metal implants in the area of spine, pain with unknown etiology, cutaneous changes in L-S area (for electrotherapy).

Methods

The clinical evaluation of patients was conducted on the basis of an interview and physical examination, carried out both before and after treatment. Kellgren-Lawrence Grading Scale, Visual Analog Scale (VAS) - subjective pain evaluation by the patient using 10-point scale where "0" is lack of pain and "10" is unbearable pain, Laitinen questionnaire – evaluation of following factors: intensity and frequency of pain, analgesic drugs administration and limitations in physical activity. The Oswestry Disability Index- ODI – evaluating the severity of disability caused by spine pain. The questions regarded pain, everyday activity, lifting, sleeping, social life, walking, standing, travelling. The Roland Morris Disability Questionnaire – conducted in order to evaluate the influence of pain and spine ailments on patients everyday activities which may induce pain as functional tests: the Schober's tests and "fingertip-to-floor" tests [12-20].

Group 1 (n=20) was subject to physical therapy (Träbert current), parameters: impulse time – 2ms, break time – 5ms, impulse frequency – 143Hz, treatment time -15 minutes. Kinesiotherapy in group 2 (n=20) was conducted in accordance with a proprietary programme in time amounting approx. to 30 minutes. The exercises started with a warm-up, which was preparing a motor system to effort. The objective of the subsequent part of exercises was the strengthening of paraspinal muscles, buttocks, and abdomen. The relaxing exercises of superficial dorsal muscles, stretching ischiocrural muscles and corrective exercises as well as learning to maintain a regular posture. Gymnastics was started from low positions (frontal lying, crouching on hands and knees) to high positions – standing. Physiotherapy was conducted in the rehabilitation ward every day for two weeks (with a break for Saturday and Sunday) in a set of ten treatments.

Statistical analysis

Data were analyzed using Statistica 10.0. Results were presented in a graphic form with the use of programmes: Microsoft Excel 2007 and Statistica 10.0. The normality of distribution has been tested with Shapiro-Wilk test. Non-parametric tests were used to verify research problems due to lack of normal distribution, such as: Wilcoxon test for dependent variables and Mann-Whitney U test for independent variables. Results were regarded as statistically significant at the level of $p< 0.05$.

RESULTS

VAS scale

The treatment used in both groups significantly decreased pain ($p< 0.05$). The pre- and post-treatment medians in group 1 were 6.0 and 4.0, respectively, while in group 2, they were 7.0 and 2.0 (Fig. 1).

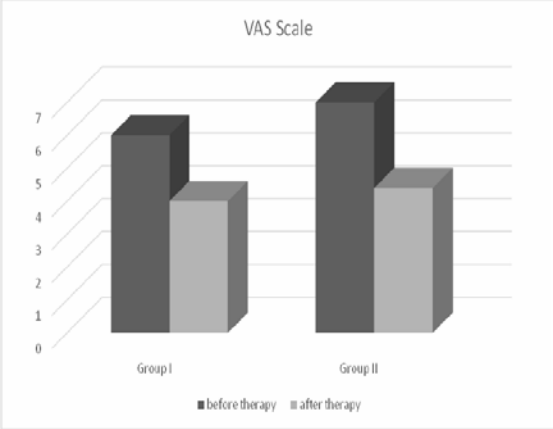

Figure 1. Pain evaluation in VAS scale

Laitinen's survey

In group 1, the pre- and post-treatment median sums of points were 8.0 and 3.5, respectively, while in group 2, they were 7.0 and 2.5 (Fig.2), (Tab.2).

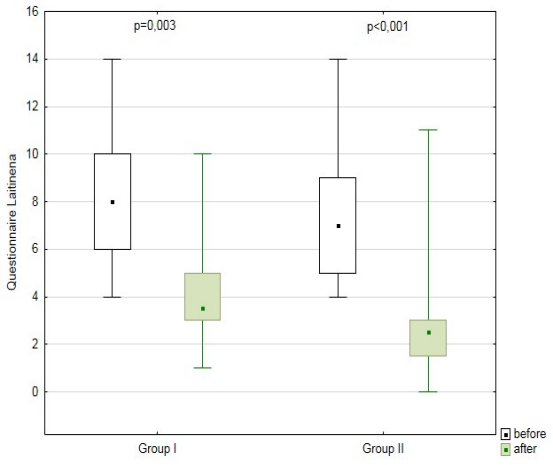

Figure 2. Laitinen's survey

Table 2. Used questionnaires

Variable	Group	N	Mean	Min	Max
Laitinen before	I	20	8	4	14
	II	20	7	4	14
Laitinen after	I	20	3.5	1	10
	II	20	2.5	0	11
Oswestry before	I	20	24	9	41
	II	20	17	7	35
Oswestry after	I	20	10.5	0	25
	II	20	7	10	28
Rolland-Morris before	I	20	16	8	23
	II	20	13	5	21
Rolland-Morris after	I	20	7	0	19
	II	20	4.5	0	21

Oswestry Disability Index

Before treatment in group 1, the median sum of points was 24.5, although after treatment, it decreased to 10.5. In group 2, by contrast, the median sum of points was 17.0 before therapy and 7.0 afterward. The differences in values in both groups were statistically significant ($p<0.05$). (Fig.3), (Tab.2).

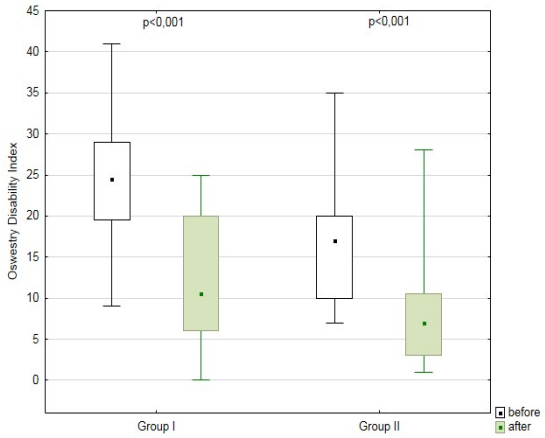

Figure 3. Oswestry Disability Index

Rolland-Morris Disability Questionnaire

Before treatment in group 1, the median was 16.0, which decreased to 7.0 after treatment. In group 2, the median was 13.0 before treatment, which decreased to 4.5 afterward. A moderate level of disability was observed among patients in both groups before treatment, whereas after treatment, their results from the questionnaire reflected a low level of disability.

The values in both groups were statistically significant $p<0.05$ (Fig.4), (Tab.2).

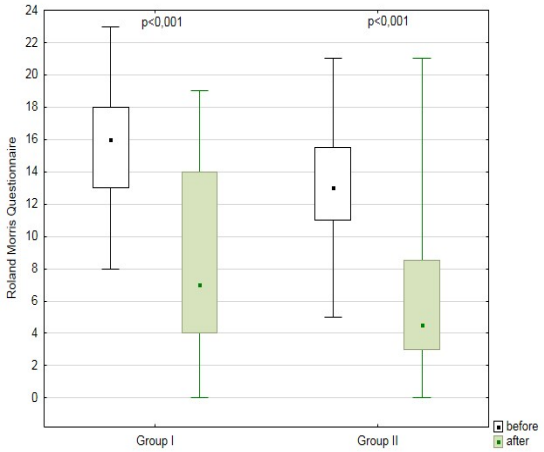

Figure 4. Rolland-Morris questionnaire

Schober's test

A scope of bending of lumbar spine amounted to 4.5 cm before treatment in group 1, however after termination of treatment it was 4.8 cm. In group 2, scope of bending amounted to 4.6 cm, and after treatment it improved and amounted to 5 cm. The medians in both groups amounted to 5 cm. The values in both groups were statistically significant $p<0.05$ (Fig.5).

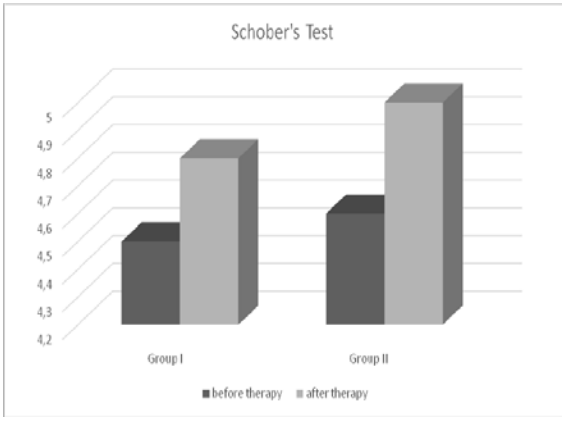

Figure 5. Schober's test

„Fingertip-to-floor" test

Before the commencement of physiotherapy in group 1, the test results amounted to 17.2 cm, and in group 2– 13 cm. After treatment a change in results was observed of 4 cm. The improvement in spine mobility was noted of 5.5 cm

in group 1 and 2.4 cm in group 2. Results were statistically significant $p<0.05$ (Fig.6).

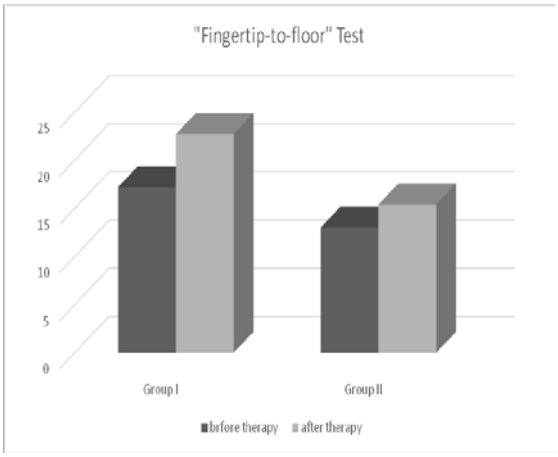

Figure 6. "Fingertip-to-floor" test

DISCUSSION

Our results indicate that the physiotherapy used in both groups significantly influence the decline in intensity and frequency of pain, the patients' motor activity improved and a number of taken painkillers decreased.

Twenty-nine patients were subject to tests in a paper by Straburzynska-Lupa *et al*. [21]. A set of ten treatments of magnetic therapy and kinesiotherapy were conducted in accordance with the established programme. Significant decrease of pain, walking improvement, decrease in a degree of rigidity of joints and a general improvement in everyday activities after treatment in the entire group were noted.

However, Kujawa *et al.* [22], compared the efficiency of laser therapy and kinesiotherapy treatments with relation to a group treated with interference currents connected with gymnastics. The evaluation of used treatment conducted on the basis of the Laitinen's survey demonstrated a higher analgesic effect in a group treated with a laser and kinesiotherapy.

In another study, three groups were isolated out of a group of 90 patients. Ultrasounds were used in the first group, kinesiotherapy in the second one; however, a therapy combining ultrasounds with kinesiotherapy was used in the third group. After termination of treatment a significant decrease of pain concentration evaluated by VAS scale and the Laitinen's survey, improvement in general fitness defined by the Oswestry index were observed [19].

In another study by Lukowicz co-workers, 40 patients of the two randomly groups were examined. Kinesiotherapy preceded by sonotherapy were applied in a research group (n=20), however, stabilising-strengthening exercises for muscular corset were done in the second control group. A decrease of pain concentration and the frequency of its occurrence were observed with all examined patients. Patients reduced the use of painkillers as well [23].

A team of Charłusz analysed the efficiency of the selected methods of physiotherapy. They found a significant improvement in the Laitinen's survey. Ninety-four people aged from 24 to 75 were examined, out of whose 3 equal groups (A, B, C) were isolated. Patients in group A were subject to laser biostimulation treatments, in group B sonotherapy was used, and in group C – hypotension therapy combined with the effect of Träbert currents [15].

Mikołajczyk and colleagues assessed two 40-person groups out of a group of 80 patients. The first group was subject to a traditional physiotherapy, however, Kinesio Taping was applied in the other one. Rehabilitation in both groups comprised ten treatment days. The complex physiotherapy used significantly influenced the decrease of pain and influenced the improvement in the patients' functionality [24].

Effect of physiotherapy in a group of 30 patients was evaluated in a paper by Ratajczak and colleagues. A series of ten laser therapy, magnetotherapy and kinesiotherapy treatments were conducted. A significant decrease of pain in VAS scale was found as well as increase in mobility of spinal joints [25].

In another study, Träbert currents and kinesiotherapy were used in a group of 50 patients. A statistically significant pain reduction was obtained after therapy [12].

In a paper by Kuciel-Lewandowska and colleagues 40 people were subject to tests, out of whose two research groups were isolated. TENS currents were used in the first group, and Träbert currents were used in the second one in a series of ten treatments. After the use of currents, pain significantly decreased with almost half of patients [11].

In a similar study by Kuciel [10], ten treatments with Kotz and Träbert currents were used in a group of 30 patients. After treatment a significant decrease of pain was observed and the patients' everyday activity improved.

The Oswestry index and Rolland-Morris questionnaire were used in own research to evaluate a degree of quality of life and disability level. A sum of points before treatment in the ODI index amounted in group 1 to 24.5 and in group II to 17.0. After termination of treatment the values significantly decreased to 10.5 in group 1 and to 7.0 in group 2. However, in RMQ parameters of disability level in group 2 from the median 16 dropped to 7, however in group 2 from the median

13 before treatment they decreased to 4.5 after completed of physiotherapy.

In a study by Topolska *et al.*, physical therapy, kinesiotherapy and a classic massage were used in a group of 319 patients. After the treatment an average of evaluation points in Oswestry and Rolland Morris' questionnaires significantly decreased [26].

Our findings indicate that the mobility of lumbosacral spine improved in patients, in particular those marked in a sagittal plane. Probably this limitation results to a considerable degree from an excessive tension of paraspinal muscles, rigidity and pain. A significant improvement of mobility of 5 cm was obtained after treatment.

Demczyszak and Wrzostek obtained similar effects in their research. An improvement in a range of movement in a sagittal plane of spine evaluated with a „fingertip-to-floor" test was demonstrated in a group of 54 patients [27].

Zaniewska and colleagues [18] described the improvement of a range of mobility in a lumbar spine in a group of 30 patients evaluated via Schober's test after electrotherapy. The therapy consisted of a series of ten treatments with TENS currents. The result improved among 19 patients after therapy.

In research by Pop and co-workers [28] a significant improvement in a range of mobility of lumbosacral spine after the use of TENS was also observed among 39 patients.

Depa and colleagues [17] demonstrated decrease of pain and improvement in functionality. Treatments within physical therapy and kinesiotherapy were used in a group of 75 patients. Decrease of pain and the improvement in spine mobility was noted.

In another study, 42 people were examined. Exercises and massage were applied to group A. Laser was additionally applied in group B, and exercises, laser and magnet therapy were conducted in group C. After termination of treatment the improvement was noted, evaluated by the Rolland-Morris and the Oswestry questionnaires [29].

In a paper by Adamczyk, two groups were selected from 60 patients. Post isometric relaxation of muscles, mobilisations, Kinesiology Taping and exercises were applied in the first group. The treatments within electrotherapy and kinesiotherapy were conducted in the control group. A decrease of pain in VAS scale and the Oswestry questionnaire were obtained as well as an improvement in spine mobility [30].

Regular physical activity and individually planned rehabilitation programme contribute to strengthening of relevant muscles, improvement in functional fitness, increase in a range of movements in joint as well as normalisation of a walking technique influencing the quality of life among patients. Physical therapy constitutes a supplement of kinesiotherapy, providing analgesic, antiedema and anti-inflammatory effects thanks to improvement of microcirculation and decrease of muscular tension [3,31,32].

CONCLUSIONS

After the physiotherapy a significant decrease of pain, with improvement of patients physical condition, and everyday activity was observed. Applied treatment improved the spine mobility.

Conflicts of interest

The authors declare that they have no conflicts interests.

REFERENCES

1. McCarthy LH, Bigal ME, Katz M, Derby C, Lipton RB, Derby C, Lipton RB. Chronic pain and obesity in the elderly results from the Einstein aging study. J Am Geriatr Soc. 2009 Jan;57(1):115-9.
2. Arden N, Nevitt MC. Osteoarthritis: epidemiology. Best Pract Res Clin Reumatol. 2006 Feb;20(1):3-25.
3. Kuryliszyn-Moskal A. Osteoarthritis. Rheuma Report Eular. Paris. 2014 Jun;1(2):21-3. (Polish).
4. Adams N, Ravey J, Bell J. Investigation of personality charakteristics in chronic low back pain patients. Physiother. 1994 Aug;80(8):514-19.
5. Knittle KP, De Gucht V, Hurkmans EJ, Vlieland TP, Peeters AJ, Ronday HK, Maes S. Effect of self-efficacy and physical activity goal achievement on arthritis pain and quality of live in patients with rheumatoid arthritis. Arthritis Care Res (Hoboken). 2011 Nov;63:1613-9.
6. Gaál J, Varga J, Szekanecz Z, Kurkó J, Ficzere A, Bodolay E, Bender T. Balneotherapy in elderly patients: Effect on pain from degenerative knee and spine conditions and on quality of life. Isr Med Assoc J. 2008 May;10 (5):365-9.
7. Roczniak W, Oświęcimska J. Basic rehabilitation advice for patients with back pain. Doctor. 2007 Jun-Aug;7-8:19-25. (Polish)
8. Mooney V, Saal JA, Saal JS. Clinical symposia. Evaluation and treatment of low back pain. Clin Symp.1996 May;48(4):1-32.
9. Adams M, Bogduk N, Burton K, Dolan P. Biomechanics of spinal pain. Biomechanics back pain. DB PUBLISHING. 2010;53-55.
10. Kuciel-Lewandowska J, Olejniczak V, Paprocka-Borowicz M, Berner E, Ratajczak B, Hawrylak A. The efficiency evaluation of the Träbert and Kotz currents therapy in patients

with lumbar pain. Acta Bio-Opt Inform Med. 2010 May;3(16):215-8. (Polish)
11. Kuciel-Lewandowska J, Jarosz N.The efficiency evaluation of the TENS and Träbert currents therapy in patients with lower spine pain. Acta Balneolog. 2010 Jan-Mar;52(1):16-23. (Polish)
12. Szczepanowska-Wołowiec B, Dudek J. The estimation of the effectiveness of Träbert's current treatment for pain ailments in the lumbar spine section. Med Stud 2008 Jan-March; 9:41-50 (Polish).
13. Straburzynska-Lupa A, Straburzynski G: Physiotherapy, Med. Pub, PZWL, Warszawa 2007:616-38. (Polish)
14. Dakowicz A, Kuryliszyn-Moskal A, Bajko A. Evaluation of the efficiency of chosen physiotherapetic procedures in patients with low back pain: Health in XXI, edit Jankowiak B, PWSIP, Łomza 2016:373-83. (Polish)
15. Charłusz M, Gasztych J, Irzmański R. Comparative analysis of analgesic efficacy of selected physiotherapy methods in low back pain patients. Orthop Traum Rehab. 2010 May-Jun;12(3):225-36. (Polish)
16. Laitinen J. Acupuncture and transcutaneous electric stimulation in the treatment chronic sacrolumbalgia and ischialgia. Ann J Chin Med. 1976 Summer;42:71-5.
17. Depa A, Wolan A, Przysada G. The influnce of rehabilitation on the spine movement and subjective pain assessment in case of patients with lumber region pain syndrome. Med Rev Rzesz. 2008;2:116-24. (Polish)
18. Zaniewska R, Okurowska-Zawada B, Kułak W, Domian K. Analysis of quality of life in patients with low back pain after receiving transcutaneous electrical nerve stimulation (TENS). Occup Med. 2012 Apr;63(3):295-302. (Polish)
19. Kowalczyk N, Zgorzalewicz-Stachowiak M, Głowacka O. Analysis of effectiveness of selected treatment methods in patients with chronic low back pain. Pol Med J. 2015 Nov; 39(233):305-10. (Polish)
20. Pop T, Przysada G, Świder B. Disability degree of medical personnel measured by Oswestry Questionnaire. Med Rev Rzesz. 2008;2:135-41. (Polish)
21. Straburzyńska-Lupa A. Romanowski W. Romanowska A. Świetlik Z. Subjective pain and physical fitness in female osteoarthritis patients treated with magnetotherapy and kinesitherapy. Physio Pol. 2004 Jun;4(2):151-6. (Polish)
22. Kujawa J, Pyszczek Talar, Janiszewski J. Comparative evaluation of the analgesic effectiveness of selected physiotherapeutic methods in the treatment of low back pain syndrome. Physio Pol. 2001 Sep;1(3):271-9. (Polish)
23. Łukowicz M, Weber-Zimmermann M, Ciechanowska K, Szefer A. The effect of association of sonotherapy into kinesitherapy management in case of low back pain. Acta Bio-Opt Inform Med. 2009 Jan;15(1):40-3. (Polish)
24. Mikołajczyk E, Jankowicz-Szymańska A, Janusz M, Bakalarz J. The influence of the traditional physiotherapy and the Medical Taping method on pain and disability level in patients with low back pain. Med Rev Rzesz. 2012;10(2):223-37. (Polish)
25. Ratajczak B, Ryfa R, Boerner E, Kuciel-Lewandowska J, Hawrylak J, Demidas A. Assessment the influence of the lasertherapy and magnetotherapy in connection with kinesitherapy used by patients with the degenerative low back disease abstract. Adv Rehabil. 2011 Jun;2:13-8. (Polish)
26. Topolska M, Sapuła R, Topolski, Marczewski K. Evaluation of the Effectiveness of Short-term Rehabilitation of Women with Chronic Low Back Pain Using the Oswestry and Rolland-Morris disability Scales. Ortho Traum Rehabil. 2011 Jul-Aug;13(4):353-60. (Polish)
27. Demczyszak I, Wrzosek Z, Hagner W. The suitability of electrotherapy in the treatment of persons with chronic pain resulting from degenerative and deformative changes in the spine. Physioth Pol. 2005 Mar;5(1):25-30. (Polish)
28. Pop T, Heiner A, Preuss R, Niedzialek M, Zaniewska A, Sobolewski M, Dobrowolski T, Zwolińska J. The impact of electrostimulation of TENS currents on pain reduction among patients with a degenerative disease of intervertebral disc in lumbosacral spine. Ortho Traum Rehabil. 2010 Jul-Aug;12(4):289-300. (Polish)
29. Ciesielska K, Żołyński K, Piątkowski P, Swiątczak M, Goc S, Dudkiewicz S. Evaluation of combined physiotherapy for chronic lumbosacral back pain syndromes. Kwart Ortop. 2009;4:418-30. (Polish)
30. Adamczyk A, Kiebzak W, Wilk-FrańczukM, Sliwinski. Effectiveness of holistic physiotherapy for low back pain. Orthop Traum Rehabil. 2009 Nov-Dec;11(6):562-76. (Polish)
31. Smeets R, Wade D, Hidding A Van Leeuwen PJ, Vlaeyen JW, Knottnerus JA. The association of physical deconditioning and chronic low back pain: a hypothesis-oriented systematic review. Disabil Rehab. 2006 Jun;28(11):673-93. (Polish)
32. Hurwitz EL, Morgenstern H, Chiao C. Effects of recreational physical activity and back exercises on low back pain and psychological distress: findings from the UCLA Low Back Pain Study. Am J Public Health. 2005 Oct;95 (10):181