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Zastosowanie medycyny ortopedycznej OMT Kaltenborn-Evjenth Konzept w zespołach bolesnego barku

Application of the Kaltenborn-Evjenth Orthopaedic Manual Therapy Concept in the Treatment of Shoulder Impingement Syndrome

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Streszczenie:

Wstęp. Celem przeprowadzonych badań była ocena wpływu zastosowanej terapii manualnej według koncepcji Kaltenborn-Evjenth na zakres ruchu, grę stawową oraz siłę mięśniową w stawie ramiennym u pacjentów z zespołem bolesnego barku. Dodatkowo analizowano zmiany natężenia bólu.

Materiał i metoda. Przebadano 53 osoby. W skład grupy badanej weszło 42 pacjentów z zespołem bolesnego barku spowodowanego uszkodzeniem barku o kodzie ICD 10: M75, natomiast do grupy kontrolnej zostało zaklasyfikowanych 11 pacjentów z zespołem bolesnego barku spowodowanego radikulopatią szyjną o kodzie ICD10: M50. Pacjenci poddawani byli terapii co drugi dzień przez okres 4 tygodni. Wykonano pomiar zakresu ruchów, oceniono grę stawową oraz siłę mięśniową w stawie ramiennym. Zbadano dolegliwości bólowe według skali VAS. Przed rozpoczęciem terapii oraz po jej zakończeniu pacjenci wypełniali ankietę dotyczącą leczenia. Otrzymane wyniki były wyznacznikiem kierunku prowadzenia leczenia technikami manualnymi według koncepcji Kaltenborna-Evjentha.

Wyniki. Wyniki badań wykazały, że zastosowanie manualnej terapii Kaltenborn-Evjenth pozwoliło uzyskać zwiększenie analizowanych czynności ruchowych oraz wpłynęło na zmniejszenie dolegliwości bólowych barku u 100% badanych pacjentów.

Wnioski. Zastosowana terapia według OMT Katlenbor-Evjenth Konzept w zespołach bolesnego barku w znaczny sposób wpłynęła na poprawę stanu funkcjonalnego w stawie ramiennym oraz przyczyniła się do spadku wartości natężenia bólu.

Słowa kluczowe:
bolesny bark, metoda Kaltenborn-Evjenth, leczenie, skala bólu VAS

Abstract

Introduction. The aim of the study has been to evaluate the impact of the manual therapy according to the Kaltenborn-Evjenth Concept on the range of motion, joint play and the muscle strength in the shoulder joint, in patients with the shoulder impingement syndrome. In addition, the changes of the intensity of pain have been analysed.

Materials and Method. The total of 53 persons have been examined. The test group consisted of 42 patients with the shoulder impingement syndrome caused by the shoulder damage, with the diagnosis code of ICD 10: M75, while the control group encompassed 11 patients with the shoulder impingement syndrome caused by the cervical radiculopathy, diagnosis code of ICD10: M50. The patients had undergone the therapy every other day, for the period of 4 weeks. Measurements of the range of motion had been taken, the joint play and muscle strength in the shoulder joint had been evaluated. The pain experienced had been assessed according to the VAS scale. Before launching the therapy, and after it was completed, the patients filled out a questionnaire regarding the treatment. The results obtained constituted the indication for the direction of the orthopaedic manual treatment techniques, according to the Kaltenborn-Evjenth Concept.

Resulsts. The results of the research have shown, that the application of the Kaltenborn-Evjenth manual therapy has led to the increased motor activities and has helped to decrease the intensity of the shoulder pain in 100% of the examined patients.

Conclusions. The therapy according to the Katlenbor-Evjenth OMT Concept, applied in the cases of the shoulder impingement syndrome, has had a significant impact on the functional improvement of the shoulder joint and has contributed to the lowering of the intensity of pain.

Key words:
shoulder impingement, Kaltenborn-Evjenth method, treatment, VAS pain scale

Introduction

Discomforts caused by the shoulder joint are quite common. Over the recent years, there has been observed a significant lowering of the age of the patients affected by this condition. The most common causes of the ailments are overexertion, injuries and the accumulated strain related to sport or occupational activities [1]. With age, the increasing degenerative changes, or the weakening of the muscle strength within the shoulder girdle, may cause the pain in the shoulder joint. It is the second most common pain syndrome related to the human locomotor system. In more than 50% of the cases the pain is brought about by inflammations of the tendons, bursae, joints and by fractures and tumours. [1,2]. The shoulder joint is the most mobile joint of the human body, very well suited to the multiplanar rotation movements. It is a ball and socket joint, unaltered and ovoid. The convex surface of the head of the humerus forms a joint with the concave surface of the glenoid cavity of the shoulder blade. The joint capsule is reinforced with ligaments: coracohumeral and glenohumeral. Six muscles, surrounding the shoulder, connect the shoulder girdle to the humerus. These are, among others: deltoid, supraspinatus, infraspinatus, teres minor, teres major and subscapularis muscles. All the muscles in the shoulder area are innervated by the branches of the dorsal part of the brachial plexus. The shoulder joint has 3 degrees of freedom along the three axis of rotation (if one takes into account the gliding and the rolling movements, which occur along the 3rd axis, then the joint has even 6 degrees of freedom). As a result, the upper limb has the high mobility and is most functional [3,4]. This brings about, however, certain consequences. Namely, the high mobility of the shoulder joint is the cause of many dysfunctions and injuries, which lead to the instability of the shoulder joint, bad posture, and even to the peripheral neuropathy [4,5]. Causes and symptoms of the shoulder joint disorders can be induced by the compression or stretching of the vessels and nerves, which called the thoracic outlet syndrome. It is assumed, that the main anatomical causes of the pressure on nerves and vessels are: cervical rib, anterior scalene, clavicle and ribs isthmus, shoulder excessive abduction syndrome, compression of the pectoralis minor muscle, collarbone damage, osteochondral tumours, post-traumatic ossification, calcified lymph nodes, subclavian vein thrombosis, nerves entrapment [1,6]. The wide range of motion and the frequent overexertion within the shoulder joint often bring about collisions, which involve acromion, coracoid process, head of the humerus and the stabilizing ligament system – leading in consequence to changes within the joint, through damages of the rotator cuff, the tendon of the long head of the biceps muscle, the impingement syndrome, or the frozen shoulder syndrome [1,2,7]. The pain in the glenohumeral joint may result from the disorders in the cervical spine. The cervical radiculopathy occurs most often due the following: disc herniation, spondylosis, spinal tumour, spinal cord tumour, nerve root tumour, post-traumatic "pinched nerve roots" [1,8,9].

The aim of the study is to evaluate the impact of the Kaltenborn-Evjenth manual therapy method on the changes in the functional status of the glenohumeral joint, in patients

with the shoulder impingement syndrome, through the verification of the following research hypotheses:
1. Techniques of the Kaltenborn-Evjenth method increase the range of motion in the glenohumeral joint.
2. Therapy according to the Kaltenborn-Evjenth Concept reduces the pain in the area of the shoulder joint.
3. Joint glide play of the shoulder joint changes after the treatment with the Kaltenboen-Evjenth method techniques.
4. The treatment of the shoulder impingement syndrome with the Kaltenboen-Evjenth method affects the change in the strength of the muscles of the shoulder girdle.

Materials and Method

We have examined 53 persons, 32 to 57 years old (M = 42.51; SD = 7.18). The test group consisted of 42 patients with the shoulder impingement syndrome, with the diagnosis code ICD:M75 (shoulder damage). The control group consisted of 11 patients with the shoulder impingement syndrome, with the diagnosis code ICD10: M50 (cervical radiculopathy). The average age in the test group was M = 41.95 (SD = 7.07), and in the control group M = 44,64 (SD = 7.53). Excluded were the patients with the shoulder impingement syndrome caused by the peripheral vessels and nerves compression. Before the examination, the patients had been informed about the purpose and the type of the examination and had agreed to it. Patients had undergone manual therapy according to the Kaltenborn-Evjenth method. The joint mobilization techniques were being applied every other day. The therapy duration time was 4 weeks.
Both groups answered the question regarding the subjective assessment of the level of pain felt before and after the Kaltenborn-Evjenth manual therapy. VAS scale had been used to assess the level of pain. Patient would indicate the pain intensity by pointing his/her finger to the scale from 0 – a complete lack of pain to 10 – the strongest imaginable level of pain. The task of the patient was to identify the specific value, that in his/her opinion reflected the level of the intensity of pain, which he/she currently experienced. Both, the test and the control group had been examined for the range of motion in the shoulder joint. There had been measurements taken of the range of motion in: external rotation, abduction, internal rotation - using the goniometer [10] (Fig. 1, 2, 3).

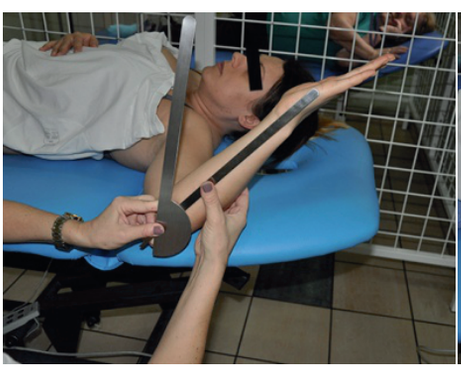

Fig. 1. Measurement of the range of external rotation

Fig. 2. Measurement of the range of internal rotation

Fig. 3 Measurement of the range of abduction

To assess the functional status of the glenohumeral joint in both examined groups, the following had been used:

1. Joint play evaluation.
For each patient, there had been applied a smooth transition through the subsequent grades of movement in the resting position or the actual resting position. Joint play grades:
Iº – large movement, flexible articular capsule,
IIº – small movement, articular capsule tense,
IIIº – no movement, no flexibility in articular capsule [11,12].
There had been performed traction, tail plane glide, front plane glide, back plane glide in sitting position, in accordance with the methodology set out in the manual therapy by Kaltenborn-Evjenth.

2. Resistance testing of the muscles: abductors, external and internal rotators of the glenohumeral joint.
For the shoulder abductors, the tests had been done in the seated position, by applying an external resistance in the vicinity of the elbow joint, with a force causing the maximum muscle contraction with no movement in the joint. Resistance testing for the shoulder external and internal rotator muscles had been performed in the position with the forearm bent at 90o. The therapist, stabilized the patient's arm and applied the resistance near the wrist on the palmar side for the internal rotator muscles and on the dorsal side for the external rotator muscles, with the force causing the maximum muscle contraction. Resistance testing had been evaluated as follows:
Iº – pain + high strength = small tendon-muscle damage
IIº – pain + low strength = large tendon-muscle damage
IIIº – no pain + low strength = neurological damage
IVº – no pain + high strength = normal condition [12].
In both groups, there had been found the characteristic, proportional limitations of the range of motion in the glenohumeral joint, decreased muscle strength in the muscle groups being examined, reduced joint play and significant pain in the shoulder area.
Both groups had been treated with the manual therapy techniques by Kaltenborn-Evjenth. There had been applied: cross and functional massage and stretching of the supraspinatus, subscapularis, and infraspinatus muscles [12,13]. In patients there had been performed the traction mobilization in the bent shoulder joint, gliding mobilization with the stabilization with belt, front plane and back plane gliding mobilizations in grades I and II in the actual resting position (Fig. 4, 5, 6, 7).
After recession of pain in the treatment of the shrunken articular capsule there had been introduced traction and gliding mobilization in grade III, in the above positions [12].
The patients were requested to carry out the pre-ordained stabilization exercises, self-stretching and self-mobilization - also after the treatment had ended.

3. Study results statistics.
To process the study results statistically we have used the Statistica 12 PL software package. Due to the fact that the test and control groups have not been equal, for the comparisons between them we have used the Mann-Whitney U test. For

comparisons within the groups (between the first and the second measurement) the Student's t-test has been used, or the Wilcoxon signed-rank test. The acceptable probability of the error type I (i.e. the incorrect rejection of the true null hypothesis), has been set at the level of $\alpha = 0.01$, therefore the hypothesis of the absence of differences has been rejected in the case the empirical statistical significance of $p \leq 0,01$.

Fig.4. Traction in the bent shoulder

Fig. 5. Gliding mobilization with the stabilization with belt

Fig. 6. Back plane gliding

Fig. 7. Front plane gliding

Table 1 represents the mean and standard deviation values of pain assessment in the VAS scale, in the test and control groups.

Table 1. Pain intensity in the VAS scale

Group	Before therapy		After therapy		Wilcoxon test for related groups		
	M	SD	M	SD	Z	p	Cohen's d
study (n=42)	6.95	0.88	1.60	0.77	5.65	< 0.001	6.10
control (n=11)	7.64	0.50	4.82	0.98	2.93	0.003	3.22
Mann-Whitney U test for not related groups	**Z**	**p**	**Z**	**p**			
	-2.44	0.015	-5.21	< 0.001			

The comparisons of the groups with the Mann-Whitney U test have shown, that before the therapy the pain intensity levels in the test and the control group did not differ from each other in a statistically significant way. Then, the after the therapy comparison results indicate, that in the control group the average level of pain has been statistically significantly higher than in the test group. The Wilcoxon test comparisons within the groups have shown, that in both groups of patients the level of pain after the therapy has been significantly lower than before the treatment. The Cohen's d effect strength measurements indicate, that in the test group the decrease in pain intensity is greater than in the control group, but it should be noted, that in both groups the effects have been significant. Graphical presentation of the evaluated differences is shown on the Figure 8.

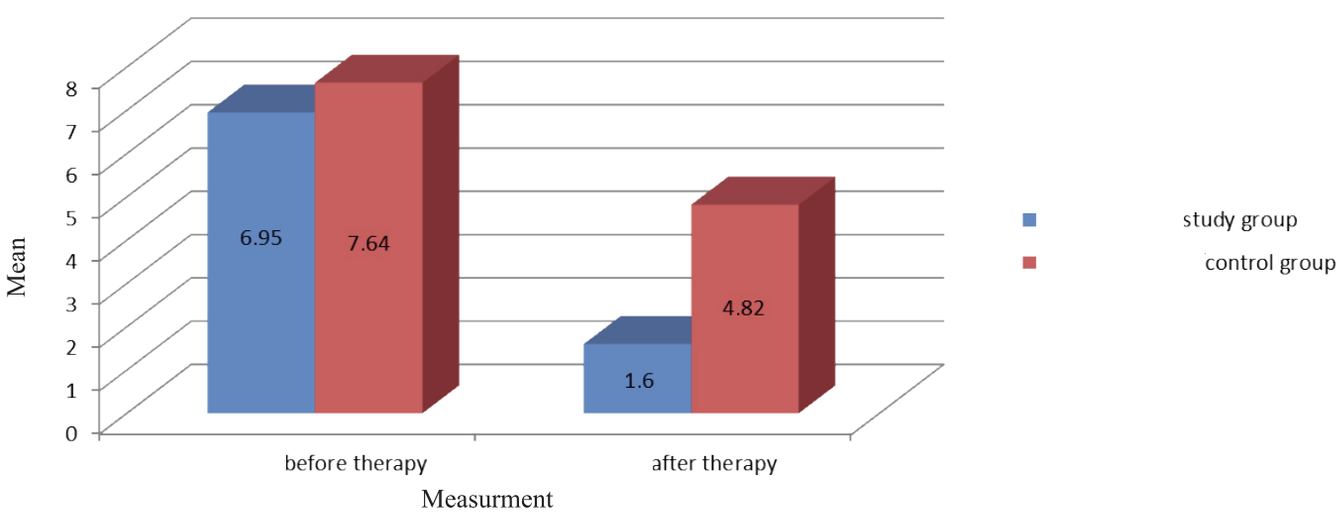

Fig. 8. Pain intensity in the VAS scale

Similar comparison procedure, to the pain intensity analysis with the VAS scale, has been used to analyse the evaluations of the external rotation range in the shoulder joint, with this difference, that for the comparisons within the groups the Student's t-test for related samples has been used. The analysis results are presented in the Table 2.

Table 2. External rotation range in shoulder joint

Group	Before therapy		After therapy		Student's t-test for related groups			
	M	SD	M	SD	t	Df	p	Cohen's d
study (n=42)	42.95	11.64	67.76	10.99	-22.35	41	< 0.001	3.45
control (n=11)	57.40	7.21	76.80	5.03	-9.27	9	< 0.001	2.93
Mann-Whitney U test for not related groups	**Z**	**p**	**Z**	**p**				
	-3,33	< 0,001	-2,59	0,010				

The results of the Mann-Whitney U test have shown, that the average range of motion in the shoulder joint has been in smaller in the test group than in the control group, in both the first and the second measurement. Comparisons within the groups indicate, that in the test and the control group, the average range of motion after the therapy has been significantly higher than before the treatment. In both groups, the effect strength measured with the Cohen's d statistics has been significant, the effect being slightly stronger within the test group. Figure 9 presents the dependencies with a graph.

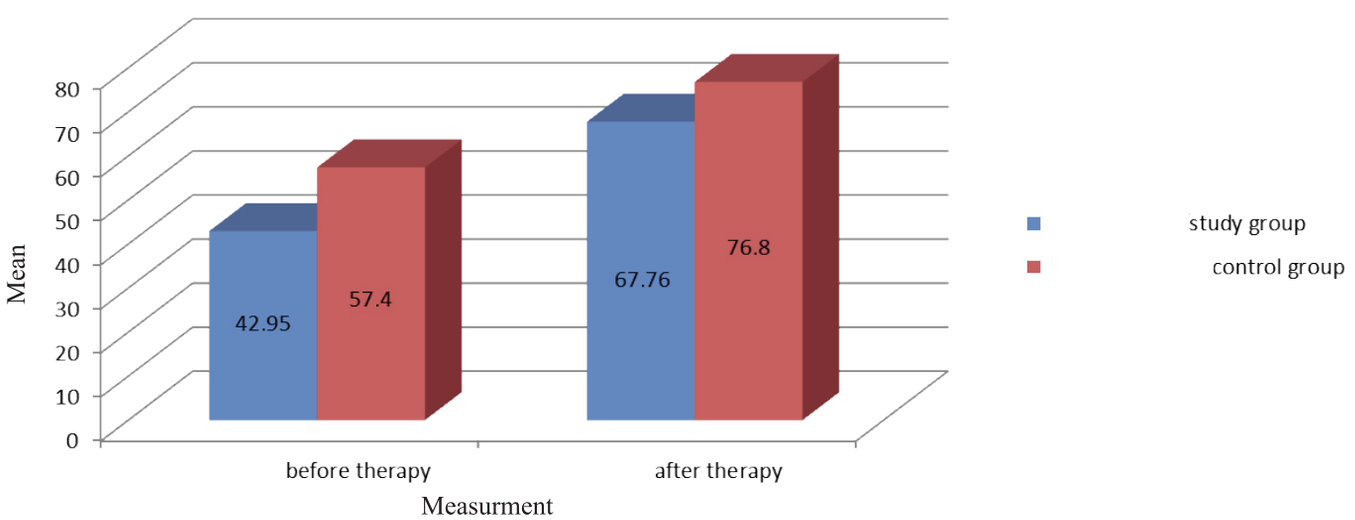

Fig. 9. Internal rotation

The next analysis regarded comparisons of the internal rotation range in the shoulder joint. The analysis results are presented in the Table 3.

Table 3. Internal rotation range in shoulder joint

Group	Before therapy		After therapy		Student's t-test for related groups			
	M	SD	M	SD	t	Df	p	Cohen's d
badana/study (n=42)	31.14	9.43	51.60	10.45	-16.61	41	< 0.001	2.56
kontrolna/control (n=11)	44.00	4.84	61.73	4.05	-19.80	10	< 0.001	5.97
Mann-Whitney U test for not related groups	**Z**	**p**	**Z**	**p**				
	-3.91	< 0.001	3.73	< 0.001				

The within the group comparisons - applying the Mann-Whitney U test - have shown, that the average range of the internal rotation movement has been larger in the control group than in the test group, in both the first and the second measurement.

Comparisons within the groups indicate, that the average internal rotation range after the therapy in the test group and the control group is statistically significantly higher than before the treatment. The value of the differences which have occurred between the measurements in both groups is high, and the value of the Cohen's d statistic indicates, that strength of the effect is greater in the case of the control group. The graphic presentation of the results shows the Figure 10.

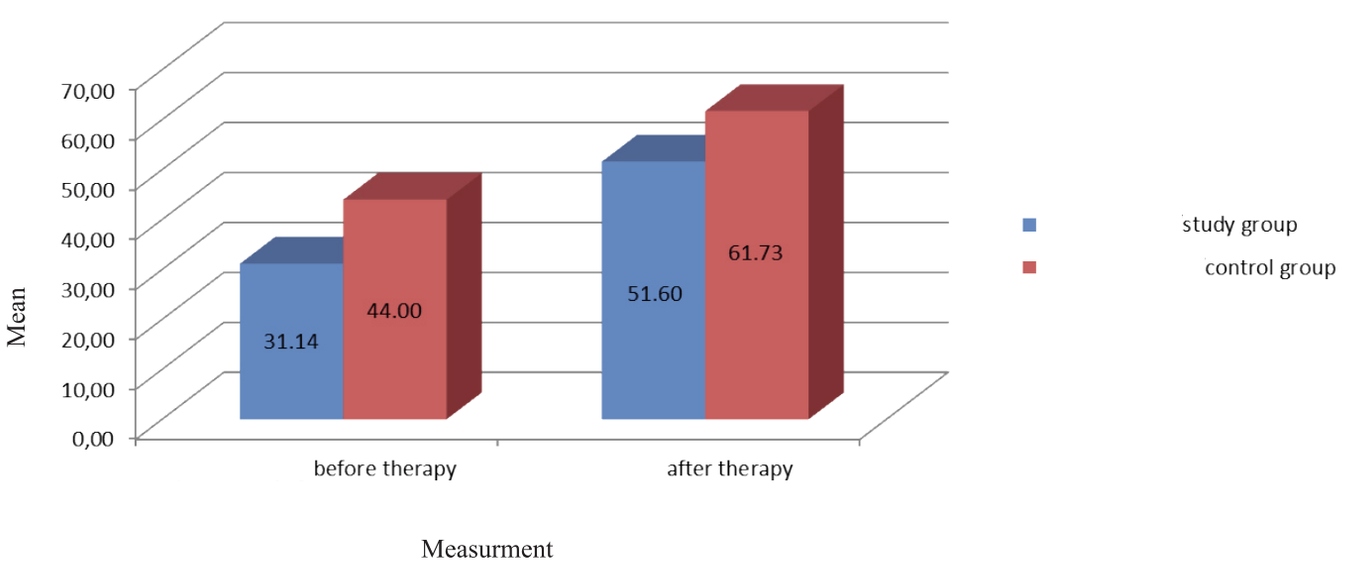

Fig. 10. Internal rotation

The next analysis regarded comparisons of the abduction range of motion in the shoulder joint. The analysis results are presented in the table 4.

Table 4. Internal rotation range in shoulder joint

Group	Before therapy		After therapy		Student's t-test for related groups			
	M	SD	M	SD	t	Df	p	Cohen's d
study (n=42)	74.02	12.35	145.98	10.49	-71.09	41	< 0.001	10.97
control (n=11)	113.18	9.29	152.91	5.91	-11.66	10	< 0,001	3.52
Mann-Whitney U test for not related groups	**Z**	**p**	**Z**	**p**				
	-5.04	< 0,001	-1.92	0.054				

Comparisons between the test and the control group indicate, that before the therapy the average abduction movement range has been statistically significantly higher in the control group than in the test group. Then, the difference between the two groups measured after completion of the treatment was not statistically significant. Student's t-test for related samples comparisons between the first and the second measurement have indicated, that both in the test and the control group there has been significant increase in the average abduction movement range. Cohen d values show, that the changes noted in both groups shall be considered strong, and the strength of the the effect has been clearly greater in the test group. Figure 11 shows the graphical presentation of the evaluated differences.

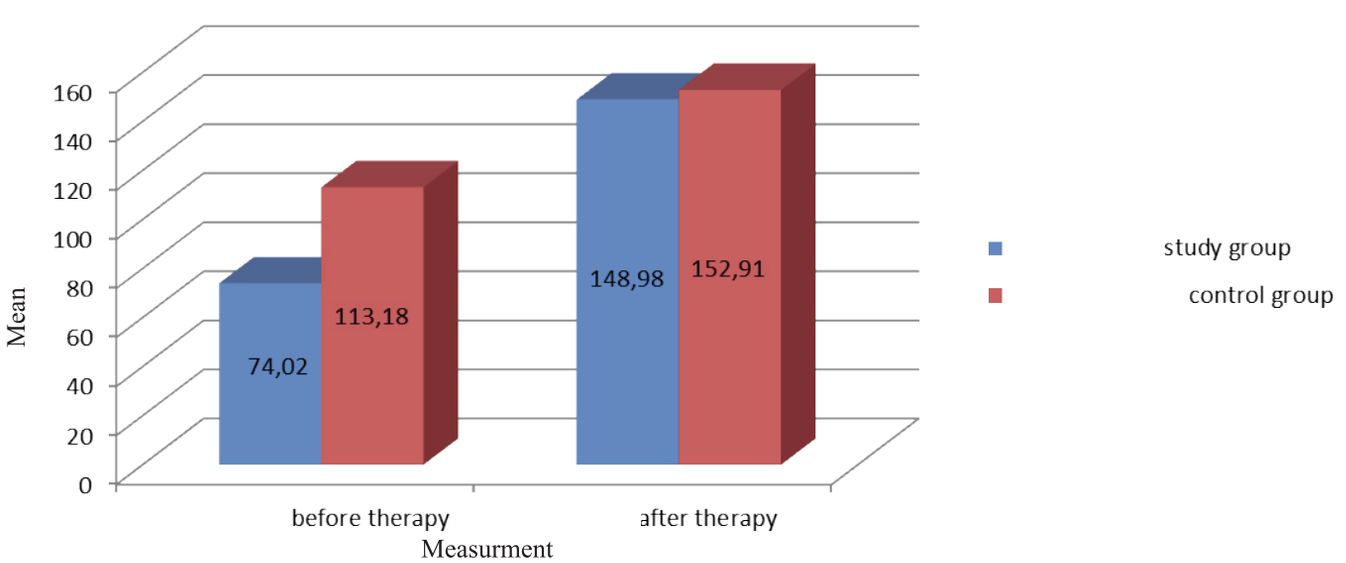

Fig. 11. Abduction movement range in shoulder joint

The results of comparisons of the joint play in the shoulder joint are presented in table 5. To measure the joint play the three point grading scale has been used: Iº – large movement, flexible articular capsule, IIº – small movement, articular capsule tense, IIIº – no movement, no flexibility in articular capsule. The percentage values indicate the percentage of the patients in the given group with the given joint play grade.

Table 5. Quantity and quality of the joint play in shoulder joint

Group	Before therapy			After therapy			Wilcoxon test for related groups	
	Iº	IIº	IIIº	Iº	IIº	IIIº	Z	p
study (n=42)	-	67%	33%	74%	24%	2%	5.08	< 0.001
control (n=11)	82%	18%	-	100%	-	-	1.34	0.180

Mann-Whitney U test for not related groups	Z	p	Z	p
	4.98	< 0.001	1.87	0.062

The Mann-Whitney U test comparisons between the groups have shown, that before the therapy the test group had on the average higher level of the joint play (Mrang 1 = 31.83) than the control group (Mrang 2 = 8.55). Similar measurement taken after completion of the treatment indicates, that the difference between the test group (Mrang 1 = 28.44) and the control group (Mrang 2 = 21.50) is statistically not significant.

For comparisons within the groups the Wilcoxon signed-rank test has been used. The analyses indicate, that the average level of the joint play in the test group after the therapy (Mrang 1 = 14.50) is statistically significantly lower than before the treatment (Mrang 2 = 19.13). In the case of the control group the measurement before the therapy (Mrang 1 = 1.50) does not differ significantly from the measurement taken after the therapy (Mrang 2 = 0.00). Figure 12 presents the evaluated relations with a graph.

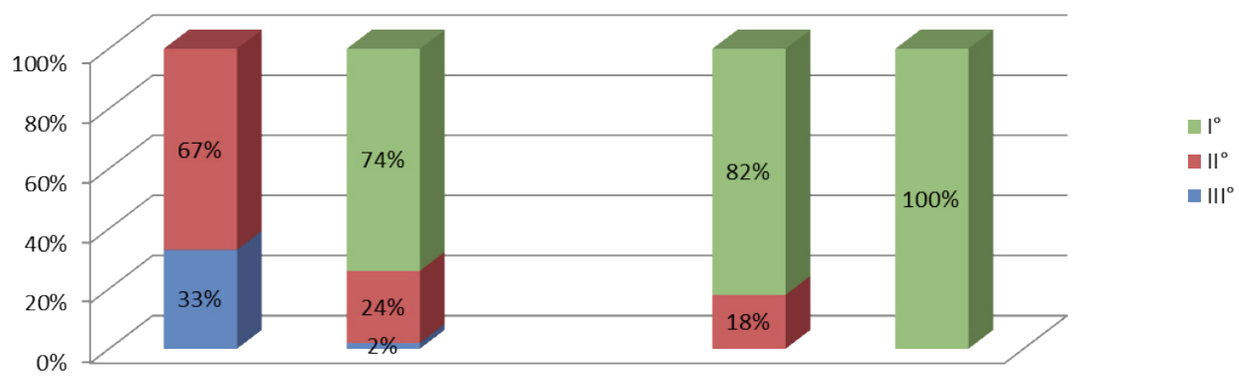

Fig. 12. Quantity and quality of the joint play in shoulder joint

Table 6 Shows the results of comparisons of the resistance tests defining the muscle strength of the muscle groups tested. For measurements in resistance tests the four points scale has been used: Iº – pain + high strength = small tendon-muscle damage, IIº – pain + low strength = large tendon-muscle damage, IIIº – no pain + low strength = neurological damage, IVº – no pain + high strength = normal condition.

Table 6 . Resistance tests results

Group	Before therapy				After therapy				Wilcoxon test for related groups	
	Iº	IIº	IIIº	IVº	Iº	IIº	IIIº	IVº	Z	p
study (n=42)	31%	69%	-	-	38%	-	-	62%	4.02	< 0.001
control (n=11)	-	-	100%	-	-	-	70%	30%	1.60	0.109

Mann-Whitney U test for not related groups	Z	p	Z	p
	-5.61	< 0.001	0.27	0.785

The percentage values in the table indicate the percentage of the patients in the given group with the given result of the resistance test.
The Mann-Whitney U test comparisons between the groups of patients have shown, that before the therapy the test group had on the average lower resistance tests results (Mrang 1 = 21.50) than the control group (Mrang 2 = 48.00). Similar measurement taken after completion of the treatment indicates, that the difference between the test group (Mrang 1 = 26.76) and the control group (Mrang 2 = 21.40) is statistically not significant. The Mann-Whitney U test comparisons within the groups have shown, that the average level of the resistance tests in the test group after the therapy (Mrang1 = 28.50) is statistically significantly higher than before the treatment (Mrang 2 = 8.00). In the case of the control group the measurement before the therapy (Mrang 1 = 0.00) does not differ significantly from the measurement taken after the therapy (Mrang 2 = 2.00). Figure 13 presents the evaluated relations with a graph.

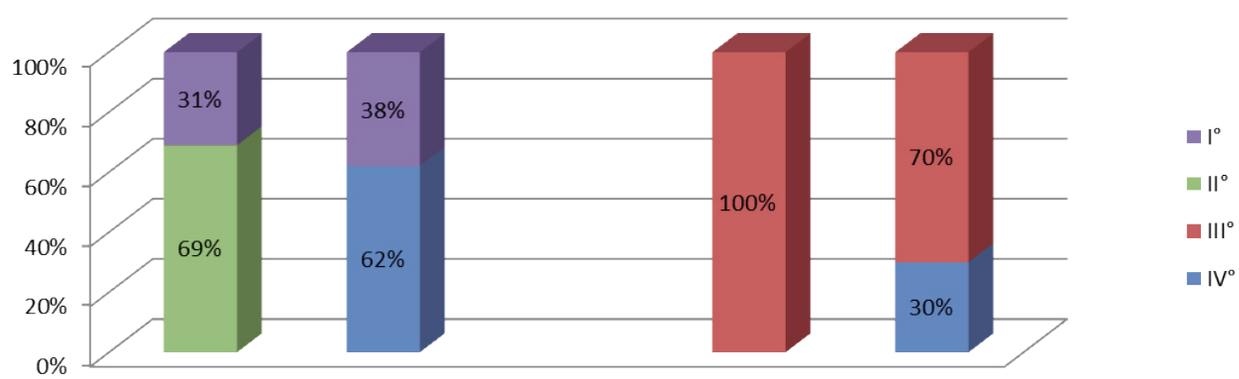

Fig. 13. Resistance tests

Discussion

The shoulder impingement syndrome constitutes a serious medical and social problem. As a result of various kinds of injuries, there occurs the significant worsening of the performance of the upper limb accompanied by pain, reduced mobility, reduced joint play and the weakening of the muscle strength in the glenohumeral joint, which to a large extent contributes to the exclusion of the persons with shoulder impingement syndrome from their regular activities of daily life and work. A study carried out by Fejer and Kyvik shows, that about 71% of the world population have experienced at least once in a lifetime the pain originating in the area of the neck and shoulder. They have demonstrated just how serious socially and economically the problem is, demanding ever more funding for the treatment of the shoulder impingement syndrome [14]. According to Skolimowski, the limitation of the active mobility affects mainly the external rotation. The loss here amounts to 44% of the value considered the physiological standard [4,5]. In our research, in all examined patients the limitation of mobility of the shoulder joint applies to the external rotation. Some authors are of the opinion that the rehabilitation procedure in patients with the injured shoulder should begin with teaching them the centring of the humeral head within the acetabulum of the scapula through the application of the isometric exercises in the closed kinetic chain. The next step would be to begin the exercises involving the lifting movement of the shoulder, then introduce in the final stage the traction, elongation and compression of the glenohumeral joint [4,5]. On the other hand, Szyluk et al. emphasize that intense physical exercises can lead to the deterioration in the overall condition of the patient, because during the intensive exercises there is the continuous irritation of the subacromial bursa and the rotator cuff [15]. Our own in-house research shows, that the early start of the rehabilitation program in patients with the shoulder impingement syndrome, with the mobilisation techniques as the basic forms of treatment, significantly reduces pain and contributes to the improvement of the glenohumeral joint functioning. Zarzycki et al. have found, that after applying the mobilisation techniques in patients with the subacromial impingement syndrome, by 9% decreased the pain intensity in the test group, and by 13% increased the number of patients, who after the therapy had returned to their regular activities of daily life and work [16]. On the other hand, the research carried out by Białoszewski et al. have demonstrated, that the mobilisation techniques, such as the deep cross massage and gliding mobilisation of the front and back of the shoulder joint brought about the improvement of the abduction movement and the lowering of the pain intensity in the evaluated joint, if compared to the group of patients who had been treated with the passive and active-passive exercises [17]. Park, Kimi et al., in their latest work, have confirmed the impact of the distraction according to the Kaltenborn-Evjenth Concept in the III grade, as the mobilisation technique affecting the stretching of the compressed shoulder joint capsule and increasing the distance of the humeral head from the acetabulum, restoring the proper gliding within the joint [18]. Dębski, in his article describing the method by Kaltenborn-Evjenth, highlighted the fact, that the applied mobilisation techniques decrease the pain intensity and prompt the joints mobility improvement, speeding up the process of regaining full health by a patient. [19]. The process of treatment with the Kaltenborn-Evjenth method, applied under the strict supervision of a physiotherapist and with the full education of a pa-

tient, has a significant impact on the therapy efficiency. However to achieve even better therapeutic effects, the patients require the application of the Kaltenborn-Evjenth treatment method not only within the glenohumeral joint but also in the cervical spine segments, being the source causing the disorder. The Kaltenborn-Evjenth OMT therapy should be applied long enough for the patient to be able, on his/her own, actively and with no pain, perform the movements within the correct, possible to be achieved range.

Conclusions

1. The Kaltenborn-Evjenth mobilisation techniques prove to be the effective method to reduce the pain intensity in the patients with the shoulder impingement syndrome.
2. Mobilisation according to the Kaltenborn-Evjenth Concept increases the range of motion in the glenohumeral joint.
3. The Kaltenborn -Evjenth therapy affects the restoration of correct shoulder joint gliding play.
4. The Kaltenborn-Evjenth method mobilization techniques improve the elasticity of the tissues and the strength of the muscles.

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Piśmiennictwo/ References

1. Szamkołowicz G.: Zespół bolesnego barku. Lekarz Rodzinny 2006; 11:1296-1298.
2. Bochenek A., Richer M.: Anatomia człowieka. Wyd.13. PZWL, Warszawa 2010
3. Skolimowski J., Demczuk-Włodarczyk E., Barczyk K. i wsp.: Trójpłaszczyznowa analiza ruchomości stawu ramiennego w zespole ciasnoty podbarkowej. Ortop Trau Rehab. 2008; 10:554-556.
4. Demczuk-Włodarczyk E., Skolimowska B., Dudek K. i wsp.: Postawa ciała osób z zespołem ciasnoty podbarkowej. Ortop Traum Rehab. 2007; 9:484-498.
5. Nawrot P,: Neuropatie uciskowe nerwów kończyny górnej. PZWL, Warszawa 2015
6. Majchrzycki M., Hoffman M., Ciepała W.: Diagnostyka Różnicowa i leczenie manualne w dolegliwościach bólowych kompleksu barkowego. Prakt. Fizjoter. Rehab. 2011;9:34-37
7. Guzy G., Ridan T., Szpitalak M i wsp.: Rola wybranych zmiennych w diagnostyce szyjnych zaburzeń strukturalnych. Ortoped. Traum. Rehab. 2013;6:532-544
8. Tampin B., Briffa N.,Hall t., et al.: Inter-therapis in classyfying patiens with cervical radiculopathy and patiens with non-specific neck-arm pain. Manual Therapy. 2012; 10: 445-450
9. Skolimowski T.: Badanie czynnościowe narządu ruchu w fizjoterapii. Wyd.II. AWF Wrocław 2012
10. Kaltenborn F. Tłum. Mirosław Dębski: Manualne mobilizacje stawów kończyn. Wydawnictwo Rolewski. Toruń 1998.
11. Kaltenborn F. Tłum Mirosław Dębski. Kręgosłup badanie manualne i mobilizacja. Tłum Mirosław Dębski. Wydawnictwo Rolewski. Toruń 1998.
12. Evjenth O., Hemberg J.: Muscule stretching in manual therapy. The extremities. Alfa Rehab Center Promotion AB, Alfa, Oslo 2002.
13. Fajer R., Kyvik KO., Hartvigsen J: The prevalence of neck pain in the word population: a systematic critical review of the literature. Eur Spine J 2006 ;6: 834-848.
14. Szyluk K., Jasińska A., Koczy B. i wsp.: zespół ciasnoty przestrzeni podbarkowej - najczęstsza przyczyna zespołu bolesnego barku. Polski Merkuriusz Lekarski 2008;25:179-183.
15. Zarzycki M., Zarzycka K., Domżalski M i wsp.: Zastosowanie techniki mobilizacji w leczeniu zespołu ciasnoty przestrzeni podbarkowej. Aktualności Neurologiczne 2013;3:189-194.
16. Białoszewski D., Zaborowski G.: Przydatność terapii manualnej w rehabilitacji pacjentów z przewlekłym uszkodzeniem stożka rotatorów stawu ramiennego. Doniesienie wstępne. Ortoped Taum Rehab. 2011:1:9-20
17. Park SS., Kim BK et al.: Effcts of joint position on the distrtaction distance diuring grade III glenohumeral joint distraction in healty indyviduals. J Phys Ther Sci. 2015; 10: 3279-3281
18. Dębski M.: Prezentacja Metody OMT Kaltenborn-Evjenth Konzept na przykładzie dolegliwości bólowych stawu barkowego. Prakt. Fizjoter. Rehab. 2010;7-8: 17-24.