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Analiza statyki miednicy w zespołach bólowych korzeniowych i rzekomokorzeniowych dolnego odcinka kręgosłupa

Analysis of statics of the pelvis in radicular and pseudoradicular syndrome of the lower part of the spine

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Streszczenie:

Wstęp. Zespoły korzeniowe oraz rzekomokorzeniowe są najczęściej spotykanymi dolegliwościami bólowymi w odcinku lędźwiowym kręgosłupa. Problem ten stał się chorobą cywilizacyjną i dotyka osoby w różnym wieku. **Cel pracy.** Celem pracy było porównanie skuteczności działania przeciwbólowego, zabiegów fizjoterapeutycznych w zespołach korzeniowych i rzekomokorzeniowych, znalezienie związku między zespołami kręgopochodnymi, a zaburzeniami elastyczności mięśni oraz ocena wpływu terapii na poziom dyskomfortu życia z powodu bólu. **Materiał i metoda.** Badania przeprowadzono na 40 pacjentach, którzy zostali podzieleni na dwie grupy. Grupę „A" tworzyli pacjenci z zespołami korzeniowymi, drugą „B" z zespołami rzekomokorzeniowymi. Podczas terapii zastosowano techniki energizacji mięśniowej (TEM), Hold Relax oraz masaż klasyczny struktur mięśniowo-powięziowych. Wykonywane były również zabiegi z zakresu fizykoterapii (prądy interferencyjne, TENS, jonoforeza, UD, laser, sollux). ***Wyniki.*** Na podstawie kwestionariusza Oswestry stwierdzono, że stopień niepełnosprawności w grupie A zmniejszył się o 38%, zaś w grupie B o 31%. W obu badanych grupach zastosowana terapia przyczyniła się do zmniejszenia bólu w skali VAS o 58%. Ruchomość kręgosłupa lędźwiowego w teście Schobera zwiększyła się w grupie A o 11%, a w grupie B o 5%. Zastosowane zabiegi fizjoterapeutyczne przyczyniły się do normalizacji długości i napięcia w badanych strukturach mięśniowo-więzadłowych. **Wnioski.** Z badań wynika, że zespoły bólowe korzeniowe i rzekomokorzeniowe wpływają na zaburzenia statyki miednicy, wyrażające się skróceniem długości mięśni oraz zwiększoną aktywnością struktur łącznotkankowych tej okolicy. Zabiegi fizjoterapeutyczne stosowane w zespołach korzeniowych i rzekomokorzeniowych w znaczny sposób zmniejszają odczucia bólowe. Techniki (TEM) przywracają elastyczność mięśni jednocześnie przyczyniając się do zmniejszenia dyskomfortu.

Słowa kluczowe:

statyka miednicy, objawy Piedellu, kwestionariusz Oswestry, normy długości mięśni, skala VAS.

Abstract

Introduction. *Radiculopathies and pseudoradiculopathies are the most common pain syndromes of the lumbar spine. This issue became a civilization disease and affects people of various ages.* ***Goal.*** *The goal of this work was to compare analgetic effectiveness of physiotherapy in radiculopathies and pseudoradiculopathies and to identify an association between syndromes of vertebral origin disorders of muscular elasticity as well as to assess the effects of therapy on pain-induced discomfort.*

Material and methods. *Study included 40 patients divided into two groups. Group A consisted of patients with radiculopathy, while group B comprised pseudoradiculopathy subjects. Muscle energizing techniques (MET), Hold Relax method and classical massage of musculofascial structures were applied in therapy. It also involved physiotherapeutic procedures (Interference currents, Tens, Iontophoresis, UD, Laser, Sollux).* ***Results.*** *Based on the Oswestry questionnaire it was determined that among group A patients level of disability was reduced by 38%, while in group B it decreased by 31%. In both study groups therapy contributed to reduction of pain measured in VAS scale by 58%. Lumbar spine mobility measured with Schober test increased by 11% in group A and by 5% in group B. Administered physiotherapy contributed to normalization of length and tension of musculoligamentous structures.* ***Conclusions.*** *Study results show that radiculopathies and pseudoradiculopathies affect the disorders of pelvic statics presenting with shortening of muscle fibers and increased activity of connective tissue structures in this region. Physiotherapeutic methods applied in treatment of radiculopathies and pseudoradiculopathies significantly reduce pain. Some techniques (MET) restore muscle elasticity, contributing to lessening of discomfort.*

Key words:

statics of the pelvis, Piedallu's sign, Oswestry questionnaire, normal values of muscle fiber length, VAS scale

Introduction

Spinal pain is one of the most common reasons for reporting to a doctor or physiotherapist [1, 2, 3]. Despite increasingly more precise diagnostic methods the pathomechanism of this disorder is difficult to elucidate. According to statistical data, 65-80% of the population experienced vertebral pain at least once. Unfortunately, the incidence of lumbosacral spine dysfunction increases with age. It was shown that such aliments affect 49% of people over 65 years old all over the world [1, 4, 5]. Over the past 50 years, disorders of the vertebral column became some of the most fundamental medical and social problems. New, sedimentary lifestyle contributed to this problem. Technical and civilizational progress led to decreased physical activity. Assuming forced, uncomfortable positions at work, severe physical work, bearing of excessive weights puts one at risk of spinal pain. We also should not forget about the negative effects of stress, which is a permanent component of life in the modern world, on a human organism [6, 7, 8]. Spinal pain usually coexists with disorders of musculoligamentous system, leading to impairment of its supportive function. Excessive muscle tension causes limitation to vertebral mobility. It is estimated that in 70% of cases dysfunction is grounded in soft tissues, including fasciae and muscles. Any changes in tension may generate pain in distant structures [7, 9].

Radicular pain is caused by compression of nerve roots. It is characterized by increasing symptoms and specific, unilateral radiation to the lower limb. It is also characteristic for radicular pain that symptoms increase during sneezing or coughing. Radicular syndromes may develop through two mechanisms. The first mechanism involves sudden trauma damaging the structure of a fibrous ring (annulus fibrosus). As a result of destructive external forces fissures are formed in the peripheral part of intervertebral disc, allowing the gel-like central mass (nucleus pulpulosus) to flow out (Fig. 1) [10, 11].

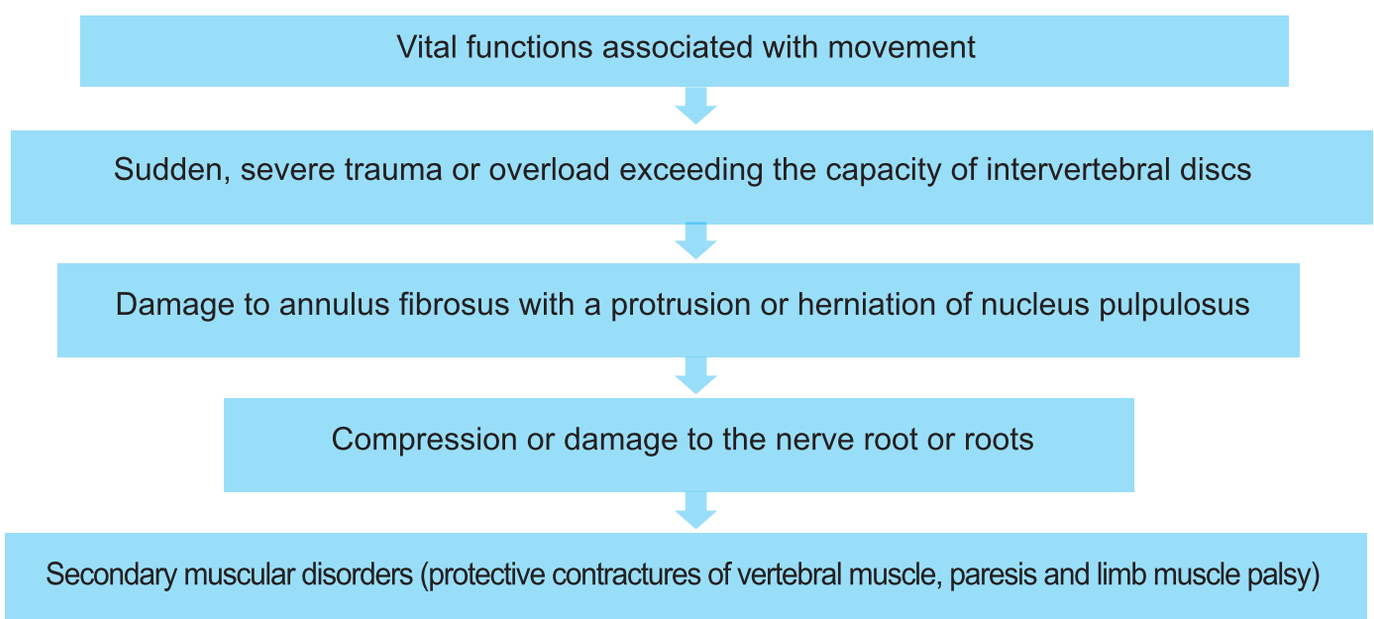

Fig.1. Scheme of the first mechanism of injury [11]

The second mechanism of vertebral injury involves chronic overload. It is a significantly more common process, leading to herniation of nucleus pulpulosus. In contrast to the first one, this pathomechanism goes on over the years. The first structures that become dysfunctional due to overload are paravertebral muscles, followed by ligaments, fasciae, intervertebral discs as well as, finally, vertebral bodies and facet joints (Fig. 2) [11].

Stages of osteoarthritis in the course of chronic overload:

1. Disorders of central nervous system control and overload of muscular system.
2. Functional disorders of muscular system and paravertebral soft tissues.
3. Functional disorders of vertebral and pelvic joints.
4. Degenerative changes of intervertebral discs, vertebral bodies and vertebral joints.
5. Secondary damage to muscular and nervous systems due to severe morphological changes [11].

Pseudoradicular syndromes may occur in isolation or be accompanied by radicular syndromes. Such combination makes the diagnosis more difficult.

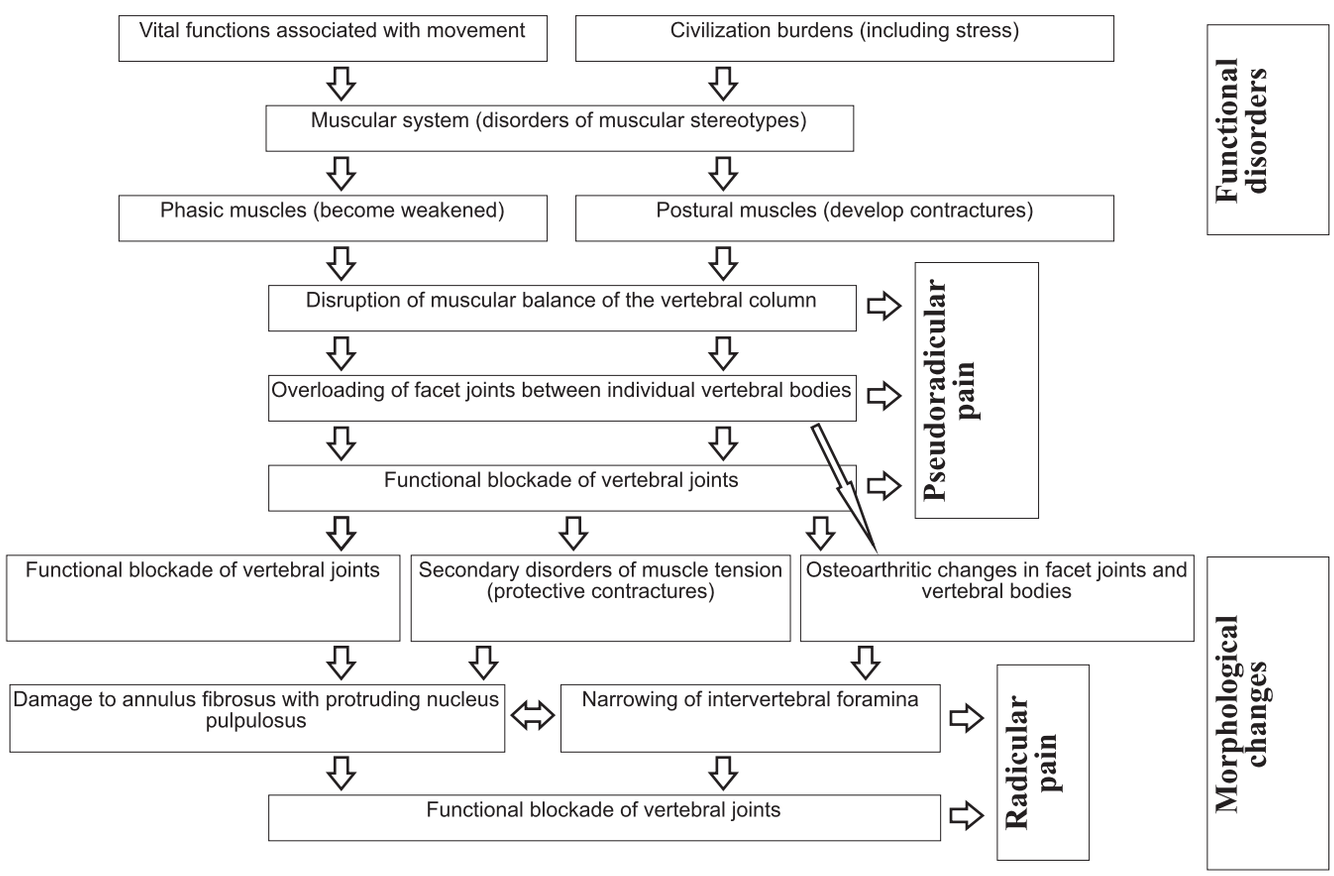

Fig.2. Phases of development of vertebral osteoarthritis [11]

The main causes of dysfunction include:

1. Disruption of motor stereotypes.
2. Muscular tension imbalance.
3. Soft tissue overload.
4. Sacroiliac joint blockage.

5. Intervertebral disc overload.
Pain is dull, persistent and diffuse, forces frequent changes of body position, frequently involving the knee or the shin [10].

The goals of this work include:
1. to demonstrate a relationship between spinal pain and dysfunction of muscle elasticity,
2. to assess the effectiveness of various forms of physiotherapy in radicular and pseudoradicular syndromes,
3. to assess the influence of soft tissue therapy techniques on the level of discomfort related to pain in everyday life,
4. to assess the influence of radicular and pseudoradicular syndromes on the disorders of pelvic statics.

Study material

Study was performed on a group of 40 subjects aged 43 to 60 years. Mean age was 53 years. The group consisted of 16 women (mean age: 53 years), comprising 40% of the group, and 24 men (mean age: 52 ears), constituting 60% of the entire group (Fig. 3). All patients were treated at the Private Physiotherapy Practice "Akton" in Opatow. Patients reported to the practice due to pain of lumbosacral region of the spine. Among 40 examined subjects 16 were women, while the remaining patients were male.

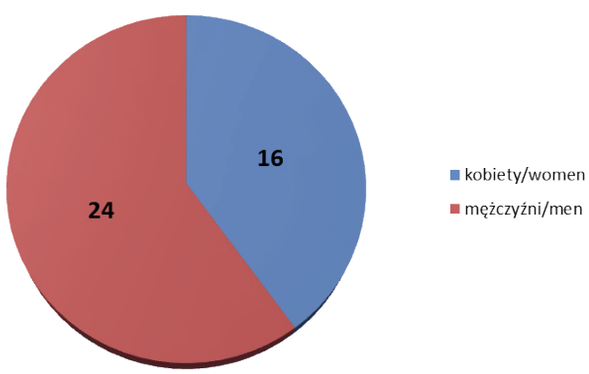

Fig.3. Total number of subjects

Patients were divided into two groups depending on the diagnosis of true radicular syndrome or pseudoradicular syndrome. The following were used to differentiate those syndromes: Laseque test, Hoover test, presence of structural syndrome features acc. to McKenzie classification and assessment of lesions in MR images performed by a radiologist. Appearance of pain in Laseque test below 15 degrees angle, positive Hoover test, visible MRI changes and features of structural syndrome acc. to McKenzie were considered the evidence of radiculopathy. The remaining patients comprised the pseudoradiculopathy group. Following the allotment we obtained two groups, each consisting of 20 subjects. Group A with radicular symptoms consisted of 8 women aged 43 to 60 years (mean: 54 years) and 12 men aged 47 to 58 years (mean: 53 years) – 40% and 60%, respectively.

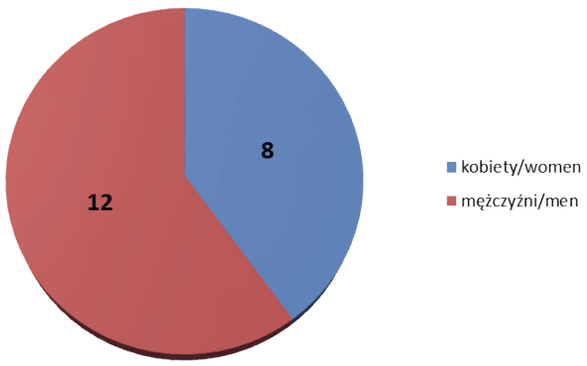

Fig. 4. Group A and B divided depending on sex

Both groups contained the same number of men and women. Group A (radiculopathy) consisted of 8 women aged 43 to 60 years (mean: 54 years) and 12 men aged 47 to 58 years (mean: 53 years). Group B (pseudoradiculopathy) consisted of 8 women aged 44 to 58 years (mean: 53 tears) and 12 men aged 45 to 58 years (mean: 52 years), constituting respectively 40% and 60% of the group.

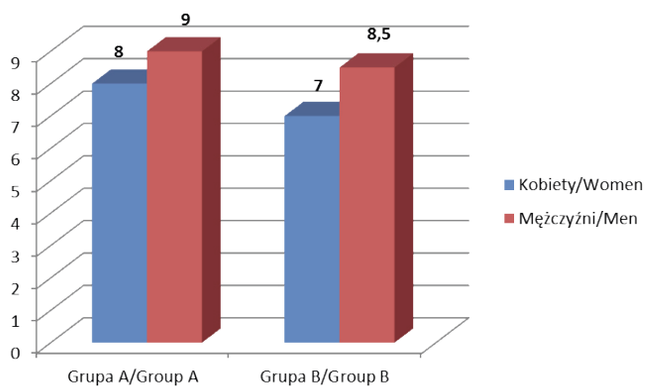

Fig. 5. Mean duration of illness among women and men in groups A and B

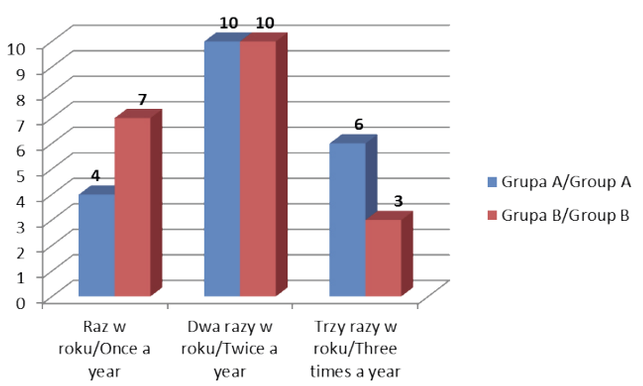

Fig. 6. Frequency of pain recurrence among patients from group A and B

Mean duration of illness among women amounted to 8 years in group A and 7 in group B. Among men belonging to group A mean duration was 9 years, while in group B it amounted to 8.5 years (Fig. 5).

Pain recurred once a year in 4 patients from group A and 7 patients from group B. Two episodes per year were reported by 10 patients from group A as well as from group B. Six patients from group A and 3 patients from group B experienced 3 episodes of pain recurrence per year.

Methodology

Study program consisted of the following procedures:

1. examination of the mobility of lumbar vertebra using Schober test,
2. examination of normal muscle length (acc. to Janda, Rakowski) [11, 12],

Modified Oswestry questionnaire

Modified Oswestry questionnaire (ODI – Oswestry Disability Index) for assessing the level of lower back dysfunction. It consists of 10 questions concerning everyday life activities; each question contains 6 answers, which are scored on a 0-5 scale. The respondent chooses only one answer that concerns him/her [7,8]. Results are calculated into percentages (%), allowing selection of 5 groups describing the level of quality of life impairment. Obtained ranges of scores expressed as percentages correspond to the following:
< 20% – minimal disability,
21-40% – moderate disability,
41-60% – severe disability,
61-80% – crippling disability,
81-100% – extreme disability (25).

Pain intensity
0 – Pain is bearable, I don't need analgetics,
1 – Pain is vexing, but I can deal with it without analgetics,
2 – use of analgetics causes complete relief of symptoms,
3 – use of analgetics causes moderate relief of symptoms,
4 – use of analgetics causes only slight decrease in pain,
5 – analgetics have no effect on symptoms.

Personal care
0 – I can look after myself normally without causing pain
1 – I can look after myself normally but it causes pain to increase
2 – It is painful to look after myself, so I perform these activities slowly and with care
3 – I need some help, but manage most of my personal care
4 – I need help every day and in most aspects of self-care
5 – I cannot get dressed by myself, I wash with difficulty and stay in bed due to my symptoms

Lifting
0 – I can lift heavy weights without extra pain,
1 – I can lift heavy weights, but it gives extra pain,
2 – Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently placed (e.g. on a table),
3 – Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned,
4 – I can lift only very light weights,
5 – I cannot lift or carry anything at all.

Walking
0 – Pain does not prevent me from walking any distance,
1 – Pain prevents me from walking more than 1 mile (about 1.6 km),
2 – Pain prevents me from walking more than half a mile (800m),
3 – Pain prevents me from walking more than a quarter of a mile (400m),
4 – I can only walk using stick or crutches,
5 – I stay in bed most of the time and I only get up to the toilet.

Sitting
0 – I can sit in any chair as long as I like,
1 – I can sit in my favorite chair as long as I like,
2 – Pain prevents me from sitting for over 1 hour,
3 – Pain prevents me from sitting for over 1/2 hour,
4 – Pain prevents me from sitting for over 10 minutes,
5 – Pain prevents me from sitting at all.

Standing
0 – I can stand as long as I want without pain,
1 – I can stand as long as I want, but it causes more pain,
2 – Pain prevents me from standing for more than 1 hour,
3 – Pain prevents me from standing for more than 30 minutes,
4 – Pain prevents me from standing for more than 10 minutes,
5 – Pain prevents me from standing at all.

Sleeping
0 – Pain does not disrupt my sleep,
1 – I can only sleep well after taking analgetics,
2 – Because of pain I have less than 6 hours of sleep even after analgetics,
3 – Because of pain I have less than 4 hours of sleep even after analgetics,
4 – Because of pain I have less than 2 hours of sleep even after analgetics,
5 – Pain prevents me from sleeping at all.

Social life
0 – My social life is normal and does not influence pain symptoms,
1 – My social life is normal, but increases the degree of pain,
2 – Pain prevents me from participating in more vigorous activities (sports, dancing),
3 – Pain often restricts my social activities,
4 – Pain restricted my social life to my home,
5 – I have almost no social life due to pain.

Traveling
0 – I can travel anywhere without pain,
1 – I can travel anywhere, but it increases my pain symptoms,
2 – Pain restricts my journeys over 2 hours,
3 – Pain restricts me to journeys of less than one hour,
4 – Pain restricts me to necessary journeys under 30 minutes,
5 – Pain prevents me from traveling except for visiting a doctor, hospital or receive treatments.

Employment/homemaking
0 – My normal job/homemaking activities do not cause pain,
1 – My normal job/homemaking activities increase my pain, but I can still perform my chores,
2 – I can perform most of my job/homemaking duties, but pain prevents me from performing more physically demanding activities (e.g. vacuuming),
3 – Pain prevents me from doing anything but light vocational/homemaking duties,
4 – Pain prevents me from doing even light duties,
5 – Pain prevents me from doing any chores.

3. examination of Piedallu's sign in a standing and sitting position
4. examination of pelvic ligaments tenderness to palpation (acc. to Maigne 1975, Rakowski) [12, 14]
5. examination of pain level using VAS scale
6. assessment of vertebral dysfunction using Oswestry questionnaire [13] [appendix 1]
7. statistical analysis with McNemara test [15]
8. statistical analysis with student's t-test.

The above examinations were performed at the beginning and at the end of treatment.

Subjects underwent therapy with individually matched physiotherapeutic techniques according to doctor's recommendations. Treatments included electrotherapy (interference currents, TENS currents, iontophoresis), phototherapy (Laser, Sollux), as well as ultrasound and classical massage. Moreover, therapy included muscle energy techniques (MET), musculofascial and fascial techniques, such as PIR, Hold, Relax. They were all aimed at analgetic and anti-inflammatory action, as well as relieving tension in the lumbosacral region. Patients were under constant physiotherapeutic care for 2 weeks and program duration amounted to 10 therapeutic days (without weekends). Therapeutic schedule involving soft tissue techniques was based on all previously mentioned techniques, while physiotherapeutic procedures were individually selected for each patient. Statistical analysis was conducted using arithmetic means, McNemara test and student's t-test [15].

Results

Before therapy patients from group A acquired 12.35 cm in a Schober's mobility test, while after treatment this index amounted to 13.75 cm. Group B patients acquired mean result of 13.1 cm in a Schober's mobility test compared to 13.8 cm following therapy. Despite this positive change expressed as increased range of motion in the lumbar vertebral region, these changes were not statistically significant.

Mean result in the entire group of patients according to modified Oswestry questionnaire was 31.0 pts., while after treatment it amounted to 21.4 pts. (Table 1).

Table 1. Comparison of results of Oswestry questionnaire in all patients before and after therapy.

	Before therapy X ±SD	Following therapy X ±SD
Results	**31.025 ±11.41**	**21.375 ±11.73**

Mean number of points acquired in Oswestry questionnaire before therapy by patients from group A (radicular symptoms) was 32.2 pts. compared with 22 pts. following treatment (Table 2).

Mean number of points obtained in modified Oswestry questionnaire by group B patients (pseudoradicular symptoms) amounted to 30 pts. before therapy and 20.8 pts. after therapy (Table 3).

Table 2. Comparison of results before and after therapy in group A patients (radicular symptoms) according to Oswestry questionnaire.

	Before therapy X ±SD	Following therapy X ±SD
Results	**32.25 ±8.91**	**22.00 ±9.74**

Table 3. Comparison of results acquired in Oswestry questionnaire by group B patients (pseudoradicular symptoms) before and after therapy.

	Before therapy X ±SD	Following therapy X ±SD
Results	**29.80 ±13.60**	**20.750 ±13.67**

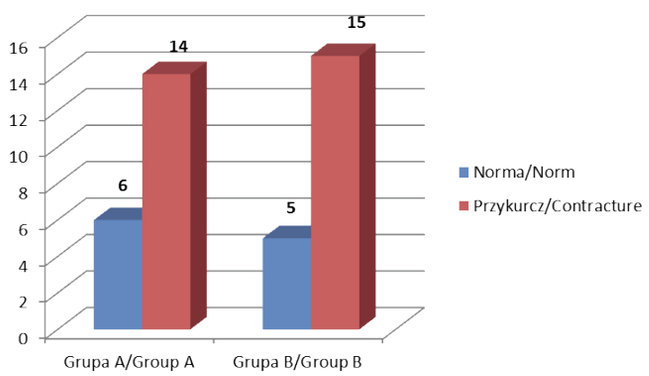

Fig. 7. Incidence of sacroiliac muscle contractures in patients from group A and group B before therapy.

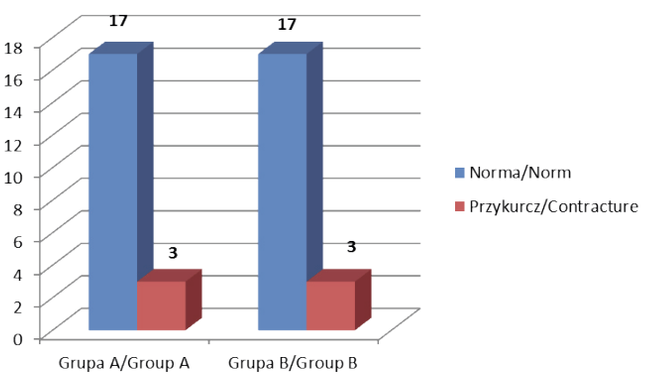

Fig. 8. Incidence of sacroiliac muscle contractures in patients from group A and group B following therapy.

Table 4. Statistical analysis of the incidence of sacroiliac muscle contractures in group A using McNemara's test – statistical significance

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	3	15%	11	55%	14	70%
1	0	0%	6	30%	6	30%
Total	3	15%	17	85%	20	100%

Z=9.09 $\chi 2$ =0.0026 in McNamara's test statistically significant

Table 5. Statistical analysis of the incidence of sacroiliac muscle contractures in group B using McNemara's test – statistical significance

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	3	15%	12	60%	15	75%
1	0	0%	5	25%	5	25%
Total	3	15%	17	85%	20	100%

Z=10.08 $\chi 2$ =in McNamara's test statistically significant

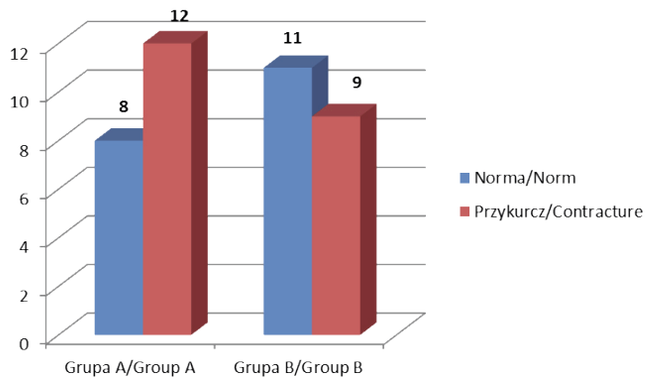

Fig. 9. Incidence of piriformis muscle contractures in patients from group A and group B before therapy.

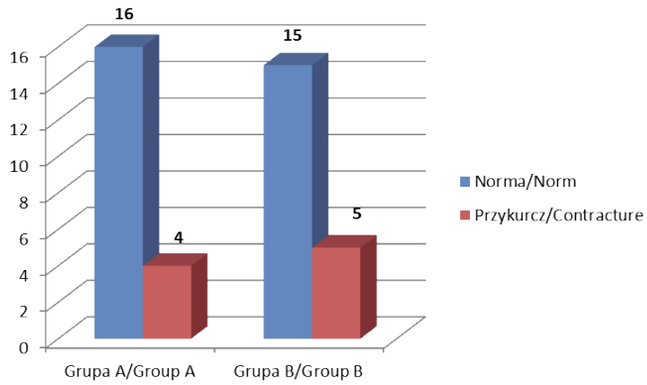

Fig. 10. Incidence of piriformis muscle contractures in patients from group A and group B following therapy.

Table 6. Statistical analysis of the incidence of piriformis muscle contractures in group A.

Before therapy	Po terapii/Following therapy					
	0		1		Total	
	n	% of total	n	% of total	n	% of total
0	4	20%	8	40%	12	60%
1	0	0%	8	40%	8	40%
Total	4	20%	16	80%	20	100%

Z=6.13 $\chi 2$ =0.0133 in McNamara's test statistically significant

Table 7. Statistical analysis of the incidence of piriformis muscle contractures in group B.

Before therapy	Following therapy					
	0		1		Total	
	n	% of total	n	% of total	n	% of total
0	5	25%	4	20%	9	45%
1	0	0%	11	55%	11	55%
Total	5	25%	15	75%	20	100%

Z=2.25 $\chi 2$ =0.1336 in McNamara's test statistically significant

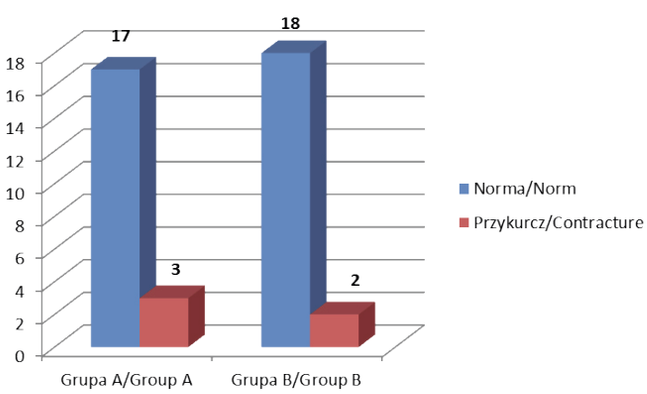

Fig. 11. Incidence of tensor fasciae latae muscle contractures in patients from group A and group B before therapy.

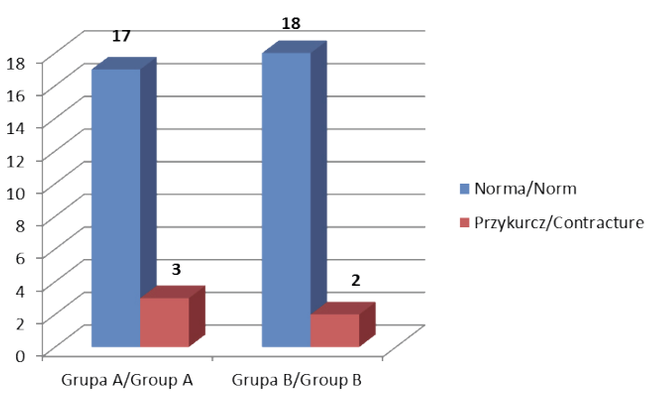

Fig. 12. Incidence of tensor fasciae latae muscle contractures in patients from group A and group B following therapy.

Incidence of quadratus muscle contractures in group A and B did not change, therefore were not subjected to statistical analysis.

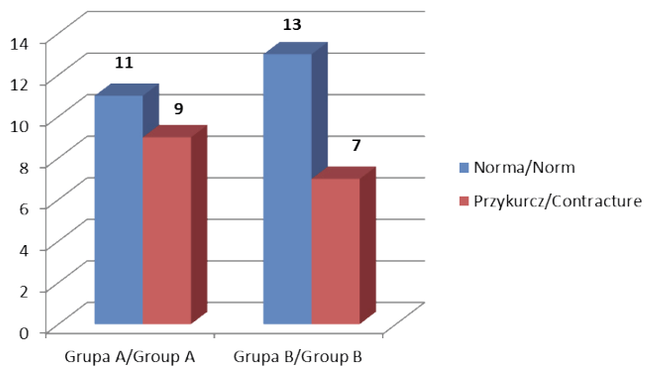

Fig. 13. Incidence of rectus femoris muscle contractures in patients from group A and group B before therapy.

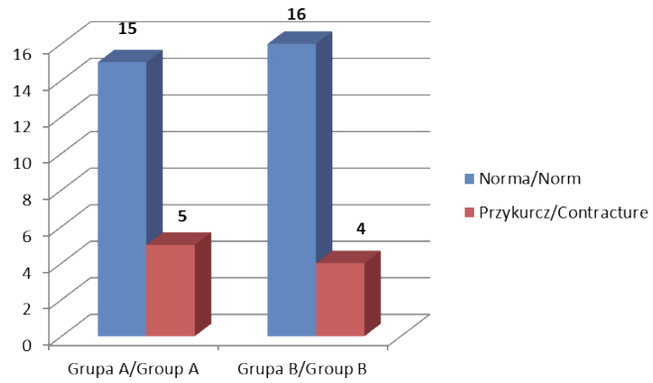

Fig. 14. Incidence of rectus femoris muscle contractures in patients from group A and group B following therapy.

Table 8. Statistical analysis of incidence of tensor fasciae latae contractures in group A.

Before therapy	Following therapy 0 n	% of total	1 n	% of total	Total n	% of total
0	5	25%	4	20%	9	45%
1	0	0%	11	55%	11	55%
Total	5	25%	15	75%	20	100%

Z=2.25 $\chi 2$ =0.1336 in McNamara's test statistically significant

Table 9. Statistical analysis of incidence of tensor fasciae latae contractures in group B.

Before therapy	Following therapy 0 n	% of total	1 n	% of total	Razem/Total n	% of total
0	4	20%	3	15%	7	35%
1	0	0%	13	65%	13	65%
Total	4	20%	16	80%	20	100%

Z=1.3 $\chi 2$ =0.248 in McNamara's test statistically significant

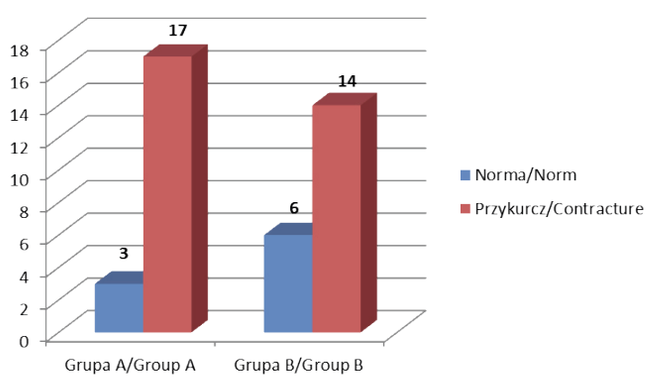

Fig. 15. Incidence of rectus femoris muscle contractures in patients from group A and group B before therapy.

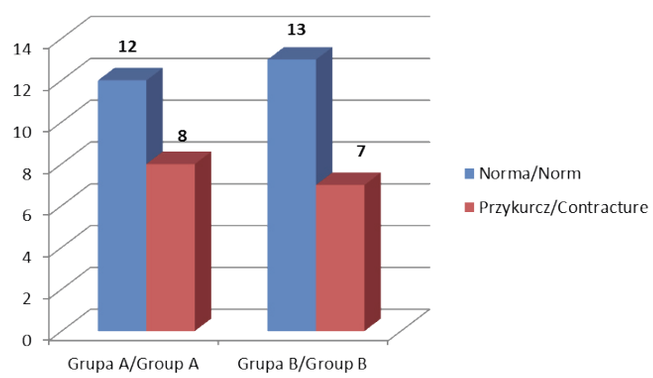

Fig. 16. Incidence of rectus femoris muscle contractures in patients from group A and group B following therapy.

Table 10. Statistical analysis of the incidence of rectus femoris muscle contractures in group A.

Before therapy	Following therapy 0 n	% of total	1 n	% of total	Total n	% of total
0	8	40%	9	45%	17	85%
1	0	0%	3	15%	3	15%
Total	8	40%	12	60%	20	100%

Z=7.11 $\chi 2$ =0.0077 in McNamara's test statistically significant

Table 11. Statistical analysis of the incidence of rectus femoris muscle contractures in group B.

Before therapy	Following therapy 0 n	% of total	1 n	% of total	Total n	% of total
0	7	35%	7	35%	14	70%
1	0	0%	6	30%	11	30%
Total	7	35%	13	65%	20	100%

Z=7.11 $\chi 2$ =0.0077 in McNamara's test statistically significant

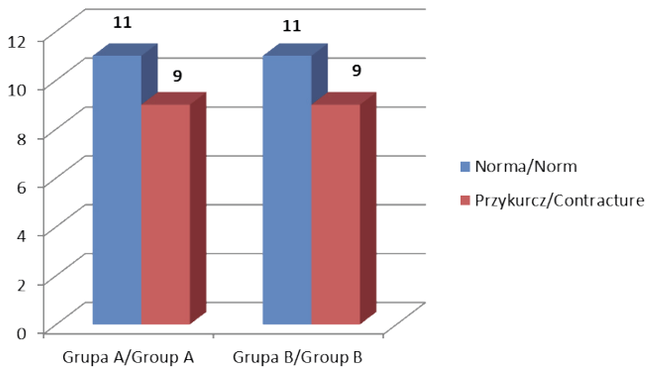

Fig. 17. Incidence of adductor muscle (brevis, longus, magnus) contractures in patients from group A and group B before therapy.

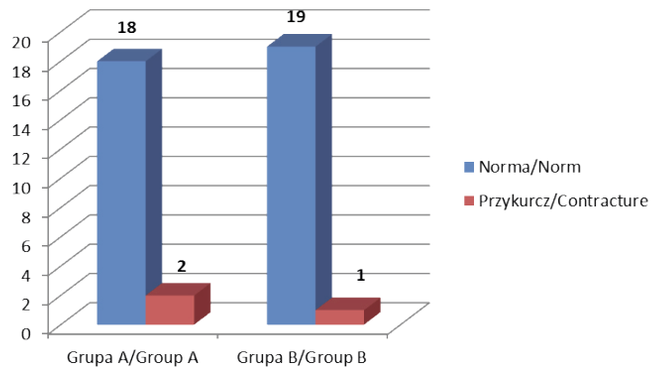

Fig. 18. Incidence of adductor muscle (brevis, longus, magnus) contractures in patients from group A and group B following therapy.

Table 12. Statistical analysis of the incidence of adductor muscle group contractures in group A.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	2	10%	7	35%	9	45%
1	0	0%	11	55%	11	55%
Total	2	10%	18	90%	20	100%

Z=5.14 $\chi 2$ =0.0233 in McNamara's test statistically significant

Table 13. Statistical analysis of the incidence of adductor muscle group contractures in group B.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	1	5%	8	40%	9	45%
1	0	0%	11	55%	11	55%
Total	1	5%	19	95%	20	100%

Z=6.13 $\chi 2$ =0.0133 in McNamara's test statistically significant

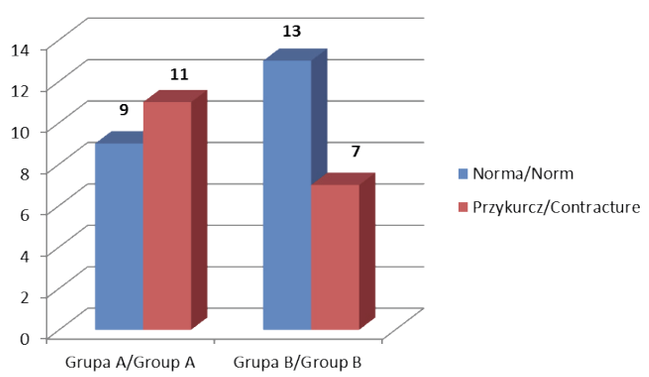

Fig. 19. Incidence of iliopsoas ligament tenderness in group A and group B patients before therapy.

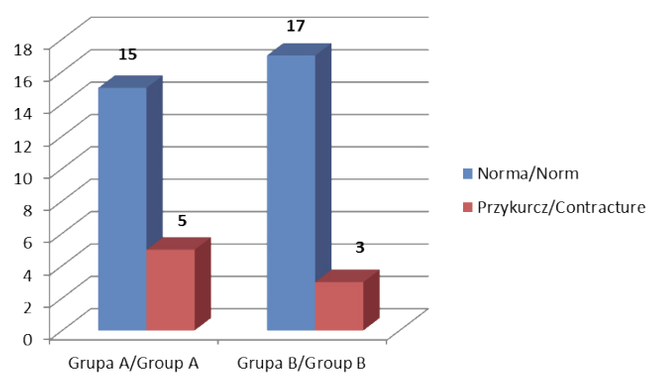

Fig. 20. Incidence of iliopsoas ligament tenderness in group A and group B patients following therapy.

Table 14. Statistical analysis of the incidence of iliopsoas ligament tenderness in group A.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	5	25%	6	30%	11	55%
1	0	0%	9	45%	9	45%
Razem	5	25%	15	75%	20	100%

Z=4.17 $\chi 2$ =0.0412 in McNamara's test statistically significant

Table 15. Statistical analysis of the incidence of iliopsoas ligament tenderness in group B.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	3	15%	4	20%	7	35%
1	0	0%	13	65%	13	65%
Razem	3	15%	17	85%	20	100%

Z=2.25 $\chi 2$ =0.1336 in McNamara's test statistically significant

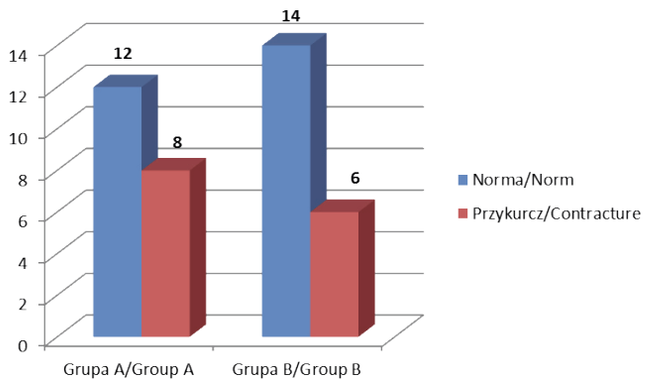

Fig. 21. Incidence of sacrotuberal ligament tenderness in group A and group B patients before therapy.

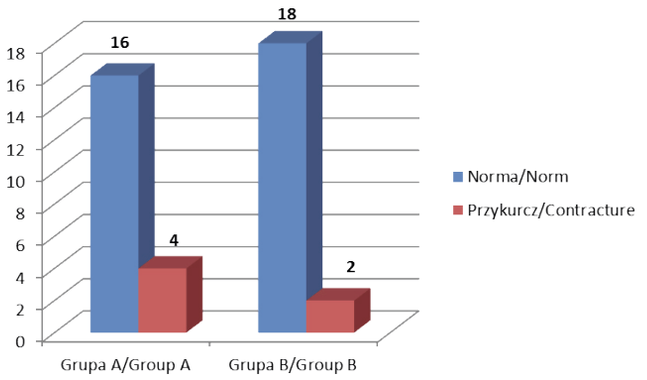

Fig. 22. Incidence of sacrotuberal ligament tenderness in group A and group B patients following therapy.

Table 16. Statistical analysis of sacrotuberal ligament tenderness in group A.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	4	20%	4	20%	8	40%
1	0	0%	12	60%	12	60%
Razem	4	20%	15	80%	20	100%

Z=2.25 $\chi 2$ =0.1336 in McNamara's test statistically significant

Table 17. Statistical analysis of sacrotuberal ligament tenderness in group B.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	2	10%	4	20%	6	30%
1	0	0%	14	70%	14	70%
Razem	2	10%	18	90%	20	100%

Z=2.25 $\chi 2$ =0.1336 in McNamara's test statistically significant

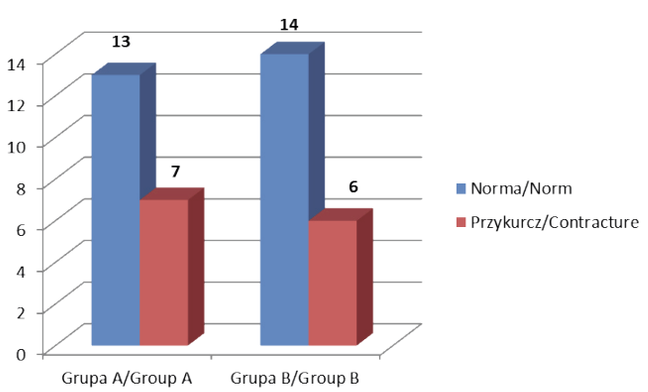

Fig. 23. Incidence of sacroiliac ligament tenderness in group A and group B patients before therapy.

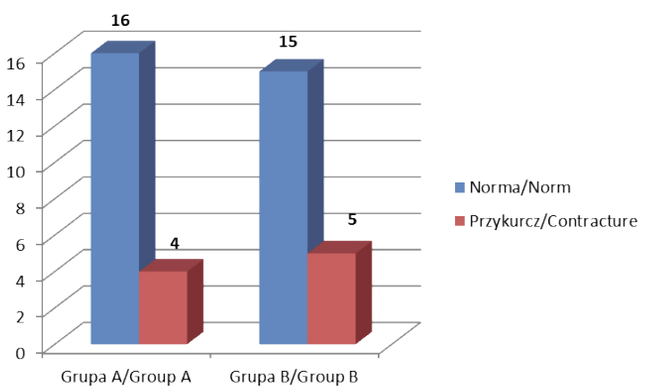

Fig. 24. Incidence of sacroiliac ligament tenderness in group A and group B patients following therapy.

Table 18. Statistical analysis of sacroiliac ligament tenderness in group A.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	4	20%	3	15%	7	35%
1	0	0%	13	65%	13	65%
Razem	4	20%	16	80%	20	100%

Z=1.3 $\chi 2$ =0.248 in McNamara's test statistically significant

Table 19. Statistical analysis of sacroiliac ligament tenderness in group B.

Before therapy	Po terapii/Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	5	25%	1	5%	6	30%
1	0	0%	14	70%	14	70%
Razem	5	25%	15	75%	20	100%

Z=0.0 $\chi 2$ =1.0 in McNamara's test statistically significant

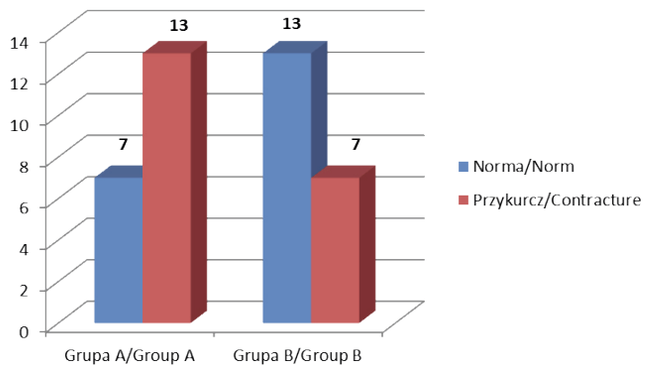

Fig. 25. Compilation of results of seated flexion test (Piedallu's test) in group A and group B before therapy.

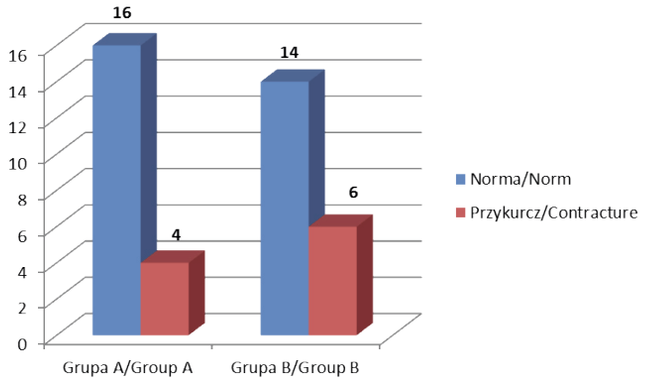

Fig. 26. Compilation of results of seated flexion test (Piedallu's test) in group A and group B following therapy.

Tab. 20. Statistical analysis of seated Piedallu's test results in group A.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	4	20%	9	45%	13	65%
1	0	0%	7	35%	7	35%
Total	4	20%	16	80%	20	100%

Z=7.11 $\chi 2$ =0.0077 in McNamara's test statistically significant

Tab. 21. Statistical analysis of seated Piedallu's test results in group B.

Before therapy	Po terapii/Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	6	30%	1	5%	7	35%
1	0	0%	13	65%	13	65%
Total	6	30%	15	70%	20	100%

Z=0.00 $\chi 2$ =1.0 in McNamara's test statistically significant

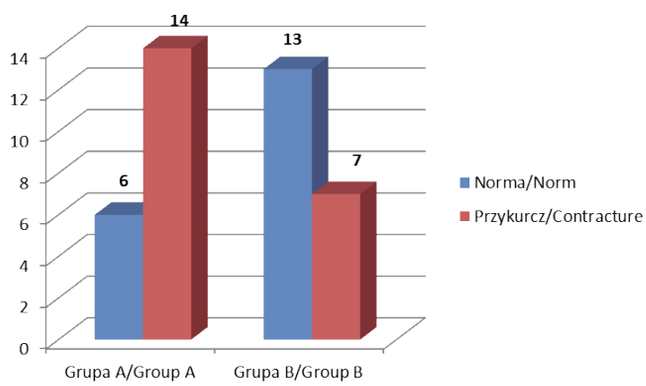

Fig. 27. Compilation of results of standing Piedallu's test in group A and group B before therapy.

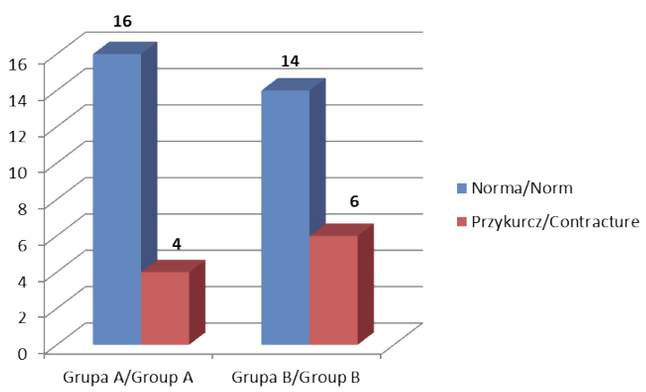

Fig. 28. Compilation of results of standing Piedallu's test in group A and group B following therapy.

Table 22. Statistical analysis of standing Piedallu's test in group A.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % całości % of total	Total n	Total % of total
0	4	20%	10	50%	13	70%
1	0	0%	6	30%	7	30%
Total	4	20%	16	80%	20	100%

Z=7.11 $\chi 2$ =0.0077 in McNamara's test statistically significant

Table 23. Statistical analysis of standing Piedallu's test in group B.

Before therapy	Following therapy 0 n	0 % of total	1 n	1 % of total	Total n	Total % of total
0	6	30%	1	5%	7	35%
1	0	0%	13	65%	13	65%
Total	6	30%	14	70%	20	100%

Z=0.0 $\chi 2$=1.0 in McNamara's test statistically significant

Table 24. Comparison of symptoms (radicular symptoms) measured using VAS scale before and after treatment among group A patients.

	Before therapy X ±SD	Following therapy X ±SD
Results	**7.25 ±1.**65	**3.1 ±1.58**

Before therapy mean level of pain perception measured using VAS scale among group A patients (radicular symptoms) amounted to 7.25 ±1.65. After therapy this value shaped at level 3.1 ± 1.58, which corresponds to 41% pain reduction relative to initial result, which is a statistically significant change ($p<0.05$) (Table 24).

Table 25. Comparison of results on a VAS scale from group B patients before and after therapy (pseudoradicular symptoms)

	Before therapy X ±SD	Following therapy X ±SD
Results	**6.15 ±2.**25	**2.6 ±1.60**

Before therapy mean result obtained on VAS scale by group B patients (pseudoradicular symptoms) amounted to 6.15 ±1.60.After therapy this value shaped at level 2.6 ±1.6, which signifies 35% pain reduction relative to initial value – this result is statistically significant ($p<0.05$) (Table 25).

Discussion of the result

In the entire study group we noted a reduction in the number of points obtained in modified Oswestry questionnaire, which determines the level of disability. Mean value before therapy amounted to 31.1 points, which corresponds to functional impairment at a level of "crippling disability," while after therapy it decreased to 21.4. It gives a difference of 9.7 points, which corresponds to 20% improvement, resulting in function at a level of "severe disability" (Table 1).
Mean result of Oswestry questionnaire in group A before therapy was 32.3 points, corresponding to "crippling disability", and 22 points after treatment. A 10.3- point difference constitutes a 20% improvement and patients achieved function at a level of "severe disability" (Table 2). In group B mean value amounted to 29.8 points before therapy, which equals to functioning at a level of "severe disability," and 20.8 after therapy. The difference amounted to 9 points, which corresponds to 19% improvement (Table 3), although according to the questionnaire, level of disability remained unchanged. Obtained point values indicate that both groups were very similar with respect to level of disability despite being qualified to different levels on the basis of Oswestry questionnaire results. Results acquired in both groups indicate positive influence of administered therapy, which reduced the level of lower back dysfunction.
In group A 14 patients suffered from iliopsoas muscle contractures before therapy compared to only three patients after treatment. Improvement was noted in 11 patients that may be presented as 55% improvement (Fig. 7, 8, Table 4) and acquired result is statistically

significant. Fifteen patients from group B had contractures, while after treatment this number amounted to 3 and improvement was reached in 12 cases, which constitutes a 60% change (Fig. 7, 8, Table 5). Obtained result is statistically significant.

Piriform muscle contractures affected 12 patients from group A before therapy and 4 patients after treatment. Improvement was reached in 8 cases, which may be considered a 40% improvement in this study group (Fig. 9, 10, Table 6) and this result is statistically significant. In group B 9 patients suffered from contractures before therapy, while this number amounted to 5 after treatment, demonstrating improvement in 4 cases (Fig. 9, 10, Tab. 7), although this result is not statistically significant.

Number of patients with contracture of quadratus lumborum muscle amounted to 3 in group A and 2 in group B both before and after treatment (Fig. 11, 12). Obtained results are not statistically significant.

Tensor fasciae latae contracture affected 9 patients from group A before therapy and 5 subjects after treatment. Improvement was noted in 4 people, which amounts to 20% of subjects (Fig. 13, 14, Table 8), and this result is not statistically significant. In group B contractures involved 7 patients before therapy and only 4 patients after treatment, which amounted to 15% improvement (Fig. 13, 14, Table 9). Results are not statistically significant.

Among all 20 studied subjects from group A 17 patients suffered from rectus femoris contractures and this value decreased to 8 after treatment. The difference amounted to 9 subjects, which constituted a 45% improvement (Fig. 15, 16, Table 10). Obtained result is statistically significant. In group B contractures were noted in 14 patients before therapy, while after treatment this number amounted to 7. Improvement occurred in 35% of patients in this group (Fig. 15, 16, Table 11). This result did not reach statistical significance.

Contractures of adductor muscles were noted in 9 subjects from group A before therapy and 2 patients after treatment. Improvement occurred in 35% of patients from this group (Fig. 17, 18, Table 12) and acquired result is statistically significant. In group B contracture was seen in 9 patients before therapy and 1 person after treatment. Improvement was seen in 40% of patients (Fig. 17, 18, Table 13). This result is statistically significant.

Iliolumbar ligament tenderness was seen in 11 patients from group A before therapy and in 5 patients after treatment. The difference was noted in 6 patients, which constitutes a 30% improvement (Fig. 19, 20, Table 14) and obtained result is statistically significant. In group B tenderness was noted in 7 patients before therapy and 3 patients after treatment. This difference corresponds to 20% improvement (Fig. 19, 20, Table 15). Obtained result is not statistically significant.

Among group A patients sacrotuberous ligament was irritated in 8 patients before therapy and 4 patients after treatment, which gave a 20% improvement (Fig. 21, 22, Table 16). Obtained result was not statistically significant. Among group B patients irritation occurred in 6 patients before therapy and 2 patients after treatment, translating into a 20% improvement (Fig. 21, 22, Table 17). Result is not statistically significant.

Sacroiliac ligament was irritated in 7 group A patients before treatment and 4 patients after therapy, amounting to 20% improvement

(Fig. 23, 24, Table 18). However, this result is not statistically significant in McNemara's test. In group B irritation occurred in 6 people before therapy and 5 after treatment, which gives only a 5% improvement (Fig. 23, 24, Table 19). Acquired result is not statistically significant.

Positive seated Piedallu's sign was noted in 13 group A patients before therapy and 4 subjects after treatment. The difference of 9 people constituted 45% improvement (Fig. 25, 26, Table 20) and obtained result is statistically significant. Among group B patients positive sign was noted in 7 patients before therapy and 6 patients after treatment. Improvement amounted to only 5% (Fig. 25, 26, Table 21). This result is not statistically significant.

Before therapy positive standing Piedallu's sign was noted in 14 patients from group A compared with 4 subjects after treatment. The difference of 10 people constituted 50% improvement (Fig. 27, 28, Table 22) and acquired result is statistically significant. Among group B patients 7 subjects presented with positive sign before therapy and 6 patients after treatment. Improvement was only 5% (Fig. 27, 28, Table 23). Obtained result is not statistically significant.

Mean number of points obtained during examination on a VAS scale among patients from group A amounted to 7.3 points before therapy and 3.1 points afterward. The difference of 4.1 points may be presented as a 41% decrease in pain perception among radiculopathy patients. In group B mean value before therapy was 6.2 points and 2.6 points after treatment. The difference was 3.6 points, which may be presented as reduction in perceived pain in a group of patients with pseudoradicular symptoms by 36%. These results demonstrate high analgetic effectiveness of administered therapy. It should be added that both groups were characterized by some differences in initial and final VAS values – the group with pseudoradicular symptoms acquired smaller values of pain perception before and after therapy. Despite reduction in perceived pain another correlation may be noted in the analysis of muscle and ligament length changes, which were not statistically significant in a group of patients with pseudoradicular symptoms as opposed to the group with radiculopathy group. The primary cause indicated primary disorders of soft tissue structures: muscles and ligaments, conditions of which were changing but not sufficiently to obtain better end results of therapy.

An interesting observation in the study groups relates to persistence of pain symptoms involving pelvic ligaments, which signifies lack of significant improvement with regard to the observed disorders in group B patients described as pseudoradicular symptoms of all examined structures. In this group we obtained a smaller number of improvement cases and observed changes were not statistically significant with regard to therapy of ligaments and muscles, as well as lack of improvement in Piedallu's tests. Group A with radicular symptoms acquired better results despite not being subjected to therapy using the McKenzie method. Characteristically, group A showed improvement, i.e. lengthening of piriform muscle and decrease in iliopsoas ligament tenderness, which could have influenced the observed reduction in the number of positive standing and seated Piedallu's tests. One might say that changes around nerve roots could be a significant mechanism stimulating pain and decrease in quality of life, while our therapy led to disabling of this mechanism. This correlation cannot be explained by the number of disease recurrences observed in our study groups and presented in Figure 4.

Discussion

Topic of lower back pain and associated disorders of pelvic statics has been frequently undertaken by various authors. Pain syndromes and methods of their management pose a problem that may be viewed from different perspectives. While working with our material we expected rapid improvement in patients with pseudoradicular symptoms, which was observed. However, we obtained better results in a group of patients with radicular symptoms.

Restoration of muscle elasticity as well as normalization of ligamentous tension exhibited analgetic action. Adamczewski [16] takes a similar view, claiming that removal of reflexory changes in these structures decreases pain symptoms, which we observed in our study group, although therapeutic effects in particular disorders differed and did not provide sufficient support for Adamczewski's claim.

Assessment of the effects of administered therapy was conducted by Kassolik [8, 17] and Mizgier [22], who also used classical massage in therapeutics. Their results corroborate the opinion that massage effectively attenuates sacrolumbar pain. That explains and supports improvement acquired in some of our patients. However, massage in our study was performed according to the principles of tensigrity.

Studies conducted by Sipko [19] confirm the notion that therapy should differ depending on presence of radicular or pseudoradicular symptoms. Our observations as well as unsatisfactory effects of therapy in pseudoradicular syndromes corroborate that idea.

Laser treatments were also used for analgesia. Jagielski [20] ascertained that laser radiation is an effective tool against pain and demonstrated that its effectiveness exceeded that of diadynamic current therapy.

According to Taradaj [10], combination therapy with Tens currents and ultrasound is a promising method of pain management.

Krakowska [21] also acquired positive effects of magnetoledotherapy, which quickly exhibited analgetic effectiveness in patients with vertebral pain.

In light of the newest studies the etiology of pain development is worth noting, with particular focus on a history of first pain incidents appearing since an early age. Due to the unsettling fact that incidence of spinal pain during developmental age increases and numerous risk factors children are exposed to by the modern civilization exposes, it seems that this problem poses a true challenge to modern medicine. Marginalization of such symptoms may cause great problems for healthcare systems [22].

Kokosz et al. demonstrated in their own studies that people complaining of mild lumbar pain are characterized by weakening of deep stabilizing muscles [23]. In light of previously presented work by Sienkiewicz et al. it should shift the attention of medical community to early prophylaxis of pain syndromes and postural defects, which may combine the elements of disorders characterized by lack of stability in small children.

All authors share a common opinion that physiotherapeutic procedures, physical therapy, kinezytherapy or massage decrease the level of pain in patients, increase range of motion in joints, restore physiological processes and improve general wellbeing.

Conclusions

1. Physiotherapy used in radicular and pseudoradicular syndromes significantly reduces pain, as confirmed by the results obtained on a VAS scale.
2. Muscles most frequently affected by contractures are those responsible for so-called pelvic statics.
3. MET techniques, including postisomeric relaxation (PIR), restore muscle elasticity, contributing to reduction in life discomfort in patients with radicular and pseudoradicular pain.
4. Radicular and pseudoradicular syndromes affect disorders of pelvic statics presenting with muscle shortening and increased activity of connective tissue structures in this region.
5. Positive changes observed in muscle structures/increase in length of muscles and connective tissue structures/decrease in pain symptoms/ affect the quality of life.

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