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PECULIARITIES OF FORMING A THERAPEUTIC ALLIANCE DURING PHYSICAL THERAPY OF PATIENTS WITH ADHESIVE CAPSULITIS AND MYOFASCIAL PAIN SYNDROME

Topicality. *The study of biopsychosocial characteristics of physical therapy is an important and relevant element of science. The purpose of the study was to investigate therapeutic alliance, formed in patients with adhesive capsulitis and myofascial pain syndrome in the thoracic spine during complex physical therapy.*

Materials and methods. *28 patients participated in the study. Goniometry of shoulder joint, assessment of pain at the endpoints of motion range and in trigger points were used before intervention and after the end of physical therapy. Therapeutic alliance was assessed with the help of Working Alliance Inventory (patient form) right after the last physical therapy procedure was finished (first questionnaire) and 1.5 months later (second questionnaire).*

Physical therapy started after examination and consultation of an orthopedist-traumatologist. Physical therapist also consulted patients on the specifics of performing end-range mobilization and ischemic compression, namely on pain levels, importance of interaction, and measures to reduce pain during the procedures. Most of the patients received 15 scheduled end-range mobilization procedures performed by a physical therapist and ischemic compression performed by the patient within 3 weeks. Ischemic compression of one trigger points was performed with an average or above average level of pain and duration of 30 seconds.

Research results. *The obtained results confirmed positive dynamics of the amplitude of movements in shoulder joint, pain when reaching the maximum amplitude and in trigger points. The analysis of the first and second questionnaires revealed high indicators in questionnaire items, and also did not show any statistical difference between them. The third item of the questionnaire had the lowest result among all the questionnaire items. The results of the first survey in the domains were: goal items – 20 (18.3; 20) points; task items – 20 (18.3; 20) points; bond items – 20 (18; 20) points. The statistical indicators of the total score therapeutic alliance were 60 (52.8; 60) points. Bond items domain had slightly lower indicators. The performed analysis did not reveal any statistical differences between the results of questionnaires in therapeutic alliance domains and the total score.*

Conclusion. *Therapeutic alliance, that is formed between the patient and the physical therapist during physical therapy, which involved a combination of end-range mobilization and ischemic compression and was characterized by pain and intensive interaction, has a high level of all three domains and does not change in the long-term period.*

Key words: *physical therapy, rehabilitation, musculoskeletal system, shoulder joint, pain.*

Русанов А. П., Вітомський В. В. ОСОБЛИВОСТІ ФОРМУВАННЯ ТЕРАПЕВТИЧНОГО АЛЬЯНСУ ВПРОДОВЖ ФІЗИЧНОЇ ТЕРАПІЇ ПАЦІЄНТІВ З АДГЕЗИВНИМ КАПСУЛІТОМ ТА МІОФАСЦІАЛЬНИМ БОЛЬОВИМ СИНДРОМОМ

Актуальність. *Дослідження біопсихосоціальних характеристик фізичної терапії є важливим й актуальним елементом науки.*

Мета роботи – *дослідити терапевтичний альянс, який формується в пацієнтів з адгезивним капсулітом та міофасціальним больовим синдромом у грудному відділі впродовж комплексної фізичної терапії.*

Матеріали та методи. У дослідженні взяли участь 28 пацієнтів. Гоніометрія плечового суглоба, оцінка болю в кінцевих точках амплітуди руху та тригерних точках використовувалась до втручання та після закінчення фізичної терапії. Для оцінки терапевтичного альянсу використовувався опитувальник «Оцінка терапевтичного альянсу» відразу після закінчення останньої процедури фізичної терапії (перше анкетування) та через 1,5 місяця (друге анкетування).

Фізична терапія починалася після обстеження та консультації ортопеда-травматолога. Фізичний терапевт також консультував щодо особливостей проведення кінцевоамплітудної мобілізації та ішемічної компресії, зокрема про рівень болю, важливість взаємодії та заходи для зменшення болю під час процедур. Більшість пацієнтів впродовж 3 тижнів отримала 15 планових процедур кінцевоамплітудної мобілізації, яка проводилася фізичним терапевтом, та ішемічної компресії, яка виконувалася пацієнтом самостійно. Ішемічна компресія однієї тригерної точки виконувалася із середнім рівнем болю або вище середнього та тривалістю 30 секунд.

Результати дослідження. Отримані результати підтвердили позитивну динаміку амплітуди рухів у плечовому суглобі, болю при досягненні максимальної амплітуди та в тригерних точках. Аналіз першого та другого анкетування встановив високі показники в пунктах опитувальника, а також не виявив статистичної різниці між ними. Третій пункт опитувальника мав найнижчий результат серед усіх. Результати першого опитування в доменах: ціль – 20 (18,3; 20) балів; завдання – 20 (18,3; 20) балів; взаємовідносини – 20 (18; 20) балів. Статистичні показники загальної оцінки терапевтичного альянсу становлять 60 (52,8; 60) балів. Домен взаємовідносини мав децю нижчі показники. Проведений аналіз не виявив жодних статистичних відмінностей між результатами опитувань у доменах терапевтичного альянсу та загальним балом.

Висновки. Терапевтичний альянс, який виникає між пацієнтом та фізичним терапевтом впродовж фізичної терапії, що передбачала комбінацію кінцевоамплітудної мобілізації та ішемічної компресії і характеризувалася болісністю, інтенсивною взаємодією, має високий рівень усіх трьох доменів та не змінюється у віддаленому періоді.

Ключові слова: фізична терапія, реабілітація, опорно-руховий апарат, плечовий суглоб, біль.

Introduction. Adhesive capsulitis (AC) is a debilitating condition characterized by restricted range of motion of the shoulder joint and pain [1]. Capsular thickening of shoulder joint, progression of fibrosis and adhesion are key reasons for the mechanical restriction of upper limb motion in AC [2]. AC prevalence ranges from 2% to 5% [2; 3]. Females are more often prone to AC [3, 4], however worse post-treatment dynamics of clinical symptoms is observed in males [3]. It leads to stiffness in shoulder, disruption of activities of daily living [3], reduced work capacity and quality of life [5].

A wide range of approaches and methods of AC therapy are described in the literature. These involve manipulation under anesthesia, capsular distension injections, arthroscopic capsular release, intra-articular corticosteroid injections, ultrasound, hot packs and supervised neglect [2; 3; 5]. At the same time, physical therapy (PT) is widely used for AC treatment [5; 6; 7], as well as for other musculoskeletal system pathologies [8; 9]. Therapeutic exercises, proprioceptive neuromuscular facilitation, mobilization techniques, and other methods which are included in PT were used in AC.

Myofascial pain syndrome (MPS) is one of the key triggers for nonspecific pain that impairs functional ability [10]. At the same time, myofascial pain is a common component of most chronic pain syndromes [11]. MPS treatment focuses on eliminating trigger points (TP). A number of methods are considered effective for MPS therapy, including therapeutic exercises, ischemic compression (IC) and other manual techniques, ultrasound, heat therapy, as well as invasive methods [10; 12].

Studying peculiarities of forming a therapeutic alliance (TA) during PT is an important aspect of scientific activity aimed at improving the rehabilitation process. This is due to the importance of the biopsychosocial model of PT and the fact that understanding and communication of the physical therapist with the patients are very important [13].

Previous studies analyzed TA formation during the work of a physical therapist with patients of cardiac surgical profile [14], orthopedic profile [13; 15; 16], in a multidisciplinary pain rehabilitation setting [17], as well as relationship between TA and therapy effectiveness [18, 19]. However, there are no studies focused on the characteristics of TA, which is formed during PT of patients with AC and MPS.

Connection of the study with scientific programs, plans, topics. The work was carried out according to the plan of scientific research work of National University of Physical Education and Sports of Ukraine for 2021–2025 on the topic «Restoration of functional capabilities, activity and participation of people of different nosological, professional and age groups by means of physical therapy», state registration number 0121U107926.

The purpose of the study was to investigate TA, formed in patients with AC and MPS in the thorax during complex PT.

Materials and methods. Participants. The study involved 28 patients who were treated at the State Institution «Institute of Traumatology and Orthopedics of the NAMS of Ukraine». Before the PT, patients underwent diagnostic tests and received consultations with an orthopedist-traumatologist.

None of the patients had a history of intra-articular corticosteroid injections prior to consultation with an orthopedist-traumatologist, while 11 (39.3%) patients received an injection after consultation with a physician prior to PT. One of the patients had previously received PT. Two patients took non-steroidal anti-inflammatory drugs during PT program.

Inclusion criteria of the study were as follows: unilateral AC, MPS in the thorax, pain and restricted shoulder range of motion in at least 2 directions (flexion less than 120°, internal and external rotation less than 50% of normal), absence of special pathological findings during ultrasound examination of the joint. Exclusion criteria of the study were as follows: history of shoulder injuries, operations or manipulations under anesthesia; neurological diseases that affect shoulder functioning in everyday activities; elbow, wrist, or hand pain or discomfort; other pathological conditions of the shoulder (rotator cuff tear, tendinitis, osteoarthritis, etc.).

The research was carried out in compliance with the main provisions of the «Ethical Principles for Medical Research Involving Human Subjects», approved by the Declaration of Helsinki (1964–2013), ICH GCP (1996), EU Directive № 609 (dated November 24, 1986), orders of the Ministry of Health of Ukraine № 690 dated September 23, 2009, № 944 dated December 14, 2009, № 616 dated August 03, 2012. The patients participated in the study completely of their own free will, which is confirmed by their personally signed informed consents. Each patient was personally informed of their responsibilities and rights as well as the possibility to end the study at any time without any consequences and explaining the reasons for their actions.

Methods. Medical histories were studied. Goniometry of shoulder joint, assessment of pain at the endpoints of motion range and in trigger points (TP) were used before intervention and after the end of PT. Active and passive amplitudes were measured. Goniometer was placed in accordance with the guidelines [20]. External and internal rotation in the examined patients was measured in the supine position with the shoulder retracted by 15° and a small elastic pillow or a folded towel placed under the elbow.

Assessment of pain at the endpoints of motion range and in TPs was carried out according to a numeric scale [21]. Numeric Pain Rating Scale assesses pain intensity from 0 to 10, with 0 being «no pain» and 10 being «the worst pain imaginable». Assessment of local pain in TP was performed when applying 2.5 kg×cm² pressure with the help of a digital force gauge VTSYIQI and the highest pain score among TP was registered.

TA was assessed with the help of Working Alliance Inventory (patient form) right after the last PT procedure was finished (first questionnaire) and 1.5 months later (second questionnaire) [14; 18; 22].

Intervention. PT started after examination and consultation of an orthopedist-traumatologist. Physical therapist also consulted patients on the specifics of performing ERM and IC, namely on pain levels, importance of interaction, and measures to reduce pain during the procedures. Most of the patients received 15 scheduled ERM procedures performed by a physical therapist within 3 weeks. Only three patients received 13, 14, and 16 procedures. IC was performed independently by the patients after instructions.

Mobilization was performed in the form of intensive ERM [23, 24] involving the methods described by Maitland [25] which are still studied and used in practice. Intensity of mobilization techniques was assessed according to 5-grade Maitland classification system [25]: starting from Grade I (small amplitude movement at the beginning of the available range of movement) to Grade V (small amplitude movement and high speed at the end of the restricted amplitude / stiffness zone).

Patients performed ERM procedure in a supine position. At the beginning of each procedure, the physical therapist assessed motion range in patient's shoulder joint in all major directions of motion. End feel was assessed at each amplitude endpoint to apply mobilization technique in stiffness areas. Then the physical therapist performed rhythmic mobilization in medium amplitude (grades II-III) and massage (kneading techniques) to prepare anatomical structures for a more intensive impact. Afterwards, the physical therapist positioned his hands close to patient's shoulder joint and humeral head to operate the short lever.

Humerus was moved to the position of maximum flexion in the sagittal plane. After 8–10 repetitions of mobilization (grades III-IV with a prevalence of grade IV) in this final position the direction of mobilization was modified by changing the plane of shoulder elevation or its rotation degree.

Then, mobilization involved shoulder abduction and rotations. During shoulder abduction, special attention was paid to scapula fixing to reduce its mobility. Mobilization included 8–10 repetitions in each direction. Its degree and stress impact duration varied depending on patient's tolerance.

Passive mobilization of joints in grade IV was performed as a passive oscillatory movement or as a sustained stretch with or without tiny amplitude oscillations at the end of the available range of move-

ment. Low-speed mobilizations were also used. During the procedure, the physical therapist could return the shoulder to the position in which he had already performed mobilization and perform re-mobilization. Mobilization of grade V involved high-speed thrusts with small amplitude.

The most effective mobilization requires achieving maximum possible relaxation of the surrounding muscles. During the procedure, the physical therapist controlled the level of reflex muscle activity (tension) by palpation, periodically taking measures to reduce excessive tension. Changes in the mobilization intensity or direction, repetition of shoulder movement over the entire amplitude were used to minimize reflex muscle activity. Distraction technique (in the supine position) with or without simultaneous movement in shoulder joint was used for the same purpose.

Patients were instructed to inform the therapist of the degree and nature of pain during and after the procedure. If pain had a negative impact on the performance of mobilization techniques (due to increased reflex muscle activity), the therapist changed the direction or degree of mobilization as was previously described. If the patient felt dull pain without increased reflex muscle activity, mobilization methods were continued. Patients were informed that pain could last for several hours after the procedure. If pain got worse or lasted more than 4 hours after therapy, the intensity of mobilization techniques was reduced during the next session.

When the amplitude of movements in shoulder joint increased, mobilization methods were performed at greater angles of flexion and abduction. This new position of the humeral head required individual adjustment of the direction of additional movements in the joint according to «convex-concave» rules outlined by F. M. Kaltenborn [26]. Modification of mobilization techniques involved greater abduction or adduction, greater flexion or extension, greater internal or external rotation, or combined adjustments. ERM was conducted by a qualified physical therapist with a long-term experience of working with thematic patients. Duration of the procedure comprised 20-25 minutes. Patients were advised to perform all types of activities, including household ones, with the maximum possible range of motion in shoulder joint.

Besides, MBS therapy involved IC. Physical therapist determined localization of active and latent TPs, with their marking on an individual card, given to the patient. The patient was instructed on techniques and ways of influencing TPs of different localization. In particular, when TP was localized in the upper part of the trapezius muscle, the patient was shown

how to palpate TP and IC specifically with a healthy upper limb, or with the help of a small elastic ball (6–10 cm in diameter) or a truncated cone. It should be noted that IC of one TP was performed with an average or above average level of pain and duration of 30 seconds.

If TP was localized in the middle part of the trapezius muscle (somewhere in the medial border of the scapula), the patient was shown how to perform an accurate search for a TP and IC specifically with the help of the abovementioned ball/truncated cone. Particularly, the patient was told that it is necessary to bring the ball/truncated cone behind his/her back with the healthy hand and place it in TP area. Then the patient was asked to approach the wall and gradually lean against the wall, pressing the ball/truncated cone on the muscles in TP area. After turning/moving the trunk with a very small amplitude slightly to the right or left/up or down, the patient had to find the most sensitive point (with possible radiation of pain/typical pain), i.e. TP, and perform IC. In this part of the chest, IC of one TP was also performed with an average or above average pain level and duration of 30 seconds for each TP. Similar algorithm was used to perform IC in the area of round muscles and other localizations, provided there were active or latent TPs, which were determined during consultations.

When performing IC, patients were advised to take slow, deep breaths with prolonged exhalation phases and try to maximally relax the muscles in the area of IC performance with each exhalation. The patient performed several repetitions of TP sequence. IC duration comprised 15-20 minutes.

Statistical analysis. The obtained results were processed by the methods of mathematical statistics. SPSS Statistics 21 was used. The median (Me) and upper and lower quartiles (25%; 75%) were calculated for the results of indicators, since they did not conform to the law of normal distribution, which was checked by Shapiro-Wilk test in both assessments. Average values were additionally calculated. Wilcoxon test was used to compare the results of two assessments (software converted the criteria to a Z value).

Research results. The studied group of patients included 17.9% males. Me (25%; 75%) values for age comprised 53 (49; 58) years, and for the duration of symptoms – 4 (2; 7) months. Eleven patients (39.3%) had localization of AC on the right side, and ten patients (35.7%) – on the dominant upper limb. Eight patients had the lesion on the dominant right upper limb.

ERM was characterized by the fact that at the end of the first, sixth, eleventh and last procedures, the

Table 1

Me (25%; 75%) indicators of the amplitude of movements in shoulder joint and pain when reaching the maximum amplitude

Movement		Amplitude, °		P*	Pain, points		P*
		before PT	after PT		before PT	after PT	
Abduction	passive	59 (40.3; 64.8)	126 (125; 126)	<0.001	9 (9; 10)	3 (2; 4)	<0.001
	active	56 (32.3; 61.8)	125 (123.3; 125.8)	<0.001	9 (8; 9)	3 (2; 4)	<0.001
Flexion	passive	67.5 (55.3; 95)	180 (180; 180)	<0.001	9.5 (9; 10)	3 (2; 4)	<0.001
	active	64.5 (51.3; 91)	179.5 (179; 180)	<0.001	9 (8; 9)	3 (2; 4)	<0.001
Internal rotation	passive	15.5 (14; 19.8)	90 (90; 90)	<0.001	9 (9; 10)	3 (2; 4)	<0.001
	active	12.5 (11; 16.5)	90 (89; 90)	<0.001	9 (8; 9)	3 (2; 4)	<0.001
External rotation	passive	18 (17; 21)	90 (90; 90)	<0.001	9 (9; 10)	3 (2; 4)	<0.001
	active	15 (13.3; 17.8)	90 (89; 90)	<0.001	9 (8.3; 9)	3 (2; 4)	<0.001

Note: * – according to the Wilcoxon test

Table 2

Me (25%; 75%) indicators of questionnaire items of Working Alliance Inventory, points

Items	Survey		Indicator*	p
	first	second		
1. As a result of these sessions I am clearer as to how I might be able to change	5 (5; 5)	5 (5; 5)	-0.447	0.655
2. What I am doing in therapy gives me new ways of looking at my problem	5 (4.3; 5)	5 (5; 5)	-1.414	0.157
3. I believe PTt likes me	5 (4; 5)	5 (4.3; 5)	-1.543	0.123
4. PTt and I collaborate on setting goals for my therapy	5 (5; 5)	5 (5; 5)	-0.276	0.783
5. PTt and I respect each other	5 (5; 5)	5 (5; 5)	-0.447	0.655
6. PTt and I are working towards mutually agreed goals	5 (5; 5)	5 (5; 5)	-0.378	0.705
7. I feel that PT appreciates me	5 (5; 5)	5 (5; 5)	-1.890	0.059
8. PTt and I agree on what is important for me to work on	5 (5; 5)	5 (5; 5)	<0.001	1.000
9. I feel PTt cares about me even when I do things that he/she does not approve of	5 (5; 5)	5 (5; 5)	<0.001	1.000
10. I feel that the things I do in therapy will help me to accomplish the changes that I want	5 (5; 5)	5 (5; 5)	-0.743	0.458
11. PTt and I have established a good understanding of the kind of changes that would be good for me	5 (5; 5)	5 (5; 5)	-0.707	0.480
12. I believe the way we are working with my problem is correct	5 (5; 5)	5 (5; 5)	-1.414	0.157

Notes: * – according to the Wilcoxon test; PTt – physical therapist

Table 3

Me (25%; 75%) indicators of the domains and the total score of Working Alliance Inventory questionnaire, points

Domains	Survey		Indicator*	p
	first	second		
Goal items	20 (18.3; 20)	20 (19.3; 20)	-0.141	0.888
Task items	20 (18.3; 20)	20 (19.3; 20)	-1.450	0.147
Bond items	20 (18; 20)	20 (18.3; 20)	-1.754	0.079
Total score	60 (52.8; 60)	60 (56.3; 60)	-1.733	0.083

Note: * – according to the Wilcoxon test.

maximum pain level on a 10-point scale during mobilization comprised: 10 (9; 10) points, 8 (8; 9) points, 7 (5.25; 8) points and 4 (3; 4.75) points respectively. The obtained indicators reflect the intensity of performed mobilization. Pain in TP at the first assessment comprised 9 (9; 9) points.

The obtained results confirmed positive dynamics of the amplitude of movements in shoulder joint and pain when reaching the maximum amplitude (Table 1), which proves the effectiveness of the used PT. It should be noted that pain indicator in TP when

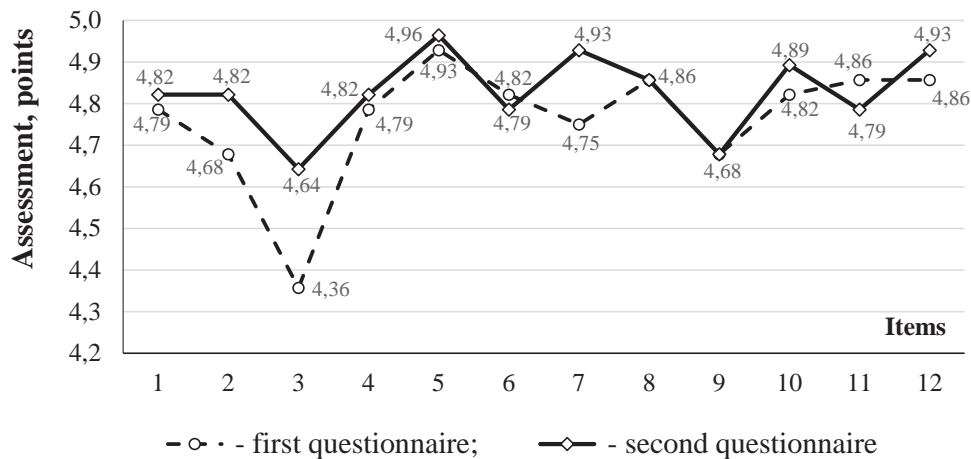
evaluated after the end of PT improved statistically and comprised 4 (3; 4) points ($Z = -4.713$; $p < 0.001$).

The analysis of the first and second questionnaires revealed high indicators in questionnaire items, and also did not show any statistical difference between them (Table 2).

The average values of questionnaire items in the first and second questionnaires were very approximated (Picture 1).

The performed analysis did not reveal any statistical differences between the results of questionnaires in TA domains and the total score (Table 3). Accordingly, the assessment of TA and its components did not change over time in patients. Statistical indicators of the domains are set at a high level, which proves successful formation of TA.

Discussion. The analysis of goniometry indicators revealed positive dynamics of the amplitude of movement in shoulder joint. Pain indicators when reaching the maximum amplitudes and in TP also improved. Dynamics of these indicators confirmed the effectiveness of PT, which consisted of ERM and IC. The obtained results



Pic. 1. Average values of the results in the items of Working Alliance Inventory questionnaire.

prove a high level of TA formation during PT of patients with AC and MPS. Hypothetically, it can be assumed that implementation of such intensive PT, particularly ERM, is impossible without providing sufficient information to patients, understanding of goals and objectives, and trust to the specialist. The remote repeated questioning did not change patients' assessment of TA, namely in all questionnaire items, in all TA domains, and in the total score. «Bond items» domain had slightly lower indicators. The third item of the questionnaire had the lowest result among all the questionnaire items.

Previous studies also revealed quite high indicators of TA and its domains. For instance, in the study of Fedorenko S. M. et al. [13] patients with an orthopedic profile with rational psychotypes had 14 (12.75; 15) points in «goal items» domain, 15 (13; 15) points in «task items» domain, and 16 (16; 17) points in «bond items» domain. At the same time, according to the study, patients with an irrational attitude to the disease (irrational psychotypes) had lower results in all TA domains according to the results of WAI questionnaire.

The study of Vitomskyi V. et al. [14] compared three groups of cardiac surgery patients. The groups differed in respiratory physical therapy, though TA indicators were statistically the same. It should be noted that Me indicators ranged from 17.5 to 19 points in «goal items» domain; from 16 to 17 points – in «task items» domain; from 16 to 16.5 points – in «bond items» domain. Hence, TA total score was also high, with the highest Me indicator comprising 52 points.

It should be noted that there is no consensus regarding the influence or close relationship between TA and PT effectiveness.

According to the study of Lawford B. J. et al. [27], correlation between clinical results and TA formed between knee osteoarthritis patients and physical therapists during telephone consultations was weak. The researchers noted that the obtained correlations are not likely to be clinically significant. According to the systematic review by Taccolini Manzoni A. C. et al. [19], the role of TA in reducing pain in musculoskeletal disorders during PT treatment is not confirmed by existing studies. At the same time, the analysis of the quality of scientific works revealed low risk of research bias. Among cardiac surgery patients, pulmonary function recovery also had a weak correlation with TA and its domains [18].

Factors affecting formation of TA and its structure are also studied in the scientific literature.

For instance, according to Myers C. T. [15], practice of PT, which is associated with higher TA, includes gathering information, pauses to receive feedbacks from the patients, use of clarifying questions and humor. Conversely, practice associated with worse TA is characterized by lack of touch and lack of patient's awareness on pain neuroscience.

Taking into account that the used PT was characterized by the majority of items related to high TA, the obtained high results can be considered justified, despite the intensity of the intervention based on pain assessment.

Conclusions. TA, that is formed between the patient and the physical therapist during PT, which involved a combination of ERM and IC and was characterized by pain and intensive interaction, has a high level of all three domains and does not change in the long-term period.

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