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Ocena czynników wpływających na skuteczność terapii integracji sensorycznej u dzieci w wieku przedszkolnym i wczesnoszkolnym

Assessment of factors influencing the effectiveness of sensory integration therapy in preschool and early school-aged children

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Functional connections between the temporomandibular joint and the hip joint

Funkcjonalne powiązania między stawem skroniowo-żuchwowym a stawem biodrowym

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Abstract

Introduction. Some of the factors in the formation of temporomandibular joint disorders are changes in the central and peripheral nervous systems. In the context of creating connections between two joints, fascia and the concept of biotensegration are important. The tension created in the tissue is linearly distributed along the entire body. The creation of excessive tension within one structure can lead to the creation of identical tension in a distant structure.

Aim of the study. The research hypothesis was that soft tissue manual treatments of the temporomandibular joint, with a duration of 7 minutes per side would affect increased mobility in the hip joint for the motion of the abduction.

Results. The obtained value for the right and left hip joint shows a strong and positive correlation. This proves that the therapy performed had an effect on increasing the range of motion.

Conclusions. Myofascial release of the tissues of the temporomandibular joint had a positive effect on the increase in the range of motion for hip abduction.

Keywords

manual therapy, hip joint, range of motion, temporomandibular joint, myofascial chains

Streszczenie

Wstęp. Niektóre z czynników wpływających na powstawanie zaburzeń stawu skroniowo-żuchwowego to zmiany w układzie nerwowym centralnym i obwodowym. W kontekście tworzenia połączeń między dwoma stawami, kluczowe znaczenie mają fascia oraz koncepcja biotensygracji. Napięcie tworzone w tkance rozprowadzane jest liniowo wzdłuż całego ciała. Powstanie nadmiernego napięcia w jednej strukturze może prowadzić do powstania identycznego napięcia w odległej strukturze.

Cel badania. Hipotezą badawczą było, że manualne zabiegi tkanki miękkiej stawu skroniowo-żuchwowego, trwające 7 minut na każdą stronę, wpłyną na zwiększenie ruchomości stawu biodrowego w zakresie abdukcji.

Wyniki. Uzyskane wartości dla prawego i lewego stawu biodrowego wykazują silną i pozytywną korelację. Dowodzi to, że przeprowadzona terapia miała wpływ na zwiększenie zakresu ruchu.

Wnioski. Uwalnianie mięśniowo-powięziowe tkanek stawu skroniowo-żuchwowego miało pozytywny wpływ na zwiększenie zakresu ruchu w abdukcji biodra.

Słowa kluczowe

terapia manualna, staw biodrowy, zakres ruchu, staw skroniowo-żuchwowy, łańcuchy mięśniowo-powięziowe

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Introduction

TMJ (Temporomandibular Joint) dysfunctions are common among one-third of the population. It is estimated that nearly half of TMD (Temporomandibular Disorders) patients do not require any therapy. Studies indicate that 75-80% of adults suffering from TMD require medical intervention, taking up to 3 years for complete resolution of symptoms [1,2]. The presence of other comorbidities can manifest with the stated symptoms and chronic disorders such as muscle or joint pain in distant body segments [3-5]. Scientific reports indicate that people with TMD are nearly 5.5 times more likely to experience pain in distal joints. One of the most vulnerable joints to pain sensations is the knee joint [6,7]. There are significant links between functional disorders of the masticatory organ in humans and the formation and occurrence of postural disorders [1,5,8,9]. Due to the anterior shift of the center of gravity and the cervicothoracic transition there occurs excessive mandibular retrusion. Habitual factors related to the nature of work, and dominant movements throughout the day also play an important role [1]. It is crucial to understand that exaggerated tension changes in a joint result in a reduced range of motion [10].

Flexibility is defined as the degree of movement around a joint. It is now recognized as a key factor affecting human health [11]. According to scientific reports, the limitation of the hip joint (HJ) range of motion is a risk factor for lower extremity injuries during various sports activities [12,13]. Crucial to the interpretation of movement is biotensegration. This concept states that the skeletal system is maintained by the resting muscle tension of numerous viscoelastic muscle chains. These assumptions suggest that during movement, the musculoskeletal system constantly adjusts causing global patterns to emerge [14]. Fascia appears to be crucial for understanding the functional connection between distant body segments [5]. Is responsible for transmission of the tension along the fibres. According to the definition of tensegrity, a created tension in a tissue is linearly distributed along the entire body. This demonstrates the cohesion and interconnectedness of the surrounding tissues [14, 15]. A study by Fischer and co-authors showed that there is a connection between HJ and TMJ. Applied myofascial release of the TMJ significantly increased the range of motion in the HJ.

Materials and methods

Young and healthy subjects aged 22-27 years (23.4 ± 1.34) participated in the study. The subjects were divided into two groups: a control group and a study group. The control group included 4 men and 4 women, while the study group included 5 men and 5 women. The groups were not divided by gender. The study was carried out after approval from the Bioethics Committee of the Poznan University of Medical Sciences (KB-88/23) and written consent from the subjects.

Inclusion criterion: healthy subjects declaring to practice physical activity for at least 150 minutes per week. Exclusion criterion: Headache and cervical pain, tinnitus, inflammation, hip dysplasia in childhood, known femoroacetabular conflict, immobilization of the lower limb in the past 12 months, Perthes disease in childhood, and neurological diseases and disorders.

The increase in the range of motion of the hip joint was evaluated using the test of leg abduction in the supination position. The test was conducted twice for the test group before and after performing therapy on the muscles of the temporomandibular joint. While for the control group after a 20-minute break. To perform the study, an orthopedic goniometer (Meloq EasyAngle - Digital goniometer) was used to measure the abduction in the supination position. The measurement was made until the outward rotation of the foot of the abducted leg.

Test procedure: the range of motion of the subjects was tested on the examination couch using a goniometer. Myofascial release for the temporalis and masseter muscles with a duration of 7 minutes per side was performed for the study group.

Therapeutic techniques: medial lateral shift technique for the masseter and temporalis muscles. Transverse movement technique in the lateral direction masseter and temporalis muscles. Longitudinal movement technique in the caudal direction masseter and temporalis muscles. Then the difference in range of motion for the hip joint was measured immediately after the therapy.

Test execution: the subject was on the couch in the supine position. Leg abduction was performed until outward rotation of the foot was observed. When tissue resistance was encountered, the degrees of abduction were measured using a goniometer. During the test, the axis of the goniometer was positioned over the superior anterior iliac spine, and the arm was directed toward the center of the patella of the test limb. The test was repeated for the opposite limb. Static analysis was performed using the StatSoft 13.1 statistical package. The research hypothesis was that soft-tissue manual treatments of the temporomandibular joint would increase mobility in the hip joint for the motion of abduction.

Results

Before proceeding to statistical analysis, it was checked whether there was a normal distribution, for this purpose the Shapiro-Wilk test was used. The values indicate a normal distribution. Then the data obtained were presented in the form of descriptive statistics for the values of mobility in the right and left hip joints in the control group (Table 1) and the group with therapy before and after the therapy (Tables 2 and 3).

Table 1. Descriptive statistics for the range of motion of abduction in the control group for the right and left lower limbs

	Average	Median	Minimum	Maximum	Q1	Q4	SD
lower limb right_1_2_control group	31.50	32.50	25	40	27	34	5.04
lower limb left_1_2_control group	33.37	33	26	41	30	37	4.89

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Table 2. Descriptive statistics for the range of motion of abduction in the group with therapy before it was performed for the right and left lower limbs

	Average	Median	Minimum	Maximum	Q1	Q4	SD
lower limb right_1_therapy group	29.50	29	16	44	26	34	7.87
lower limb left_1_therapy group	28	27	21	36	25	31	4.89

Table 3. Descriptive statistics for the range of motion of abduction in the group with therapy after the therapy for the right and left lower limbs

	Average	Median	Minimum	Maximum	Q1	Q4	SD
lower limb right_2_therapy group	30.30	30.50	21	45	28	33	6.81
lower limb left_2_therapy group	28.70	29	21	36	25	31	4.92

The next step in the statistical analysis was to see if the therapy had an effect on increasing the range of motion in the right and left hip joints for the motion of the abduction. For this purpose, Spearman's rank correlation was performed. The obtained value for the right hip joint r = 0.96 and for the left hip joint r = 0.90 indicates a strong and positive correlation, showing that the therapy performed affected increasing the range of motion.

Discussion

The impact of temporomandibular joint dysfunction on the perception of pain and distant structure dysfunction is known and studied [1, 6, 7]. The link between TMD and cervical spine mobility is known [3, 16]. The subject of the functional connection between the TMJ and the hip joint has not been extensively studied to date, and there are many questions about the mechanisms of interaction between these two joints [1, 6, 7, 16]. It therefore seems important to learn more about the direct mechanisms linking the two joints to improve forms of diagnosis and ongoing therapies [17]. This can be of great importance in both sports and daily functioning benefits [18]. The results of our study indicate that soft tissue muscle and fascial therapy in the TMJ influenced the increased angle of abduction in the HJ. This suggests some relationship that may exist between these two joints. Its mechanism of action may be conditioned by the existence of myofascial chains, although this requires further in-depth research [5, 15, 16]. As Sarfraz et al. suggest, manual therapy is an effective means in the context of treating this type of complaint [19]. Chung et al. indicate that after using the TMJ exercise device, the hip, knee, and ankle joint angle ranges of the subjects approached those of healthy individuals [20]. A study by Macías-Hernández et al. emphasizes the importance of exercising and strengthening the local muscles of the joint in terms of improving the function of patients in whom degenerative changes in the TMJ are present [21]. Allen et al. showed that increased TMJ muscle activation due to maximal jaw clenching has an erogenous effect on force production capacity [22]. The results of the research of Espejo-Antúnez et al. indicate that the use of a distal technique such as stretching the muscles of the ischiofemoral group increases mouth opening in patients with TMD [23]. According to Fadillioglu et al, jaw clenching shows no significant effect on dynamic reactive balance performance [24]. It has been observed in women with endometriosis between the occurrence of pelvic pain and that of TMJ [25].

Conclusions

Myofascial release of the tissues in the temporomandibular joint with a duration of 7 minutes per side affects increasing the range of hip joint abduction among people performing 150 minutes of physical activity per week. The study requires further observation conducted on a larger number of participants using more accurate forms of measurement, and on individuals with different frequencies of physical activity over the course of a week.

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