

Mielcarek Magdalena, Złotnicka Katarzyna, Jaranowska Katarzyna, Borek Joanna, Malak Roksana, Samborski Włodzimierz. Impact of temporomandibular joint disorders on body posture. Journal of Education, Health and Sport. 2019;9(10):160-165. eISSN 2391-8306. DOI <http://dx.doi.org/10.5281/zenodo.3509983> <http://ojs.ukw.edu.pl/index.php/johs/article/view/7590>

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019.

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The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 25.09.2019. Revised: 30.09.2019. Accepted: 19.10.2019.

Impact of temporomandibular joint disorders on body posture

Wpływ zaburzeń stawu skroniowo-żuchwowego na postawę ciała

**Magdalena Mielcarek, Katarzyna Złotnicka, Katarzyna Jaranowska,
Joanna Monika Borek, Roksana Ewa Malak, Włodzimierz Samborski**

M. Mielcarek¹, mielcarek.madzia@gmail.com, ORCID: 0000-0002-8744-2658

K. Złotnicka¹, zlotnicka.katarzyna@wp.pl, ORCID: 0000-0003-0441-3745

K. Jaranowska¹, kjaranowska@gmail.com, ORCID: 0000-0002-8285-4450

J. Borek^{1,2,3}, joanna.monika.borek@gmail.com, ORCID: 0000-0003-3959-7214

R. Malak², rmalak@ump.edu.pl, ORCID: 0000-0003-0521-5249

W. Samborski² samborskiw@tlen.pl, ORCID: 0000-0002-0338-894X

¹Studenckie Koło Naukowe „Open Physiotherapy”, Uniwersytet Medyczny im. Karola Marcinkowskiego w Poznaniu

²Pracownia Rehabilitacji Fizjoterapii Reumatologicznej, Katedra i Klinika Reumatologii i Rehabilitacji, Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

³Katedra i Klinika Ortopedii Szcękowej i Ortodoncji, Uniwersytet Medyczny im. K. Marcinkowskiego w Poznaniu

¹*Student Science Club "Open Physiotherapy", Poznan University of Medical Sciences*

²*Department and Clinic of Maxillofacial Orthopaedics and Orthodontics, Poznan University of Medical Sciences*

³*Department of Rheumatology and Rehabilitation, Poznan University of Medical Sciences*

Abstract:**Introduction:**

Occlusion defects, temporomandibular joints disorders, and postural defects often occur in pediatric patients. The temporomandibular joint disorder is a term that includes a range of clinical complaints of masticatory muscles, temporomandibular joint, and related structures. They can lead to incorrect spinal positioning in the cervical spine, which may result in body posture defect.

Aim:

Review of literature to determine the relationship between temporomandibular joint disorders and postural defects in children.

Material and methods:

The PubMed, Research Gate and Google Scholar databases were reviewed using the keywords: (temporomandibular joint, malocclusion), (postural defect). The authors have analyzed articles published in the last 5 years.

Results:

A forward shift of the body posture due to head protraction, increased cervical lordosis, deepening of lumbar lordosis and thoracic kyphosis occurs in malocclusion class II according to Angle's scale. This defect affects the location of the center of gravity of the body, which is shifted forward, which causes impairment of gait stability. Whereas class III malocclusions present a shifted posture backward. These defects can cause pain in given structures. The relationship between malocclusion and postural defects can be related to speech defects.

Conclusions:

Available literature shows that the temporomandibular joint affects body posture. Temporomandibular joint dysfunction can affect the position of the shoulders, spine, pelvis, and limbs. It is necessary to conduct further research on this topic.

Key words: body posture defect, temporomandibular joint dysfunction, physiotherapy

Introduction:

The relationship between body posture and masticatory organ defects is a topic of constant interest among researchers. Temporomandibular joint dysfunction accompanies the abnormalities of the jaw, therefore special attention should be paid to the correlation of occlusion defects with the musculoskeletal system [1]. Irregularities in this area are associated with faulty posture and incorrect body stability. Disorders of the temporomandibular joints may affect the masticatory muscles, temporomandibular joints and/or related structures [2,3]. There is a relationship between the cervical spine, the craniofacial complex and the body posture regarding the control of body balance in posturographic examination [4]. Temporomandibular joint dysfunction is defined as the "triad of dysfunction", concerning three main areas: temporomandibular joint disorders, changes in the cervical spine, the presence of pain and myofascial dysfunction [5]. They lead to the adaptation of somebody's structures, which minimizes the patient's discomfort due to pain, and affects the musculoskeletal change [6]. According to D'Attilio, there is a relationship between the jaw and morphology of the mandible and cervical posture [7]. Children with skeletal class III have a much lower cervical lordosis angle than children with skeletal class I and II. An important issue is a fact that there are differences in the inclination of the base of the jaw against the spine. The neck posture is strongly associated with the vertical and sagittal structure of the

face [8]. Temporomandibular joint dysfunction is a problem affecting not only adults but also children. It is not clear what is the etiological factor when considering temporomandibular disorders and incorrect body posture. These disorders should be diagnosed at the earliest possible age in order to eliminate incorrect factors [9].

Material and methods:

The PubMed and Google Scholar databases were reviewed using the keywords: (postural defect), (temporomandibular joint, malocclusion). The authors analyzed articles published in English and Polish from the last 5 years in the period from March 2019 to May 2019. Ultimately, the researchers selected 4 articles for discussion. The following inclusion criteria were used in the study:

1. The participants of the selected studies were people from 8 years to 18 years of age.
2. Patients with temporomandibular joint dysfunction.

The researchers considered the exclusion criteria to be:

1. People with genetic and / or neurological diseases.
2. Studies in which surgical treatment was performed on the craniofacial or spine.

Results:

According to A. Gogola et al., Children with faulty posture show greater problems associated with malocclusion than children with normal posture [10]. S. Cortese et al. Found that the presence of changes in head position, curvature of the spine and lower limbs are risk factors for muscular dysfunction of the temporomandibular joint [11]. M. Šidlauskienė et al., Observed connections between postural, orthopedic and occlusive changes [12]. P. de Jesus et al. Showed a relationship between head and shoulder positioning, and biomechanical adaptation of masticatory muscles and the resulting changes in temporomandibular joints [13]. The authors analyzed the problem analyzed in this work in a tabular study - Table 1.

Author	Research group	Age	Type of examination	Research goal	Results	Summary
A. Gogola et al., 2014	336 people	8-14 years	The test was carried out according to the Kasperczyk method. The occlusion quality was compared using the Emmerich-Poplatek scale.	The authors examined the relationship between occlusion and body posture in children.	According to the authors, studies on children with faulty posture show greater problems associated with malocclusion than children with normal posture.	The results of A. Gogoli et al. suggest the need for a holistic look at people with malocclusions whose therapy should include posture correction.
S. Cortese et al., 2017	243 people	10-15 years	The study authors used photos that were analyzed according to the Kendall model for static posture evaluation.	The aim of this study was to assess the frequency and assessment of posture change as a risk factor for temporomandibular joint disorders.	It was found that the highest frequency of temporomandibular joint dysfunction occurs in relation to incorrect head positioning.	Cortese et al. Stated that the occurrence of changes in head position and curvature of the spine may lead to temporomandibular joint dysfunction.
M. Šidlauskienė et al., 2015	94 people	7-14 years	The authors of the study performed cephalometric and radiological analysis as well as model tests through which the presence of posterior crossbite was confirmed. In addition, they evaluated body posture.	The aim of the study was to investigate the relationship between the type of malocclusion, body posture and nasopharyngeal obstruction .	Researchers have observed posture disorders in the majority of patients studied.	This study has shown that there is a significant relationship between a change in the mandible position and a kyphotic attitude.
P. de Jesus Chaves et al., 2017	117 people	10-18 years	Autorzy przeprowadzili badanie przy użyciu kwestionariusza American Academy of Orofacial Pain i Fonseca.	Autorzy zbadali występowanie zaburzeń postawy i dysfunkcji stawu skroniowo-żuchwowego.	According to the authors of the study, pediatric patients often have temporomandibular joint dysfunction. Misalignment of the head, neck, and shoulders was observed.	According to Chaves et al., Head and shoulder position changes may be associated with biomechanical adaptation of the masticatory muscles and resulting changes in the temporomandibular joints.

Tab. 1 Charakterystyka poszczególnych prac badawczych.

Discussion

In many publications, studies that confirming the relationship between the temporomandibular joint and postural defect can be seen more and more often. According to Gogoli et al., children with faulty body posture present greater malocclusion than children with a correct posture. Sakaguchi et al. also observed a correlation between changes in the position of the mandible that affects the center of foot pressure on the ground (COP). They are also confirmed that the changing body posture also corrects the position of the lower jaw [14]. Cortese et al. found that the presence of changes in the position of the head, curvature of the spine and disorders in the lower extremities are risk factors for muscular dysfunction of the temporomandibular joint [11]. The observation of Cuccia et al. also shows that the forward shift through head protraction, increased cervical lordosis, exacerbation of thoracic kyphosis and lumbar lordosis occurs in malocclusion class II according to Angle' a scale. Whereas class III malocclusion presents the reverse, i.e. the posture shifted back. The first of the described posture defects affect the center of gravity, which instead of the correct course is shifted forward, and this causes impairment of gait stability and the center of foot pressure on the

ground (COP). All of the above components of posture defects can cause pain in given structures [15]. Chaves et al. confirmed the relationship of changes in posture in the head and shoulders with the biomechanical adaptation of masticatory muscles and the resulting changes in [16]. Also, according to A. Souza et al., Postural changes were more pronounced in patients with temporomandibular joint disorders. In addition, patients with symptoms had abnormal plantar pressure distribution, suggesting that temporomandibular joint disorders may affect the postural system [17]. Unfortunately, Faulin E. et al. in their studies did not find a positive correlation between head forward or head tilt and the diagnosis of temporomandibular joint disorders [18]. According to studies by Silvestrini-Biavati A et al., postural and occlusive changes may be clinically related. These include clinical associations or associated frequencies, often with significant differences. Studies by Šidlauskienė M. et al. confirmed the existence of a significant relationship between the sagittal position of the mandible and the kyphotic posture. Paola Di Giacomo et al., according to the authors of the study, functional changes in the mandible, not anatomical changes, may influence the assessment of the cervical spine [19]. It was also noticed that the relationship between malocclusion and postural defects is translated into speech defects. By Jabłońska et al., a child who has speech defects and a pathological bite, should be diagnosed for spinal diseases and vice versa, and if he shows posture defects, he should be rehabilitated as soon as possible to prevent the development of anomalies in the stomatognathic system [20]. The cervical spine is closely related to the skull and chewing system through the specificity of the joints, muscle trailers, and nerve and vascular innervation, and the relationship of posture balance between them are of fundamental importance in maintaining the system created by these structures [21].

Conclusions

A review of the available literature and research shows that the temporomandibular joint significantly affects body posture. Disorders in its area can affect the position of the spine, shoulders, pelvis, and limbs. It is necessary to conduct further research on this topic. Cooperation between a physiotherapist and a specialist doctor will be important to develop the topic of temporomandibular joint disorders.

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