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Analiza związku między jakością postawy i zgryzu u dzieci i młodzieży

Analysis of the relationship between the quality of body posture and occlusion in children and adolescents

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Streszczenie:

Cel. Postawa ciała stanowi integralną całość, więc ukształtowanie stawów skroniowo – żuchwowych teoretycznie powinno odpowiadać jakości pozostałych składowych narządu ruchu. W związku z tym założeniem podjęto próbę oceny postawy ciała w grupach wyznaczonych względem wad zgryzu.

Materiał i metody. Zbadano 336 dzieci, w tym 173 dziewczynki i 163 chłopców w wieku od 8 do 14 lat. Wszyscy badani poddani zostali ocenie jakości postawy metodą punktową Kasperczyka oraz ocenie zgryzu według skali opracowanej przez Emmerich-Popłatek.

Wyniki. Uzyskano istotne zróżnicowanie ($p < 0,01$) wartości średnich oceny postawy ciała w porównaniu między grupami bez wad i z wadami zgryzu. Następnie poddano analizie wszystkie składowe oceniane metodą punktową Kasperczyka i dokonano weryfikacji, czy wykazują one związek z jakością zgryzu. Stwierdzono istotny związek wad zgryzu z asymetrycznie i protrakcyjnie ustawionymi barkami ($p = 0,03$) oraz odstającymi od płaszczyzny pleców łopatkami ($p = 0,03$).

Wnioski. Jakość postawy ciała dzieci z wadami zgryzu jest istotnie gorsza w porównaniu do dzieci bez wad zgryzu. W porównywanych grupach uzyskano istotne zróżnicowanie w zakresie ustawienia barków i łopatek.

Słowa kluczowe:

wada postawy, wada zgryzu

Abstract

Purpose. Body posture constitutes integral whole, so the formation of the temporomandibular joints should hypothetically correspond to the remaining parts of motor organ. On account of this assumption, an attempt was made to assess the body posture in groups according to presence of malocclusion.

Material and methods. 336 children were examined including 173 girls and 163 boys aged 8-14. All the subjects underwent assessment of the body posture with use of Kasperczyk's point classification and assessment of the occlusion according to scale drawn up by Emmerich-Popłatek.

Results. There was significant diversification ($p < 0.01$) of mean value of body posture assessment between groups – with and without malocclusions. All parts assessed with use of Kasperczyk's point classification were analyzed and tested if there was a connection with the quality of occlusion. A statistically significant connection of malocclusion was found with shoulders set asymmetrically and protractionally ($p = 0.03$) and the shoulder blades standing out from the back surface ($p = 0.03$).

Conclusions. Quality of body posture of children with malocclusions is significantly worse comparing to children without malocclusion. In the compared groups there was significant diversity of shoulders and shoulder blades setting.

Key words:

faulty posture, malocclusion

Preface

The relationship between the occlusion and the body posture is a subject of scientific research, especially in orthodontics. This research has found that orthopaedic disorders are noticeably more common in patients suffering from orthodontic problems, especially in the case of orthopaedic disorders within the cervical spine (torticollis, scoliosis, abnormal head positioning) [1, 2, 3]. The research focuses primarily on linking occlusion to postural stability [3, 4, 5]. Occlusion quality was compared with posture assessment performed with Posture Evaluation Platforms, Stability Evaluation Platforms and the Fukuda-Unterberger stepping test results [6]. In most cases the relation between the position of the jaw and the dynamic posture of the body has been identified. However, due to substantial variation in patient groups, as well as employed methodologies and approaches to orthopaedic pathology, scientific comparison of examinations can be problematic and the results inconclusive [7, 8, 9]. It can therefore be concluded that the issue of the relationship between posture and occlusion quality is significant and of interest to many researchers. The aim of this paper is to thoroughly evaluate the quality of body posture in groups with specific types of malocclusions. The scientific goal was to verify the hypothesis that children with postural defects are more likely to suffer from malocclusions than those who do not suffer from postural defects.

Research materials and methods

The study comprised 336 children, including 173 female and 163 male respondents, tested in orthodontic clinics (n=237) and schools (n=98). The choice of locations was driven by the need to assess children with a range of occlusion and posture conditions. When establishing the research group, two requirements were taken into consideration:

- 1) The respondents had to be 8-14 years of age;
- 2) There could not be any overt causes of malocclusion, including birth defects of the spine, nervous system diseases, genetic syndromes, endocrine glands disorders and neuro-muscular dystrophies.

The test procedures were carried out in accordance with the applicable declaration of Helsinki of 1979, amended in 1983. The research methods were approved by the University Bioethics Committee for Research of The Jerzy Kukuczka Academy of Physical Education in Katowice (Decision no. 8/2008).

Occlusion quality in the research group was determined on the basis of the Emmerich-Popłatek scale [10]. Functional examinations were performed [11] using 0-3 scale, determined as follows: 0 points - no defects; 1 point - light defect including discrete malfunctions that do not cause any harm to development, activities and patient aesthetics, not requiring any treatment; 2 points - average defect with functional consequences requiring orthodontic treatment; 3 points - severe morphological defect impairing the function of chewing and speaking, strictly requiring orthodontic treatment. In the case of children who were already in the process of orthodontic treatment du-

ring the examination, the severity of the defect being treated was taken into consideration. As the first two levels of severity do not require orthodontic treatment, for the purpose of this paper the scale was modified and the results presented in two groups:

1. Group without malocclusions and with light defects. It includes children with no defects at all or with defects that do not require orthodontic treatment (n = 49; 14, 58% of respondents);

2. Group with medium and severe defects. Includes children with malocclusion currently with orthodontic treatment or qualifying for treatment (n = 287; 85, 42% of respondents);

Biometric characteristics of the research group are presented in Table 1

Table 1 Biometrics characterization of the examined group

Group	n	Age		Weight of body	Height of body
1	49	8-14	\bar{x} , SD,	39.30±11.20	147.00±12.07
			min, max	22-65	123-175
2	287	8-14	\bar{x} , SD,	39.32±10.53	147.75±13.30
			min, max	20-80	136-182

1 – group without malocclusions, 2 – group with malocclusion.

Posture was evaluated using the Kasperczyk's Scoring Method used in hospitals for initial assessment of postural quality [12]. The assessment on the 0 to 3 scale included the following elements: the chest shape, the curvatures of the spine in the sagittal plane, position of the abdomen, vaulting of the feet.

Another scale, from 0 to 5, was used to determine the degree of lateral curvature of the spine. The parameters were assessed in accordance with the following point system: 0 points: Spine correct; 1 point: Slight deviations; 2-3 points: Significant deviations; 4-5 points: A high level of deformation. All characteristics were assessed in accordance with the guidelines of the scoring method's author'; however, a modified classification of the posture was used as described in the literature on the subject [13]. Three categories of posture were determined: 0-5 points: Respondents with correct posture; 6-12 points: Respondents with slight postural disorders; 13-28 points: Respondents with significant postural disorders. In accordance with the above division, the following percentage distribution was determined in the research group:

1. Correct posture (n = 96; 28.96%);
2. Slight postural defects (n = 200; 59.70%);
3. Significant postural defects (n = 38; 11.34%);

All examinations were carried out by two specialists, a physiotherapist assessed the posture and an orthodontist evaluated occlusion.

To examine the dependence of malocclusion, posture, age and gender of the respondents, the ANOVA analysis of variance was used. The Mann-Whitney test was used to verify the differences of mean values obtained for body posture and individual parameters in the two groups (with and without defects).

Results

The analysis of the dependence of occlusion quality and gender and age of the respondents identified no significant correlation (gender: $p=0.35$, age: $p=0.38$). Significant differences were observed in the dependence of posture and gender ($p=0.01$) and age ($p=0.01$). No significant interaction was observed, which means that the variations in posture with age is similar for both genders. The main objective of the examination was the comparative analysis of the posture quality in groups determined by the occlusion type. All the calculations therefore were jointly made for all respondents. In the comparison of the mean values obtained in posture evaluation, significant differences ($p < 0.01$) were observed between the two groups as determined by the occlusion type (with and without defect). Higher mean values of the posture assessment were recorded for the group with malocclusions than without any occlusion defects (Table. 2).

Table 2. Comparison of the average values of body posture assessment in two groups determined relative to malocclusions

	Group 1	Group 2	Statistical significance
\bar{x} , SD,	4.75±2.72	5.89±5.89	$p < 0.01^*$
min, max	1-12	0-17	

statistically significant difference

1 – group without malocclusions, 2 – group with malocclusion

Then all the components evaluated using Kasperczyk's Scoring Method were analysed and their dependency on occlusion quality verified. The results obtained in the groups compared showed significant differences in the position of shoulders and shoulder blades. Malocclusions positively correlate with asymmetric and protractive shoulders ($p = 0.03$) and protruding shoulder blades ($p = 0.03$) (Table 3).

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Tab. 3. Comparison of the parameters assessed by Kasperczyk's method between two groups determined relative to malocclusions

Parameter	Group 1 \bar{x} , SD min-max	Group 2 \bar{x} , SD min-max	Significancy level
Głowa Head	0.28±0.45 0-1	0.34±0.53 0-2	0.56
Barki Shoulders	0.53±0.54 0-2	0.71±0.56 0-2	0.03*
Łopatki Shoulder blades	0.57±0.54 0-2	0.75±0.55 0-2	0.03*
Klatka piersiowa szewska Pectus excavatum	0.44±0.84 0-3	0.45±0.84 0-3	0.93
Klatka piersiowa kurza Pectus carinatum	0.08±0.44 0-3	0.04±0.23 0-2	0.91
Kifoza piersiowa zwiększona Inc thoracic kyphosis	0.16±0.47 0-2	0.24±0.59 0-3	0.39
Kifoza piersiowa zmniejszona Dec thoracic kyphosis	0.40±0.53 0-2	0.41±0.54 0-2	0.99
Brzuch Abdomen	0.71±0.76 0-2	0.76±0.79 0-3	0.73
Lordoza lędźwiowa zwiększona Inc lumbar lordosis	0.46±0.61 0-2	0.62±0.71 0-3	0.20
Skolioza Scoliosis	0.18±0.44 0-2	0.31±0.56 0-3	0.09
Kolana szpotawe Genu varum	0.20±0.45 0-2	0.22±0.42 0-2	0.55
Kolana koślawe Genu valgum	0.28±0.57 0-2	0.41±0.67 0-2	0.22
Stopy Feet	0.40±0.61 0-2	0.55±0.75 0-3	0.25

*statistically significant difference

1 – group without malocclusions, 2- group with malocclusion

Discussion

The literature published on the subject provides ample evidence of a dependence between the occlusal plane and the posture, both general and measured for specific elements [1, 2, 3, 4, 5, 6, 7, 8, 9]. Numerous researchers have used complicated, objective research methods to examine this relationship. These methods cannot be applied in the clinical setting. The authors of this paper used a simple screening method to test the documented relationship between posture and occlusion in practice. The analysis results confirmed that, regardless of the methods applied, dependency between the posture quality and occlusion can be observed. The initial hypothesis that children with malocclusions have a greater predisposition to postural defects than children with correct occlusion was confirmed.

The scientific confirmation of the dependency between the posture and occlusion may well prompt a more thorough assessment of body posture in children with malocclusions. Biavati Silvestrini et al. [14] added that any disorders observed in one of the areas examined should trigger screening tests of the other area. Many researchers claim that pathological conditions in one area may affect other areas due to the bodily systems being bonded together to form an integral structural unit [15, 16, 17, 18, 19]. This type of dependence was also confirmed in this study, where the relationship between occlusion quality and posture was identified using more subjective research tools. The dependency observed is based on logical evidence; abnormal muscle tension in one of the elements of the chain, including temporomandibular joints, spine, pelvis and extremities, might be transferred directly to other parts of the body. This leads to the body losing its equilibrium by triggering a series of compensatory mechanisms involving increased muscle tension in antagonistic parts of the body [19]. The widely documented relationships between specific parts of the body and the test results support routine orthodontic control covering the children with posture defects, and vice versa.

However, it must be understood that a number of issues is, for the time being, only discussed as hypotheses; the subject matter is very complex. Both the posture and the occlusion are affected by many factors that are difficult to eliminate during scientific observation [20, 21]. The basic research problem is the inability to reduce the influence of confounding factors, as well as difficulty in selection of accurate diagnostic tests, and creation of homogeneous control groups [21, 22]. For ethical reasons, longitudinal observation of the impact of abnormal muscle activity on the postural and occlusion quality cannot be conducted. Therefore the main basis for the adoption of appropriate strategies are theoretical considerations supported by the research results and professional expertise.

Limitations

A significant limitation of this project is an unbalanced number of participants in the research groups, mixed sources of participants (hospitals and schools), as well as the wide age range in respondents.

Conclusions

1. Body posture quality in children with malocclusion is significantly worse than that found in children with correct occlusion.

2. The relation between malocclusion and asymmetrically and protractively positioned shoulders and protruding shoulder blades was confirmed.

The results obtained in this research group invite an interdisciplinary approach to children with malocclusion, with therapy that includes posture correction.

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