Zeszyty Naukowe
Akademii Górnośląskiej
Nr 11/2023, s. 122 - 129
DOI: 10.53259/2023.11.14

ISSN 2956-6673
e-ISSN 2956-6681

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POSTURAL DISORDERS AND OCCURRING LOGOPEDIC DEFECTS IN PRESCHOOL CHILDREN

ZABURZENIA WZORCA POSTAWY A WYSTĘPUJĄCE WADY LOGOPEDYCZNE U DZIECI W WIEKU PRZEDSZKOLNYM

Keywords: posture pattern, physiotherapeutic diagnosis, speech defects, speech disorders.
Słowa kluczowe: *wzorzec postawy, diagnoza fizjoterapeutyczna, wady logopedyczne, zaburzenia mowy.*

Abstract

Connected structures within the human body that form a chain of interdependencies require understanding it in a holistic way. Therefore, a particular condition should not be viewed in isolation, but rather as a potential consequence of other dysfunctions in the body. It can be inferred that only such concept of treatment and therapeutic procedure allows for achieving satisfactory treatment outcomes. This study points out the importance of early therapeutic intervention in case of postural defects and speech disorders in order to prevent further dysfunction in the body. It also emphasises the significance of interdisciplinary approaches in treating the discussed subject.

This research is of an exploratory nature and illustrates the importance of body posture and its correlation with speech disorders.

Streszczenie

Połączenie struktur w organizmie człowieka tworzącym łańcuch współzależności wymaga pojmowania go w sposób holistyczny. Dlatego też nie powinno rozpatrywać się danego schorzenia jako odrębnej jednostki, ale niejako możliwej późnej konsekwencji innych dysfunkcji występujących w ciele. Można wnioskować, iż tylko taka koncepcja leczenia i postępowania terapeutycznego pozwala na osiągnięcie zadowalających efektów leczenia. W opracowaniu zwrócono uwagę, jak ważne jest wczesne podejmowanie działań terapeutycznych w przypadku wad postawy oraz zaburzeń logopedycznych, po to by nie dopuścić do rozwinięcia dalszych zaburzeń organizmu. Zwrócono uwagę jak ważna jest interdyscyplinarność w leczeniu omawianego tematu.

Niniejsza praca ma charakter badawczy i obrazuje, jak istotna jest postawa ciała oraz jak może ona korelować z zaburzeniami logopedycznymi.

INTRODUCTION

Complexity of the human body requires holistic and total approach while considering the interrelation of all structures and its interdependence. This leads us to examine a particular disease not merely as a distinct issue, but as a consequence or cause of other dysfunctions. Such reasoning and approach significantly influence diagnostic and therapeutic processes in body posture disorders and their impact

on the oral-facial (orofacial) area [Brzozowska-Misiewicz, Stańczak-Urbańska, 2016]. The close link between the orofacial muscle complex with the shoulder girdle, respiratory muscles, and indirectly with the pelvic girdle as well as the lower limbs requires therapy on multiple levels covering the entire body. Notably, the correct coordination of the orofacial complex with the body forms the basis for the success of articulation therapy in its treatment program [Regner, Masgutowa, 2009]. Early diagnosis and systematic therapy allow for satisfactory results and, above all, prevent the further development of defects [Mieszkowska, Kochanowicz, 2016]. This article aims to determine the correlation between occurrence, type of posture defects, and speech dysfunctions.

Creating a single body posture pattern that could be considered correct seems impossible. There are many factors which could influence posture including different body types, age, gender, but also the amount, intensity, and type of physical activity. Despite difficulties in defining the concept of correct posture, several definitions have emerged. One of the authors emphasises that correct posture should enable proper functioning of the body in the most economical manner possible [Zeyland-Malawka, 1984]. Other authors describe correct posture as corresponding to the typical posture from a peer group of the same sex and similar psychophysical characteristics [Maciałczyk-Paprocka et al., 2011]. The preschool age is a phase that spans from 3 to approximately 6 years old and is also known as early childhood which is a period of intensive development characterised by enormous inter-individual variety. During this time, children develop basic somatic characteristics at different rates, but also build posture and develop motor memory. Simultaneously, intense development of the skeletal and nervous systems occurs resulting in the final stage of the muscular system innervation, thereby increasing its strength. These parameters have a significant impact on the body posture [Mieszkowska, Kochanowicz, 2016]. Posture of a preschool age child is characterised by a fairly long and slightly flattened thoracic kyphosis. A slightly flattened chest causes shoulder rounding. One can also observe a forward-leaning head, slightly protruding shoulder blades, and deepened lumbar lordosis resulting in a protruding abdomen. A common occurrence in children of this developmental stage is the hypermobility of the spine. Changes progress slowly and are characterised by increasingly pronounced front tilting of the lumbar spine and gradual reduction of excessive abdominal bulging [Lichota, Górniak, 2018; Brzeska, Sokołowska, Baumgart, 2012; Miszewska, Miszewski, 2018; Kasperczyk, 2004]. Therefore, posture pattern refers to the arrangement of respective body elements relative to each other, which a young person assumes naturally. Body disorders that are not identified and diagnosed early can bring many negative consequences later in life, making correction even more difficult. Preventive measures against posture defects in children during developmental age allow for the cessation of defect progression or their complete correction.

Modern physiotherapy sets itself a key goal of an appropriately tailored therapy program that takes into account all the problems encountered by the patient. For therapy to yield expected results, cooperation with an interdisciplinary team throughout the rehabilitation process is essential. It is crucial to ensure a holistic approach to the patient which is achievable only through mutual collaboration of specialists.

Speech is commonly called the tool of thought because it is one of the components of psychological development. Proper speech development in a five-year-old should demonstrate assimilation of all conjugational and declensional forms as well as all verb forms. During this phase passive and active vocabulary is being enriched. Children with high intelligence and proficient motor skills show higher levels of speech development while being capable of constructing complex and correct sentences [Górszczyk, 2020]. Causes of speech disorders can be categorised as external, resulting from the child's environment, or internal, inherent in the child itself. The main internal disorders include dyslalia, dysglossia, dysarthria, stuttering, and aphasia.

The linkage between posture defects and speech disorders is an issue that opens up a multi-aspect approach to therapy and is intended to enhance the effectiveness of ongoing rehabilitation. Constantly increasing research efforts in this area will allow for future reference concerning correlation between these two subjects.

AIM OF THE STUDY

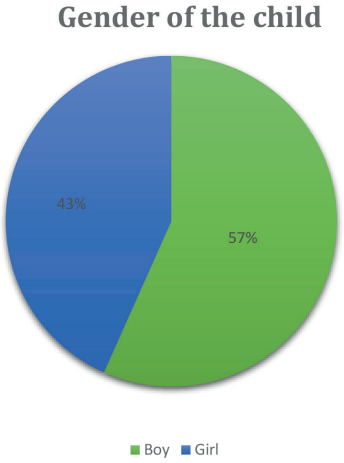
The aim of this study was to analyse the body posture of preschool children with diagnosed speech defects. Postural defects were described using the Kasperczyk scoring method, and the co-occurrence of postural defects with speech defects was examined.

1. The connection between disrupted postural patterns and speech defects in children was investigated.
2. It was assessed whether improperly formed elements of body posture influenced speech disorders.
3. The study examined how postural pattern disorders translate into speech defects.

RESEARCH METHODOLOGY

The examinations included 53 children. The study group consisted of 18 boys and 13 girls diagnosed with speech disorders by a speech therapist, and 22 children (10 boys and 12 girls) without speech disorders in preschool age. In the study group aged 3–7 years, boys predominated, constituting 53% (28 subjects), while girls accounted for 47% (25 subjects). The largest group consisted of six-year-olds (26%). Eleven subjects were aged 4 and 7 years (21%), while the group of three-year-olds constituted nine subjects (17%), and five-year-olds eight subjects (15%).

Figure 1. Distribution of subjects by individuals with diagnosed speech defects and without speech defects.



Respective observations were made on the elements of body structure and posture using the Kasperczyk method. In the sagittal plane: head, shoulders, shoulder blades, chest, abdomen, back. In the frontal plane (forwards and backwards): shoulders, torso, spine, and knees. Each element was assigned a specific number of points: 0 points – correct alignment of the assessed element, 1 point – slight deviation from the correct state, 2 or 3 points – significant deviation from the correct state, 3 or 5 points – major deformities, changes of a structural nature (pathological state) [Kasperczyk, 2004].

Hypothesis testing was conducted using Fisher's test with an assumed significance level set at $p < 0.05$. The occurrence of speech defects was conducted using the Mann-Whitney test. The analysis was performed using Statistica 13 and MS Excel 2016 programs.

RESEARCH RESULTS

Significant deviations from the correct head position were found in 77.8% of children with speech disorders. Lack of disorders or slight deviations from the correct state were found in 48.6% of subjects. Among children without speech disorders, significant deviations from the correct head position were found in only 22.2% of children. In 51.4% of children without speech disorders, no significant deviations

in head position were observed. At a significance level, it was found that speech defects are associated with incorrect head positioning, as shown in Figure 2.

Figure 2. Head position and speech disorders

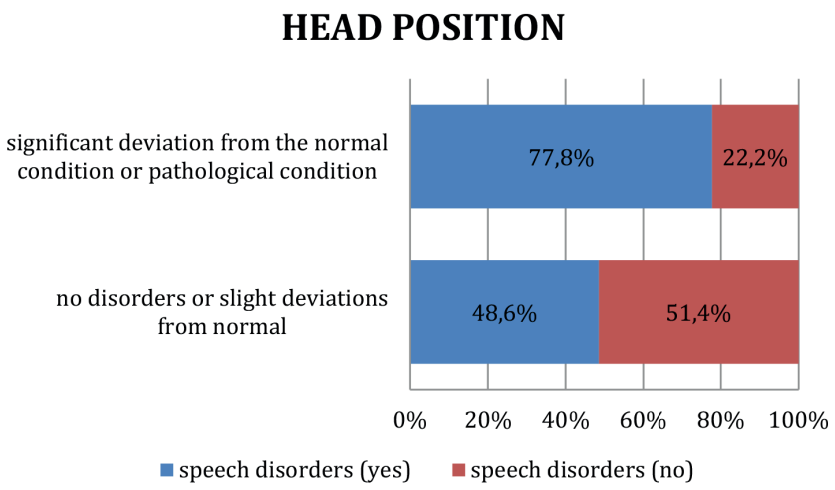
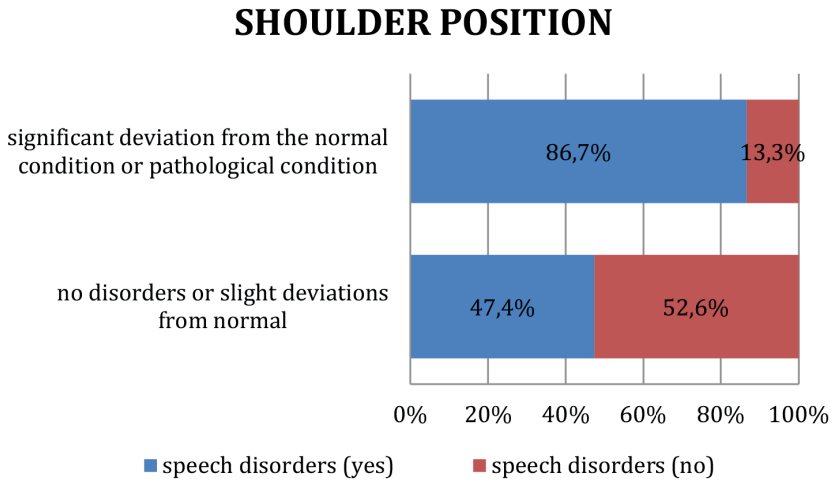


Figure 3. Shoulder position and speech disorders



Significant deviations from the correct shoulder position were confirmed in 86.7% of children with speech disorders, compared to only 13.3% of those without speech disorders (Fig. 3). Meanwhile, 47.4% of children with speech disorders and 52.6% of those without speech disorders showed no significant deviations in shoulder positioning. At a significant level, shoulder positioning was found to be associated with speech defects.

Majority of children with speech disorders showed significant deviations from the correct abdominal position, 74.2%. In contrast, 63.6% of children without speech disorders showed no or slight deviations from the correct abdominal position. Significant deviations in abdominal positioning were observed in only 36.4% of children without speech disorders, as shown in Figure 4. Statistical significance was found in children with incorrect abdominal positioning and concurrent speech defects.

Median, first (25%) and third (75%) quartiles, and minimum value illustrating overall posture in terms of individuals with and without speech disorders.

Children with speech defects were more likely to exhibit postural defects compared to children without speech disorders. It can be stated that overall posture significantly differs between the two study groups ($p < 0.05$). Fig.5 confirms the test result and indicates that in the group with speech disorders the median level denotes incorrect posture. In the second group posture can be considered good.

Figure 4. Abdominal position and speech disorders

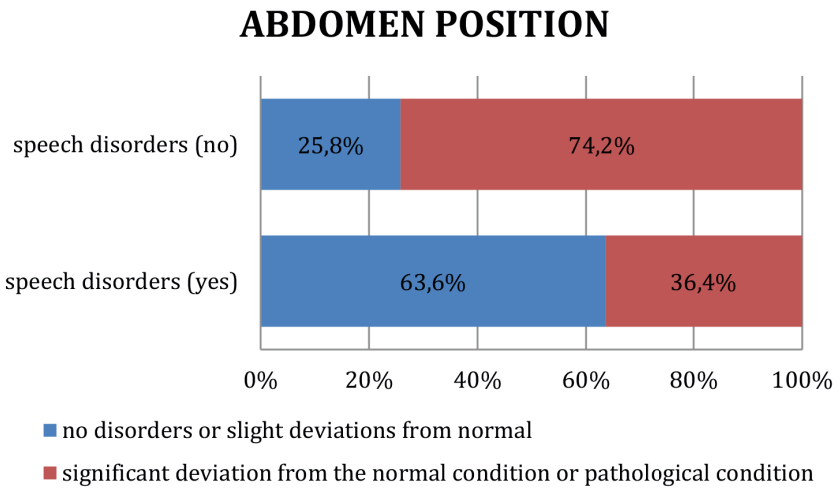
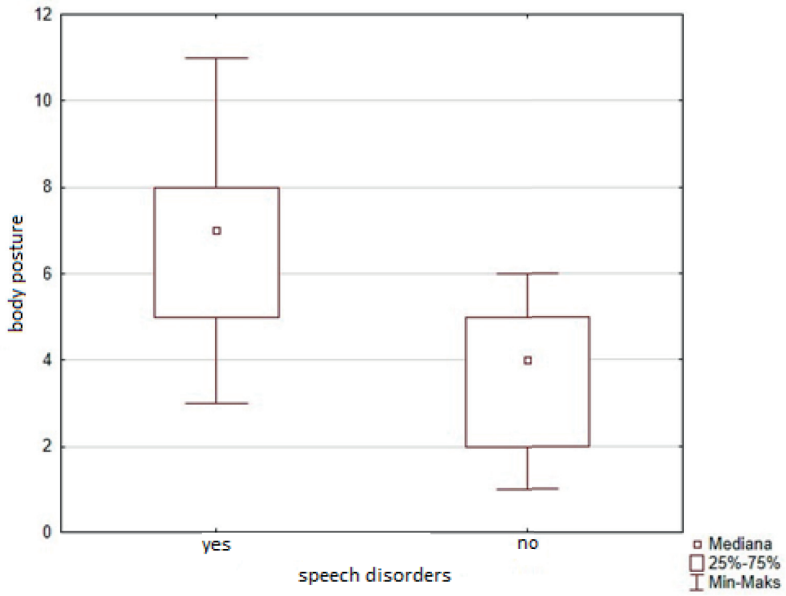


Figure 5. Faulty posture and speech disorders



DISCUSSION

Language acquisition is one of the key milestones in children's development. Delayed language acquisition affects a child's social and intellectual development which can potentially lead to lasting consequences such as a lack of acceptance and withdrawal among peers. This, in turn, can result in poorer academic performance and the development of further problems. Treating postural defects and understanding their etiology requires significant effort, skill, and experience from therapists. This presents a significant challenge as it requires a thorough understanding of the musculoskeletal system, its anatomical structures, and their interrelations. The available literature on this topic provides limited evidence linking various types of malocclusion and speech disorders with body posture, both generally and in specific elements, using different research methods. Statistical analysis in our own research demonstrated a correlation between incorrect positioning of the head, shoulders, and abdomen and speech disorders. No correlation was found in positioning of the shoulder blades, chest, and spine. Similar conclusions were drawn by Krysiński and Sójka. Authors conducted a study to evaluate the frequency in occurrence of some symptoms of masticatory system dysfunction as well as parafunctions and malocclusion in young patients with musculoskeletal disorders compared to a control group of healthy children. Their analysis included 40 children with musculoskeletal disorders and a control group of 40 randomly selected healthy children,

highlighting similarities in research findings regarding the impact of oral area defects on proper motor development in children [Krysiński, Sójka, 2005]. Gogola's analysis [Gogola et al., 2015], which involved examining 336 children in orthodontic clinics and schools, used the Kasperczyk scoring method to evaluate posture. This analysis revealed a statistically significant relationship between poorer posture quality in children with malocclusion compared to those without this dysfunction. Thus, incorrect occlusion appears to be a significant implication for speech defects and other developmental disorders[1][Łuszczyk, 2018,]. Many publications conclude that pathological conditions in one area can affect even distant areas of the body [Hurmerinta et al., 2000; Lippold et al., 2006; Lippold et al., 2007]. The fact that neurodevelopmental abnormalities can cause speech disorder development suggests that speech therapy standards and approaches should be reviewed [Grabias et al., 2015]. Therapy standards should be revised to consider causes beyond strictly linguistic ones and include psychomotor therapy [Grabias et al., 2015]. This indicates a continuous need to seek proper causes of child's language acquisition or learning problems [Motyka, 2020].

It could be concluded that incorrect muscle tension in one part of the chain, including the temporomandibular joints, spine, pelvis, and limbs, can be directly transferred to other parts of the body, leading to the loss of proper muscle tension by activating compensatory mechanisms that increase muscle tension in antagonistic body parts [Chilosi et al., 2022]. Among available literature examining body posture and its disorders, shoulder positioning abnormalities are most frequently observed. The study by Kania-Gudzio reported the highest percentage of participants with shoulder positioning disorders, at 92% [Kania-Gudzio, Wiercicka, 2002]. In our research, incorrect shoulder positioning was also the most common postural disorder in children with speech defects, affecting 86.7% of participants.

In conclusion, it could be stated that proper development of posture and speech depends on many factors. Therefore, a multidirectional approach to the issue and actions aimed at the earliest possible detection of defects are essential. Educational institutions should place particular emphasis on screening for postural and speech defects to prevent development or exacerbation of further dysfunctions in children. It is also crucial for therapists to be aware of the potential clinical connections highlighted in this study. The importance of interdisciplinary work with patients has been emphasised throughout this paper. Lawrence et al. confirm the hypothesis that speech disorders, especially motor speech disorders, are common in individuals with certain types of complex neurodevelopmental disorders. The authors concluded that comparative studies of motor speech disorders in the context of complex neurodevelopmental disorders could potentially aid in research programmes on biobehavioral causal pathways, treatment efficacy as well as primary, secondary, and tertiary forms of prevention [Lawrence et al., 2019].

Therefore, in the diagnosis and treatment of postural disorders, the potential impact of speech disorders should be considered, and parallel physiotherapy and speech therapy should be introduced. Awareness of the problem allows for the detection of these children already at the preschool stage, ensuring appropriate early rehabilitation to avoid complications affecting their development.

CONCLUSION

In conclusion, the study underscores significant correlation between speech disorders and the incorrect positioning of the head, shoulders and abdomen in preschool children. Children diagnosed with speech dysfunction are more likely to have misalignments in these body parts compared to children without speech disorders. The quality of posture in children with speech disorders is significantly worse than in children without speech disorders. Our findings support the importance of early screening for posture and speech defects to prevent further dysfunction or exacerbation. Further research is warranted to explore these relationships more comprehensively, potentially refining therapeutic strategies and improving long-term outcomes for affected children.

[1] https://www.forumpediatryczne.pl/artykul/wady-postawy-a-wady-wymowy/23257/2

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