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THE CONDITION OF SKELETAL SYSTEM IN PUPILS WITH HEARING IMPAIRMENT

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ABSTRACT

Introduction: Pathogenic link of dentofacial abnormalities with posture disturbance and vertebra deformation causes interest in researchers, because the problem of the disorder of skeletal system has an important role. Orthodontic correction of dentofacial abnormalities without treatment of skeletal apparatus is incorrect and it leads to the large number of relapses and complications and also including temporo-mandibular joint.

The aim of the research was to study correlation between injuries of hard tissues of teeth, posture disorders, bite abnormalities (malocclusion) in schoolchildren with hearing disorders.

Materials and methods: The condition of hard tissues of teeth, muscoskeletal system, dentofacial system in pupils with hearing impairment was done and evaluated. The age of examined is 6-19 years old, bite formation: 1st – presents the period of mixed bite (6-13 years old), 2nd – presents the period of permanent bite (14-19 years old).

Results and conclusions: During dental examination it was detected that 58 pupils with hearing disorders (81,8%) have carious lesions of the teeth, the level of caries intensity contains 3,36. The condition of skeletal system was investigated in 56 pupils (36 boys and 20 girls). Disturbances of skeletal system in schoolchildren with hearing disorders presented 94,74%; 5,26% of pupils were almost healthy. The condition of the bite was examined in 58 pupils (32 boys and 26 girls). Different types of disorders of dentofacial apparatus were detected in 100% of pupils with hearing disorders. The most widespread pathology of bite was Angle's bite (the first class) 68,97%, the second class – in 27,58%, the third class – 3,45%. Orthognathic bite among pupils with hearing disorders was not observed. In 31,15% of pupils during temporo-mandibular joint, deviation of mandible is observed.

KEY WORDS: children with hearing impairment, decay, dentofacial pathologies, disorder of skeletal system

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INTRODUCTION

Orthodontic treatment of schoolchildren is complicated due to the complex injury of morphological, functional and aesthetic component of dentofacial area based on age absence.

The number of dentofacial abnormalities has a tendency to increase in many countries of the world and contains 85-90% [1].

Pathogenic link of dentofacial abnormalities with posture disturbance and vertebra deformation causes interest in researchers [2, 3, 4, 5], because the problem of the disorder of skeletal system has an important role [6]. Epidemiological researches of native and foreign scientists prove that scoliosis takes one of the first places among diseases of skeletal apparatus [7].

The posture is the usual position of the human body in space at rest and in motion. During the correct posture, a man easily and loosely holds his head and body straight, his shoulders slightly lowered and laid back on one level, the abdomen is tightened, the knees are straightened, the chest is somewhat forward [6].

The number of general somatic diseases in children occurs when acid-alkali balance in biological tissues and liquids of an organism is impaired and subtypes of connective tissue pathology are bone and cartilaginous tissues [8]. So, the abnormality of skeletal system is a scoliosis of different level of severity or scoliotic posture is a consequence of the disorder of bone and cartilaginous tissue of vertebra in infancy [9].

Feet of person present «foundation» of person's organism, so one of the causes of vertebra arcuation in saggital and frontal areas include the disorder of amortizing peculiarities due to decrease of spring possibilities. The increased exertion that occurs when the leg is placed, goes up, reaching to the head. That is why the deformation of the feet and scoliosis is seen as a provocation of the systemic bone injury of the body as a whole, which negatively affects the appearance of the person and the state of bite [10].

Different morphological and functional disorders of feet and other disorders are the cause of posture disorder. Among such disorders one can name platypodia, talipes valgus, talipes varus can be the reason of posture disorder [11,12].

Asymmetry of biomechanics of vertebra causes changes of kinematic chain and leads to the occurrence of scoliotic vertebra deformations [13].

Orthodontic correction of dentofacial abnormalities without treatment of skeletal apparatus is incorrect and it leads to the large number of relapses and complications and also including temporo-mandibular joint [14].

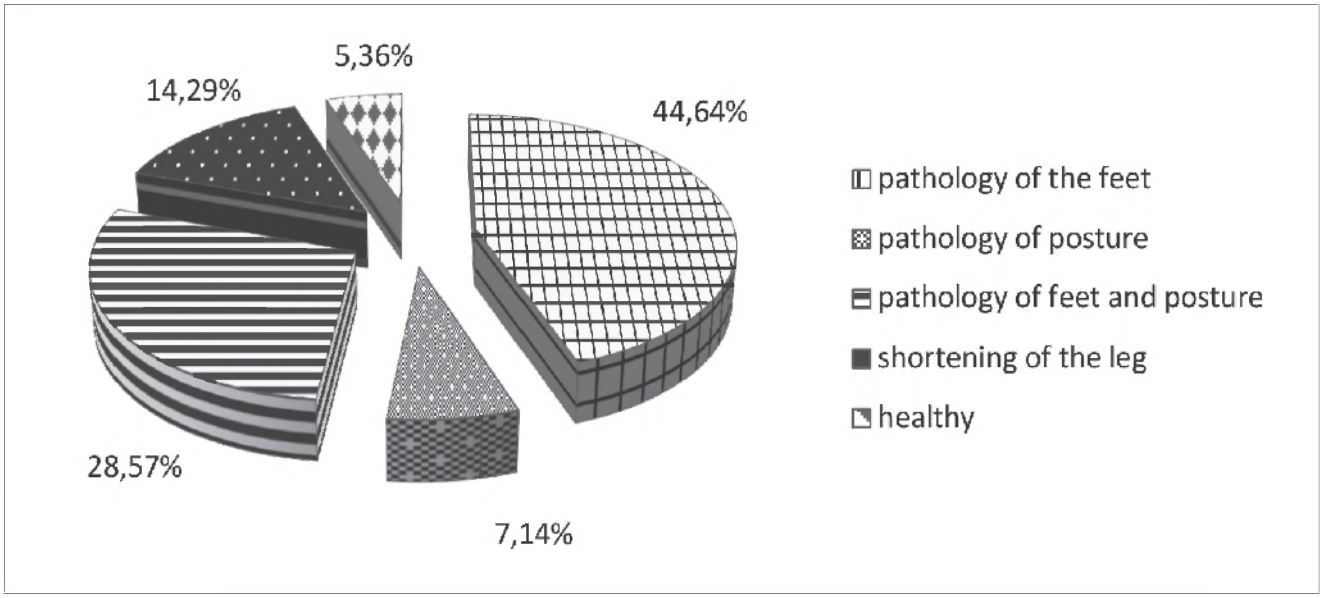

Fig. 1. The condition of skeletal apparatus in pupils with hearing disorders.

Data of etiological pathogenesis of dentofacial abnormalities in children with hearing disorders were not observed.

THE AIM

The aim of the research was to study correlation between injuries of hard tissues of teeth, posture disorders, bite abnormalities (malocclusion) in schoolchildren with hearing disorders.

MATERIALS AND METHODS

Child's dentist, orthodontist, orthopedist provided complex clinical treatment of 58 pupils with hearing disorders, who study in Poltava boarding school of I-III degrees. Peculiarities of communicative skills were considered. Communication with schoolchildren of junior age was done by teachers who use sign language.

All children were divided into two groups: 1st – presents the period of mixed bite – 8-13 years old and 2nd – presents the period of permanent bite – 14-19 years old. Results of the research were evaluated based on nosological types of diseases.

A dentist determined the presence of decay, filling, removed teeth.

The condition of the musculoskeletal system was determined by the orthopedist visually and manually-instrumentally according to the generally accepted method with devices: hardware-software anthropometric complex and feetscope (podoscope). The condition of vertebra, that is, posture (presence or absence of distortion), recorded deformations of the feet (platypodia, talipes valgus, talipes varus, talipes), emphasized the length of the lower extremities was evaluated. Each examined pupil was given a record in case history and reccomendations.

Orthodontist provided clinical evaluation of orthodontic status, determined correlation of jaws in three areas, defined pathologies of dental arches, position of some teeth, evaluated symmetry, paid attention to the condition and character of attachment of frenulum of upper and lower lips, tongue, defined peculiarities of the depth of vestibule of the mouth. Much attention was paid to the condition of temporo-mandibular joint. Palpation of temporo-mandibular joint was done, localization of articular heads during open and closed mouth was determined. Character of lateral displacement of mandible was evaluated; amplitude of displacement of mandible was fixed (the presence of deviation or deflexion).

All received data were registered in the card of orthodontic examination.

RESULTS

Based on results of dental examination caries intensity and prevalence of decay in schoolchildren with hearing disorders was determined and 81,8% of caries intensity contains 3,36, that corresponds to average indices in Ukraine.

The evaluation of skeletal apparatus was done in 56 schoolchildren with hearing disorders. The first group contained (the period of mixed bite) 29 pupils (51,79%), the second group included (the period of permanent bite) 27 pupils (48,28%). Only 5,26% of examined pupils were almost healthy and in 94,74% of cases disorders of skeletal apparatus were registered (Fig. 1).

Different morphological and functional disorders of the foot were diagnosed. The given abnormality occurred both independently and with vertebra deformation.

Almost in half of examined pupils with hearing disorders and in 44,64% such abnormalities of feet were determined. Talipes valgus (M21.0) contained 23,21% and acquired platypodia (M21.4) included 21,43%. The given pathology occurred in schoolchildren of the first group.

In 7,14% of schoolchildren with hearing disorders pathology of skeletal apparatus was diagnosed (anterior

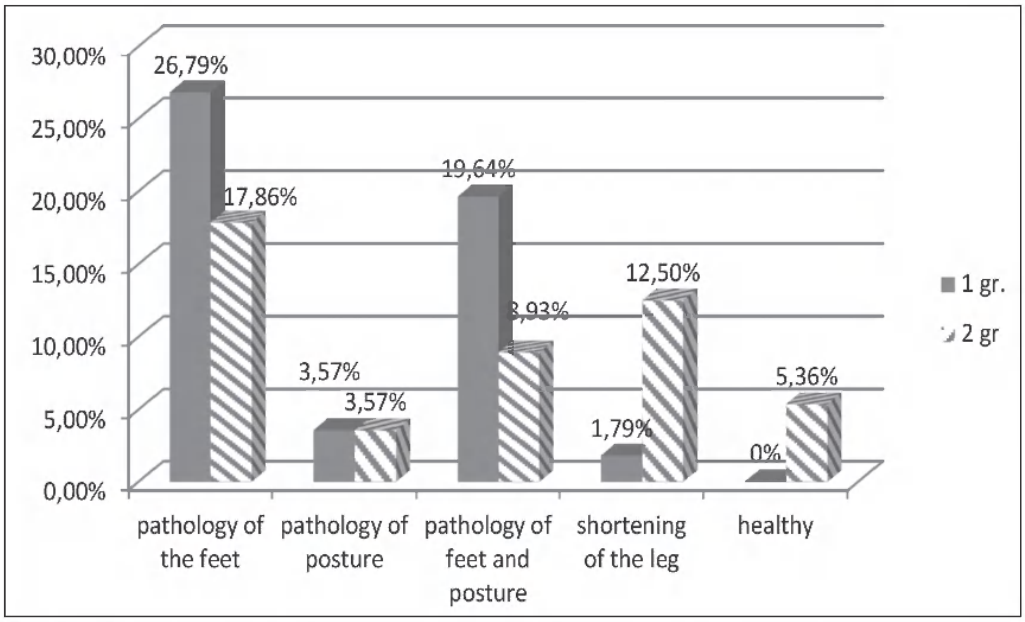

Fig 2. The abnormality of skeletal apparatus in children with hearing disorders (age groups).

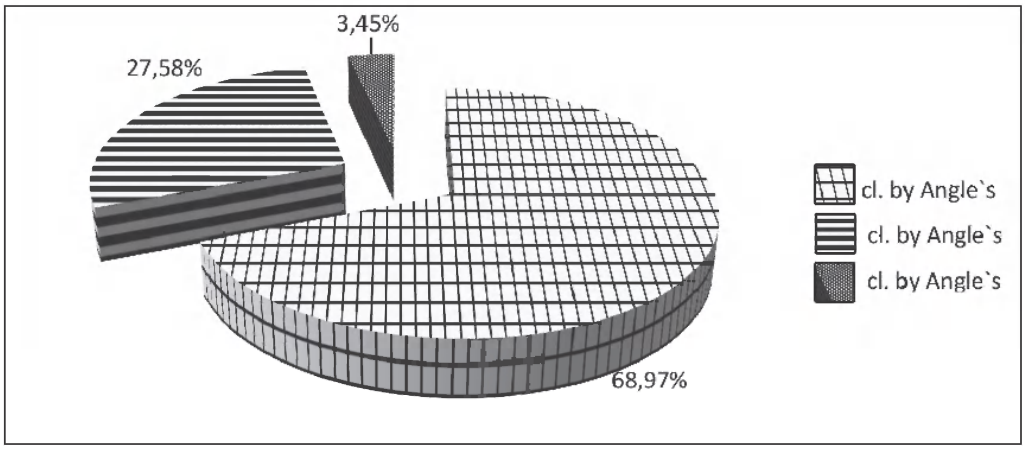

Fig 3. The condition of bite in schoolchildren with hearing disorder.

curvature, backward curvature, scoliosis) with similar frequency in children of both age groups - the first one contained (3,57%) and the second one included (3,57%), and it defines the absence of self-regulation of this pathology.

In 28,57% of examined pupils vertebra deformation was combined with feet disorders.

Unilateral shortening of the lower limb was diagnosed in 14,29% of pupils. If in children of the first group the length of legs was in 1,79%, and with age (2^{nd}) the number of asymmetries increased in 7 times – 12,5%, and it is direct consequence of untimely visit to orthopedist and the absence of hospitalization. Shortening of the left leg occurs more often (Fig. 2).

All examined hearing-impaired schoolchildren who suffered from foot pathology, special covering and physical therapy was recommended. Spinal assistant (jacket) was used for posture correction.

Abnormalities of dentofacial system were detected in 100 of examined schoolchildren. Orthognathic occlusion was not observed in any pupil in both age groups. The division of malocclusion was done based on Angle's classification (1889). The most widespread pathology of examined schoolchildren is the pathology of bite of the first class of Angle's classification, so the abnormality of positioning of teeth which occurred, in 68,97%, the second one presented in 27,58%, abnormality of the third class presented in 3,45% (Fig.3).

The first group of schoolchildren (6-13 years) in mixed bite occurs the pathology of the first class of Angle's classification and occurred in 41,38% of schoolchildren with similar frequency of gender sign – 20,69%. The second class of mixed bite (the first group) occurred in 10,34% of schoolchildren. Both the first class and the second class of Angle's classifications were not determined. The third class of classification was determined and it was defined in 3,45%.

In schoolchildren in permanent bite (2^{nd} group) pathology of the first class contained 27,59%, bite abnormalities of the second class was determined in 17,24%. Bite disturbance both

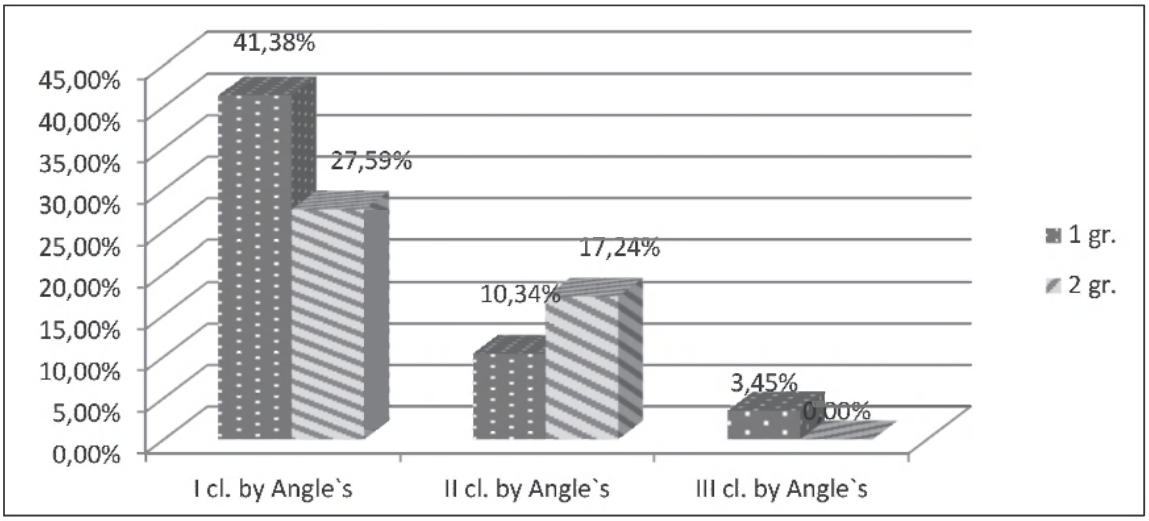

Fig. 4. Bite malocclusion in pupils with hearing disorders.

in the first class and in the second class occurred in 1,5 times more often in girls. The pathology of the third class in examined schoolchildren of 14-19 years old was not occurred (Fig.4).

If the pathology of 1st class by Angle's classification with age tends to be slightly self-regulating (Fig. 4), distal bite in children with age (2 g.) increases by 6.9%, which underlines the well-known postulate: prognation has almost no tendency to self-regulation, and, on the contrary, this complicated morphological and functional side pathology only complicates as the child grows up and requires more complex orthodontic intervention.

Much attention is paid to functions of the oral cavity during orthodontic examination. Swallowing and respiration is checked in children (36,36%) and type of swallowing was determined. Oral type of respiration was found in 27,3%.

The vestibule of the mouth, was determined in the third part of schoolchildren with hearing disorders (31,82%) frenulum of upper and lower lips was detected in 38,64%, and in 41% examined frenulum of tongue was occurred.

In the fifth part of pupils deviation of mandible was observed (20,5%) and in the second group in 4,55% of schoolchildren crepitus was observed.

CONCLUSIONS

Data of complex dental, orthodontic and orthopedic examination of schoolchildren with hearing impairment determine total morbidity of osteoarticular system and also 81,8% of schoolchildren suffer from carious damages and the level of intensity of caries contains 3,36, all children are prone to dentofacial abnormalities (100%), disorders of skeletal system in 94,64% and it determines the link and direct dependence of morphological and functional status of skeletal system and dentofacial area.

Abnormality of feet (26,79%) and combined abnormality of feet and vertebra (19,64%) and it leads to unilateral shortening of lower limb (12,5%) in pupils with mixed bite.

The development and realization of preventive orthodontic measures in children with hearing disorders should be complex with different specialists (dentists, orthodontists, orthopedists and others), and it will allow decreasing the negative influence of caries risk factors, dentofacial abnormalities and reduction of their spread and severity of orthodontic pathology.

Only complex investigation, complex treatment and prevention of diseases of hard tissues of teeth, skeletal system and dentofacial abnormalities in children with hearing disorders allow reducing the problems of skeletal system of children with peculiar needs.

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Conflict of interest:
The Authors declare no conflict of interest.

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