

SUMMARY

ELASTOGRAPHY OF THE MASSIVE MUSCLES WITH THE USE OF A CROSS WAVE A MORPHOLOGICAL MEASUREMANTS OF THE HEAD IN CHILDREN AND YOUTH.

Introduction: Popularization of the canons of beauty and the sense of aesthetics becomes a stimulus to the growing importance of the stomatognathic system, with particular emphasis on temporomandibular joints, and to explore the issues of one's own health. Identification of this system by the patient as the basic tool responsible for the main vital functions is a factor determining the sense of necessity to undertake the necessary preventive and corrective actions. Revolutionary in the diagnosis of masseter muscles as non-invasive methods are imaging in the framework of elastography and Kinect 3D technology, which are an important element contributing to the improvement of physiotherapeutic awareness, which is of key importance in starting the proper therapy of the masseter muscles and prophylaxis in preventing the occurrence of malocclusion and posture. These methods make it possible to investigate the relationship between particular morphological points of the craniofacial face and the flexibility and thickness of the masseter and temporal muscles.

Aim of the study: The aim of this study was to assess the relationship between the stiffness and thickness of the masseter muscles and the morphological parameters of the head in children and adolescents, which may be associated with numerous disorders of the stomatognathic system.

Material and methods: The research was carried out on a group of 39 children aged 9 to 16 years. Before starting the study, a previously completed questionnaire was analyzed or an interview with the child's guardian was made in order to obtain information about possible contraindications. The next step was the analysis of school medical records and a dental examination in order to qualify the person for further verification procedure. The main study was divided into three stages, where the first stage consisted of making a 3D scan of the head using the Microsoft Kinect motion sensor and a laptop with specialized KScan3D 1.2 software installed in order to record subsequent scans. Before starting the scan, linear measurements of the length and width of the face were made with a tape measure. Each person had three series of photos of the facial part of the head, ranging in number from 8 to 10 frames. The scans underwent further computer processing where the assembly of the model was obtained. After marking the characteristic anthropometric points, the distance between them was measured.

Selected morphological features of the head based on skeletal and structural reference points lying within the immobile parts of the skull, i.e. not changing their position during mandibular movements, were analyzed. In the second stage of the examination, using an ultrasound scanner with SWE mode (Aixplorer, product version 12.2.0., Software version 12.2.0.808, Supersonc Imagine, Aixen-Provence, France) equipped with a linear probe (2-10 MHz; SuperLineaur 10 -2, Vermon, Tours, France), the thickness and stiffness of the masseter and temporal muscles on both sides of the face in the supine and sitting positions were measured twice. The last stage was to conduct a questionnaire of eating habits up to the age of two in order to determine the influence of the feeding method and the type of diet on the current parameters of flexibility and thickness of the masseter muscles.

Results: On the basis of the obtained results of the analyzes, which constitute the basis for answering the questions posed in this paper, it can be assumed that the thickness and elasticity of the masseter muscles changes proportionally with the morphological development of the face. Research was also carried out to answer the question whether there is a relationship between the asymmetry of masseter muscle thickness and stiffness and the morphological and comparative direction. The observations showed a relationship between the difference in the morphological point of Go-Gn and the difference in thickness of the temporal muscle in a sitting position. Which may indicate that the proportional distribution of morphological points is accompanied by the proportion of flexibility and thickness of the masseter muscles. The conducted research on the relationship between the linear measurement of the frontal length of the face and the elasticity and thickness of the masseter muscles did not clearly confirm the hypothesis that the wider and longer the face, the greater the thickness and stiffness of the masseter and temporal muscles. Only a moderate correlation was found between the measurement of the width of the mandible and the flexibility of the temporal muscle in a sitting position. The assessment of the relationship between sex, age, body weight and the parameters of the masseter muscles has shown that the process of human growth will be accompanied by an increase in the volume of individual muscles and thus a decrease in flexibility, which is particularly evident in people with larger craniofacial dimensions. The research process ended with an assessment of the influence of 100 eating habits on the thickness and elasticity of the masseter and temporal muscles. Studies have shown that the method of feeding influenced the elasticity of the masseter muscle in a sitting position in the case of breastfeeding a child. Moreover, it was found that the thickness of the masseter and temporal muscles as well as their elasticity did not change depending on how long the baby was bottle-fed. The research also

concerned the assessment of the influence on the parameters of the masseter muscle and the temporal moment when solid foods were introduced into the diet. The changes were noted in the supine position and concerned the average thickness of the masseter and temporal muscles. For the thickness of the masseter muscle, significant differences were found in the group of people for whom solid foods were introduced before 6 months of age, and those after 9 months of age. On the other hand, in the case of the temporal muscle, differences occurred among people after 9 months of age. Observations that were carried out in terms of the impact of using a pacifier provided data that it reduces the thickness of the masseter muscle and is indifferent to the elasticity of the masseter and temporal muscles. On the other hand, studies on the influence of a child's sleep with their mouths open, the willingness and biting of solid products or the presence of speech impediment on the thickness and elasticity of the masseter and temporal muscles did not confirm that the above variables are of significant importance.

Conclusions: The conducted research has shown that the craniofacial morphological points are closely related to the thickness and elasticity of the masseter muscles. It has been noticed that in people with broader faces, the masseter muscles will be more prominent and stiffer. It was also assessed that the physical parameters of the body, such as age, body weight, and gender, also affect the thickness and elasticity of the masseter and temporal muscles. In this case, a certain pattern was observed that for both sexes, with the passage of years and with increasing body weight, the masseter muscles will thicken and show increasing stiffness at rest. The method of feeding is also important, where, for example, the introduction of solid food after 6 months of age resulted in an increased thickness of the temporal and rumen muscles. Awareness of the relationship between particular morphological points of the craniofacial face and the flexibility and thickness of the masseter muscles is an important weapon in the prevention and treatment of malocclusion and posture.