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KINEMATICS ANALYSIS OF THE TEMPOROMANDIBULAR JOINT IN PRESCHOOL CHILDREN

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SUMMARY

Measurement of the temporomandibular joint (TMJ) range of motion is an important component of the assessment of children with TMJ dysfunction, which is associated with an imbalance between components of the stomatognathic system that can compromise functions such as mastication and phonation, leading also to postural asymmetries. Therefore, the objectives of this study were to measure the mandibular range of motion in preschool aged children, and to correlate it with postural parameters. This is a descriptive cross-sectional design study performed in 42 children, both genders, aged between 4 and 6 years. The following mandibular movements were measured in mm with a 30 cm flexible ruler: maximum oral opening, protrusion, retrusion, lateralization to the left and the right. Measurements of overjet and overbite were also performed. Postural parameters were analyzed using photogrammetry. Mean, standard deviation and symmetry ratio (SR) were calculated for each parameter, being considered symmetry values greater than 90%. The parameters for mandibular movement were maximum oral opening (40.0±4.5, n=42); protrusion (4.0±1.8, n=35); retrusion (2.7±2.1, n=35); left (6.3±2.0,n=38) and right (5.7±1.8, n=38) mandible lateralization, overbit (2.5±1.1, n=21) and overjet (4.4±1.3, n=21). Postural and kinematic parameters did not differ significantly between genders ($p>0.05$). There was a significantly positive correlation between SR of the alignment of the trunk and SR of the mandible lateralization (correlation coefficient=0.39, $p=0.01$, n=39). No other correlations were found between measurements. These results contribute as reference for TMJ assessment in preschool children, and evidence the relation between trunk asymmetry and TMJ range of motion.

Key words: Children. Perimetry Exam. Posture. TMJ

INTRODUCTION

Temporomandibular joint (TMJ) disorders are common among children and adolescents. Their incidence has been reported as being between 6% and 68% in literature (1). Patients with functional disorders related to this joint have to be assessed in terms of its range of motion, in order to evaluate the effects of treatment in this condition (2,3).

Thus, measurement of TMJ range of motion is an important component of the assessment of children with TMJ dysfunction, which is associated with an imbalance between components of the stomatognathic system that can compromise functions such as mastication and phonation, leading also to postural asymmetries (4,5). Therefore, the objectives of this study were to measure the mandibular range of motion in preschool aged children, and to correlate it with postural parameters.

METHODS

This is a descriptive cross-sectional design study performed in 42 children, both genders, aged between 4 and 6 years. All mandibular movements were measured in mm with a 30 cm flexible ruler, including measurements of overjet and overbite. Maximum oral opening was assessed using the distance between the incisive faces of the upper and lower teeth and added the vertical trespass value. Mandible lateralization was measured by the horizontal distance of the line between the lower central incisive teeth to the line between the upper central incisive teeth after right-side or left-side mandible shifting. Mandible protrusion measurement was performed by the summation of the horizontal trespass value with the maximum horizontal shifting of the mandible. Finally, horizontal trespass – in occlusion - was measured using the distance between the occlusal face of the upper central incisive and the distal face of the lower central incisive.

Postural parameters were analyzed using photogrammetry. The children had markers placed on anatomical landmarks with styrofoam balls, that were positioned in standing to obtain the images of posture in the frontal, right and left lateral and sagittal planes. Camera (Sony Cyber-shot DSC-P93) was placed on a tripod (height of 1.63 meters) at 90 degrees and 1.9 meters from participant. A plumb line marked with two styrofoam balls was used for vertical calibration. Photos were analyzed by SAPO (postural analysis software) available in the public domain. Mean, standard deviation and the symmetry ratio (SR) were calculated for each parameter, being considered symmetry values greater than 90%. The study was approved by the Ethics Committee in Research of Universidade Federal do Ceará (089/11).

RESULTS AND DISCUSSION

The presente study began with a sample of 42 children, however some data referred to jaw movements could not be collected in all of them, for there was an inability in some participants to perform some of the required movements. Specially to overbite and overjet measurements, the studied sample was further reduced for these data collection in many participant was not applied because of the conformation of their dental arches.

The parameters for mandibular movement were maximum oral opening (40.0±4.5, n=42); protrusion (4.0±1.8, n=35); retrusion (2.7±2.1, n=35); left (6.3±2.0,n=38) and right (5.7±1.8, n=38) lateral lateralization to the left, overbit (2.5±1.1, n=21) and overjet (4.4±1.3, n=21). Andrade *et al*., 2011 demonstraded in a sample that included youth and adults values for range of motion of the jaw that were similar to our findings s.

Postural and kinematic parameters did not differ significantly between genders ($p>0.05$). There was a significantly positive correlation between SR of the vertical alignment of the head and SR of the lateralization of the mandible (Figure 1). No other correlations were found between measurements. Global posture deviations cause body adaptation and realignment, which may interfere with the organization and function of the temporomandibular joint (6). There were correlations between posture and the stomatognathic system (7). An influence of periodontal receptors on body posture was hypothesized by Gangloff and Perrin (2002), who found a significant alteration of postural control after unilateral truncular anesthesia of the mandibular nerve(8).

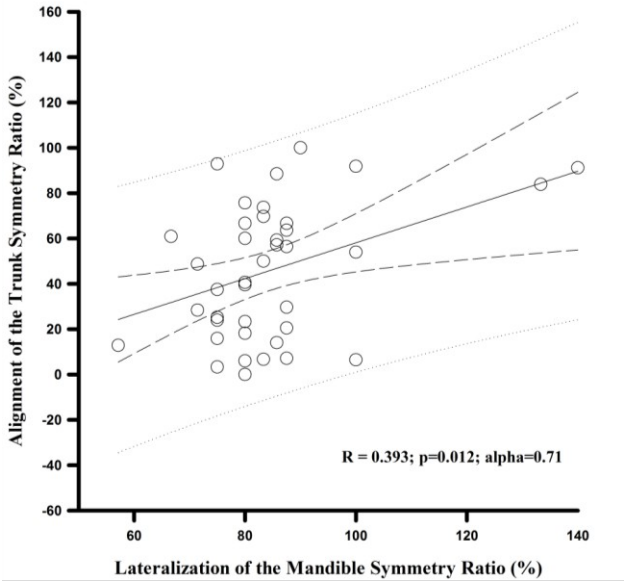

Figure 1. Correlation between SR of the vertical alignment of the trunk and SR of the lateralization of the mandible.

CONCLUSIONS

These results contribute as reference for TMJ assessment in preschool children, and evidence the relation between trunk asymmetry and TMJ range of motion. It is important that the posture of children with temporomandibular disorders were assessed for the correct treatment of these disorders.

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