



## Orofacial motor functions in pediatric obstructive sleep apnea and implications for myofunctional therapy



Cláudia Maria de Felício <sup>a, b, \*</sup>, Franciele Voltarelli da Silva Dias <sup>a, b</sup>,  
 Gislaine Aparecida Folha <sup>a, b</sup>, Leila Azevedo de Almeida <sup>c</sup>, Jaqueline Freitas de Souza <sup>a, b</sup>,  
 Wilma Terezinha Anselmo-Lima <sup>a, b</sup>, Luciana Vitaliano Voi Trawitzki <sup>a, b</sup>,  
 Fabiana Cardoso Pereira Valera <sup>a, b</sup>

<sup>a</sup> Department of Ophthalmology, Otorhinolaryngology and Head and Neck Surgery, School of Medicine of Ribeirão Preto, University of São Paulo USP, Ribeirão Preto, SP, Brazil

<sup>b</sup> Craniofacial Research Support Center, University of São Paulo USP, Ribeirão Preto, SP, Brazil

<sup>c</sup> Department of Neurosciences and Behavioral Sciences, School of Medicine of Ribeirão Preto, University of São Paulo USP, Ribeirão Preto, SP, Brazil

Support for Orofacial Myofunctional Evaluation with Scores (OMES) protocol utilization

The OMES protocol has predetermined scores, with the highest values indicating normal patterns. The categories assessed and their respective items were the following:

- Appearance/Posture: face (symmetry), cheeks, mandible, lips, tongue, and hard palate were evaluated. Scores were attributed according to a three-point scale (1 = severe alteration; 2 = mild alteration; 3 = normal) and the maximum possible score was 18.

- Mobility: subjects were asked to perform 4-6 movements with each component (lips, tongue, cheeks, and mandible). Each separate task was scored in a three-point scale from 1 (severe inability) to 3 (precise movement without tremors). Tremors alone and inaccurate movements with or without tremor were scored 2. The maximum possible score in this category was 57.

- Functions:

Breathing mode: this function was also assessed using a three-point score. The examiner assigned a score of 3 (normal pattern) when inspiration occurred through the nostrils, with lips occluded without effort; 2 (mild change), when the subject's mouth was open, suggesting oronasal inspiration, but he or she could breathe through the nose without showing signs of fatigue and dyspnea; and a score of 1 (severe disturbance) when the subject, while trying to perform inspiration only through the nose, showed signs of fatigue and dyspnea and opened his mouth to inspire within a few seconds. Breathing mode was observed mainly at rest and during mastication [15].

Deglutition was assessed first with liquid and later with a solid bolus. Except for efficiency, scores were assigned only once, considering the worst condition. Rated behaviors and scores were:

Lip behavior: rated as normal (4 points) when lips were occluded without apparent contraction. When lip contraction was observed, the ratings were 3 (mild contraction) or

2 (moderate or severe contraction). A score of 1 was assigned when lip occlusion was absent.

Tongue behavior: in this assessment, subjects were asked to swallow as usual for them. The examiner explained that the subject's lips would be separated immediately after swallowing (with examiner placing the index finger and thumb, respectively, under the subject's chin and lower lip (region of the mentalis muscle) [15]. Tongue behavior was rated as normal (score of 3) when it was contained in the oral cavity. A score of 2 was given when the tongue was interposed between the teeth in the limit of the incisal surfaces (or margins, in the absence of incisors) and a score of 1 if the tongue was placed beyond the incisal surfaces.

When compensatory behaviors and signs of alteration (jaw sliding, tension of facial muscles, food escape, movement of the head or other parts of the body, choking, and noise) were observed, their presence (score 0) or absence (score 1) was recorded for each sign.

The efficiency of deglutition was assessed according to the number of swallowing repetitions. When there was no more than one repetition for the same bolus, efficiency was rated as 3, two to three repetitions were rated as 2, and multiple swallowing repetitions were rated as 1.

Mastication: subjects were instructed to chew a Bono® chocolate-filled cookie (Nestle, São Paulo, Brazil) in their usual manner.

The bite was observed and the examiner assigned scores indicating when biting occurred with the incisors (3 points) or posterior teeth (2 points). When subjects did not bite the food but broke it into pieces with their hands before bringing it to the mouth, a score of 1 was attributed.

Masticatory type was evaluated by the percentage of chewing strokes occurring on each side of the oral cavity, determined by observing the bolus localization (volume on cheeks) as well as orofacial movements, especially jaw, lip, and cheek displacements. This analysis was based on video recordings and followed procedures detailed elsewhere [15]. The different masticatory types were classified and scored as follows:

(i) *bilateral and alternate*, when chewing strokes were evenly distributed on both sides or occurred up to 65% of the times on the same side (4 points);

(ii) *simultaneous bilateral*, when chewing occurred on both sides 95% of the times (3 points);

(iii) *unilateral preference*, when chewing occurred on the same side 66–94% of the times (2 points); and

(iv) *chronic unilateral*, when chewing occurred on the same side 95–100% of the times (1 point);

(v) *anterior*, when chewing occurred in the region of the incisors and canines (1 point).

Compensatory behaviors and signs of alteration (movement of the head and other parts of the body, altered posture, or both; food escape and uncoordinated jaw movements) were observed, and a presence [0] or absence [1] scale was used for each sign [16].

The maximum possible score for functions was 29 (breathing = 3; deglutition = 16, and mastication = 10). Total score range from 32 to 104, with the highest value indicating the better orofacial myofunctional condition, and the lowest value the worse degree myofunctional disorder.