FINDINGS OF MULTIPROFESSIONAL EVALUATION OF MOUTH BREATHING CHILDREN

Achados da avaliação multiprofissional de crianças respiradoras orais

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ABSTRACT

Purpose: to describe orofacial myofunctional findings, as well as the main otolaryngological, allergological and orthodontic problems found in mouth breathing children. **Methods:** 502 medical charts from the Mouth Breathing Outpatient Clinic from Hospital das Clínicas da Universidade Federal de Minas Gerais were analyzed. The subjects were aged between 2 and 12 years (median 6.0 years) and, about genders, 289 (57.6%) were male and 213 (42.4%) were female. The data collected was regarding general anamnesis, speech-language pathology evaluation, as well as the relevant parts of otolaryngological, allergological and orthodontic assessments. Data was submitted to statistical analysis. **Results:** at anamnesis, significant prevalence of maintaining the mouth opened (98.0%), snoring (89.9%) and nocturnal drooling (68.6%) was observed. Allergologic evaluation showed positive skin test (59.0%) and rhinitis (57.8%) and otolaryngological assessment revealed hypertrophic adenoids (91.7%) and tonsils (72.6%) and changed nasal mucosa (60.3%). The findings on orthodontic evaluation were malocclusion (86.8%), convex facial profile (62.9%) and overbite (55.5%). Data from speech-language pathology assessment indicated inappropriate usual lips position (70.5%), facial changes in lips (65.4%) and tongue (64.4%) strength, high hard palate (57.1%), altered nasolabial angle (57.0%) and asymmetry (55.0%). **Conclusion:** alterations were found on the evaluations made by all professionals, confirming the huge impact of mouth breathing on quality of life of those children, and therefore the need for multidisciplinary treatment for these patients.

KEYWORDS: Mouth Breathing; Stomatognatic System; Evaluation

INTRODUCTION

Mouth breathing is a change in the breathing mode that takes place when breathing occurs continuously through the mouth[1,2]. Mouth breathing is a frequent dysfunction in childhood. Although prevalence studies of this disorder are scant in the literature, rates of 55%[3] and 56.8% have been reported[4] in schoolchildren aged 6–9 years. Mouth breathing may be related to genetic factors, inadequate oral habits, and nasal obstruction of varying severity and duration[3]. Among the obstructive presentations are adeno-tonsillar hyperplasia, allergic and nonallergic rhinites, and hypertrophic inferior nasal conchas. Allergic rhinitis is one of the most common causes of an abnormal breathing mode[5].

Mouth breathing propitiates alterations in several organs and systems, which compromises quality of life[6]. When mouth breathing replaces or complements nasal breathing, it can lead to severe morphological, functional, and behavioral disturbances depending on the duration, intensity, and time of onset of this change in breathing mode[6]. Some examples of alterations are frequent tiredness,

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daytime sleepiness, adynamia, decreased appetite, and, possibly, learning and attention deficits[5]. In addition, typical facial abnormalities may occur, such as increased vertical height of the lower third of the face, narrow maxillary arch, arched palate, obtuse gonial angle, dental malocclusions (open bite, proclined maxillary incisors, cross-bite), and higher position of the hyoid bone[1]. In addition, a short upper lip; everted lower lip; lip incompetence; hypotonic mandibular elevators; hypotonic tongue; changes in resting tongue posture, deglutition, and speech; mastication and voice abnormalities, and postural adaptations may be found[5].

Assessing which abnormalities are prevalent in the population of mouth breathing children is key in order to guide initiatives of health promotion and prevention in orofacial myology. Such endeavors would allow these children to have adequate and early muscle stimulation, thereby preventing orofacial myofunctional disorders. This prevalence study also helps to direct the attention of the practitioners of related fields—such as pediatric dentists, orthodontists, and physical therapists— to the orofacial myofunctional parameters that are typically affected by mouth breathing and will likely have an impact on their professional activity. It should also be underlined that most of the literature regarding the implications of mouth breathing provides theoretical information or data from studies with small samples, which prevent the generalization of the findings.

The aim of the present study was to describe the orofacial myofunctional findings and the main otolaryngological, allergological, and orthodontic problems in mouth breathing children.

METHODS

Our study was conducted at the Mouth Breathing Outpatient Clinic (MBOC) of the Federal University of Minas Gerais *Hospital das Clínicas* (HC-UFMG) after approval by the institutional review board of the UFMG (protocol no. 291/03).

The MBOC has been in activity since December 2002 with the aim of providing multidisciplinary care to mouth breathing children aged between 2 and 12 years. The clinic provides care to children with health conditions encompassing a variety of medical specialties who present with a complaint of mouth breathing. The MBOC team comprises otolaryngologists, allergologists, orthodontists, and a speech-language pathologist, in addition to UFMG undergraduate students of Medicine and Speech-Language Pathology & Audiology. The project is developed on a weekly basis at the HC-UFMG Otolaryngology Outpatient Clinic, with the presence of all the participating team. On these weekly encounters, all specialist evaluations are performed for a multidisciplinary diagnosis of mouth breathing and indication of the required approach.

We conducted a retrospective study consisting of the review of the medical charts of 502 children who had been evaluated at the MBOC and received the multidisciplinary diagnosis of mouth breathing.

The study included the records of children evaluated at the MBOC from June 2005 through December 2010 and who had been diagnosed with mouth breathing after multidisciplinary case discussion and ancillary tests. Charts that did not include the evaluation of the child by a speech-language pathologist were excluded.

Of the 502 charts reviewed, 289 (57.6%) belonged to boys and 213 (42.4%), to girls. The mean age of the children was 6.3 years, with a median of 6.0 years. All the data concerning patient history, speech-language pathology evaluation, as well as some data pertaining to the otolaryngological, allergological, and orthodontic evaluations, were collected from the children's records.

The medical history was obtained from the guardians or caretakers of the children by a medical student. Speech-language pathology evaluation was carried out using a protocol administered by 7th semester students of the Speech-language pathology & Audiology program of the UFMG in an outreach project; the protocol included an assessment of the structures and functioning of the stomatognathic system and an evaluation of voice disorders (Appendix 1). All these senior students were trained by the same teacher, with 15 years' experience in orofacial myology.

The children were examined sitting on a regular chair or in their parents' lap if they were too small to be seated.

The protocol includes a clinical examination in which morphological features of the face, lips, tongue, and cheeks were evaluated. These structures were evaluated by direct observation and classified as either adequate or abnormal and, when applicable, the affected side was noted. Lip, tongue, and cheek tone were assessed by bidigital palpation and/or by resistance to movement. Each structure was evaluated separately and rated as normotonic or hypotonic/hypertonic, both of which were considered inadequate. The mobility of the lips, tongue, cheeks, mandible, and soft palate was assessed by asking the children to perform specific movements after the examiner. Mobility was categorized as adequate or abnormal, if it was limited or the child was unable to execute the movement. Lip mobility was tested by asking the child to pouch and to smile. To evaluate tongue mobility, movements of protrusion, lateralization, elevation, and rotation were elicited. The mobility of the cheeks was

observed as they were contracted and inflated, while the soft palate movements were tested with the production of the sounds “a” and “ã” alternately. Mandibular range of motion was evaluated based on movements of opening, lateralization, protrusion and maximum mouth opening with the tip of the tongue on the papilla. To determine the nasal airflow, a Glatzel mirror was used; discrepancy between nares was visually assessed.

Mastication was assessed with a piece of bread; only the swallowing of saliva was observed; speech was evaluated during a guided talk, and the voice was assessed using auditory-perceptual analysis.

The data obtained from the evaluation of the children were digitized; the analyses were done with the aid of the PASW Statistics 18 software (SPSS). For comparisons between proportions, some data were pooled in order to allow for dichotomous variables-namely, abnormal and adequate. This classification took into account the presence of at least one abnormality. Data concerning functional assessments were not pooled, as we prioritized an analysis based on greater detail.

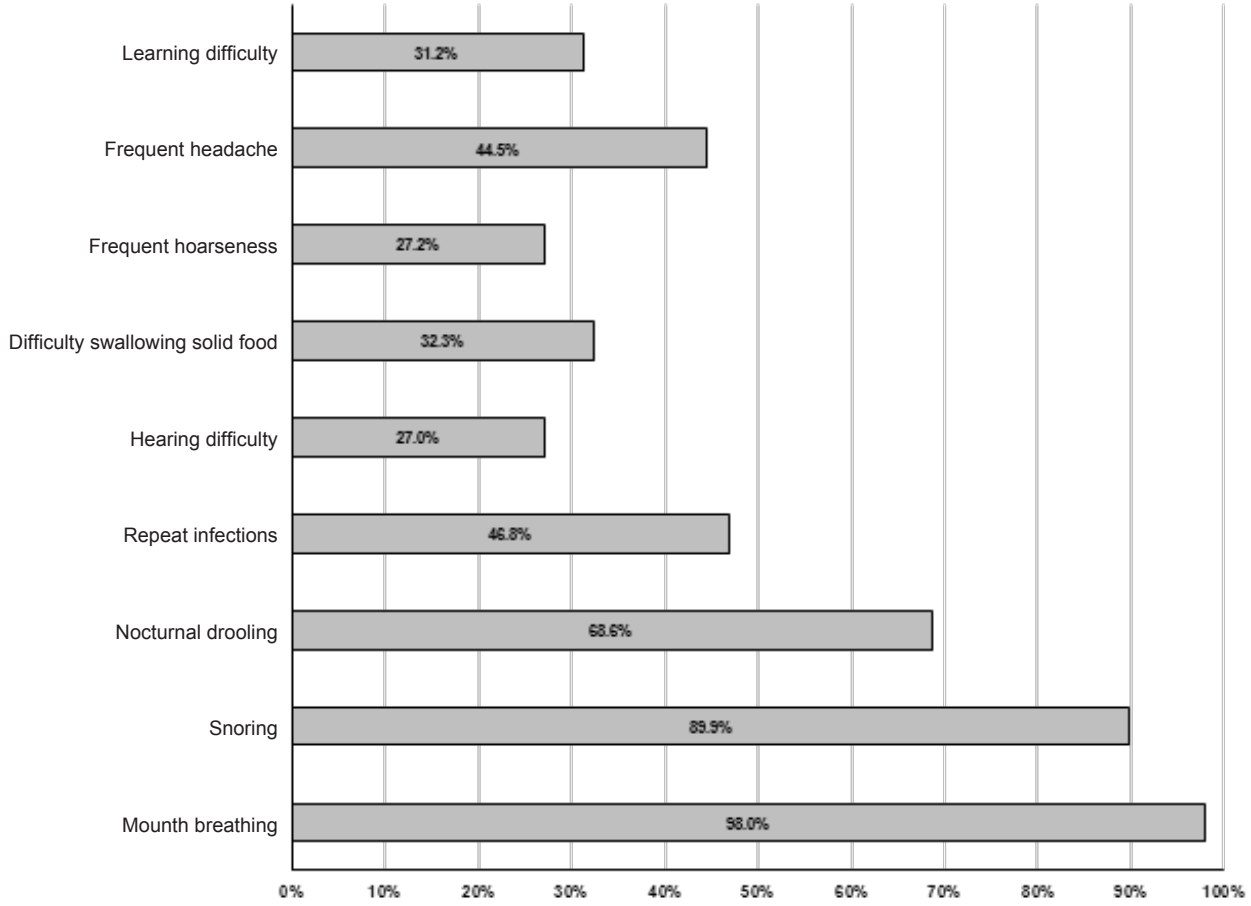
Some data do not add up to 100% (n = 502) because, for some evaluated items, the choices of answers for the variables could be cumulative.

The data were analyzed using the binomial test with a level of statistical significance of 5% (α = .05). The lacking data in the medical charts were not taken into account in the calculations of percentages.

RESULTS

According to the medical history data, the most prevalent complaints of the children seen at the HC-UFMG MBOC were a persistent open mouth posture, snoring, and nocturnal drooling (Figure 1).

The allergological evaluation (Table 1) indicated rhinitis and positive skin tests among the study children, while no case of asthma was reported. The otolaryngological examination (Table 1) revealed compromised nasal mucosa, tonsillar hypertrophy (right and left), adenoidal hypertrophy (right and left), normal tympanic membranes, and normal nasal septum.



Note: [1]binomial test; ***p < 0.05** indicates significant prevalence of abnormal aspects; ***p* < 0.05 indicates significant prevalence of adequate aspects

Figure 1 - Medical history data

Table 1 - Data from the allergological and otolaryngological evaluations

Characteristics	n	%	*p*-value[1]
Rhinitis			
Present	243	57.8	
Absent	177	42.1	**0.001***
N/A	82	16.3	
Asthma			
Present	127	30.2	
Absent	293	69.7	< 0.001**
N/A	82	16.3	
Skin test			
Positive	245	59.0	
Negative	170	40.9	**< 0.001***
N/A	87	17.3	
Right tympanic membrane			
Normal	337	70.8	
Abnormal	139	29.2	< 0.001**
N/A	26	10.4	
Left tympanic membrane			
Normal	321	67.0	
Abnormal	158	32.9	< 0.001**
N/A	23	9.2	
Nasal septum			
Normal	405	80.7	
Abnormal	97	19.3	< 0.001**
N/A	0	0	
Right inferior turbinate			
Normal	251	50.1	
Abnormal	250	49.9	1.000
N/A	1	0.2	
Left inferior turbinate			
Normal	268	53.6	
Abnormal	232	46.4	0.117
N/A	2	0.4	
Nasal mucosa			
Normal	201	39.6	
Abnormal	332	60.3	**< 0.001***
N/A	0	0	
Right palatine tonsil			
Normal (Grade I)	138	27.4	
Abnormal (hypertrophic)	364	72.5	**< 0.001***
N/A	0	0	
Left palatine tonsil			
Normal (Grade I)	137	27.2	
Abnormal (hypertrophic)	365	72.7	**< 0.001***
N/A	0	0	
Free right pharyngeal opening of the auditory tube			
Yes	244	51.2	
No	232	48.7	0.614
N/A	26	5.2	
Free left pharyngeal opening of the auditory tube			
Yes	246	51.6	
No	231	48.43	0.522
N/A	25	5.0	
Right adenoid			
Normal (free)	42	8.6	
Abnormal	444	91.3	**< 0.001***
N/A	16	3.2	
Left adenoid			
Normal (free)	39	7.9	
Abnormal	446	92.0	**< 0.001***
N/A	17	3.4	

Note: [1]binomial test; ***$p < 0.05$** indicates significant prevalence of abnormal aspects; **$p < 0.05$ indicates significant prevalence of adequate aspects

The orthodontic evaluation (Figure 2) revealed the following abnormalities: increased overbite, presence of malocclusions, and convex facial profile. Among the most frequent malocclusions, we found Angle class I malocclusion in 168 (33.5%) cases; class II, division 1 in 163 (32.5%); class III in 46 (9.2%), and class II, division 2 in 6 cases (1.2%). One (0.2%) case was noted as "atypical" and no classification was documented in 60 (12%) charts. With regard to dentition, 361 (52.0%) children had mixed dentition, 161 (32.1%), deciduous, and 29 (5.8%) children had permanent dentition.

The notes of the speech-language pathology evaluation concerning facial symmetry and type (Figure 3) indicated facial asymmetry.

The analysis of the data regarding the assessment of the orofacial structures (Table 2) revealed that the following features were abnormal: lip tone/tension, resting lip posture, nasolabial angle, and tongue tone/tension.

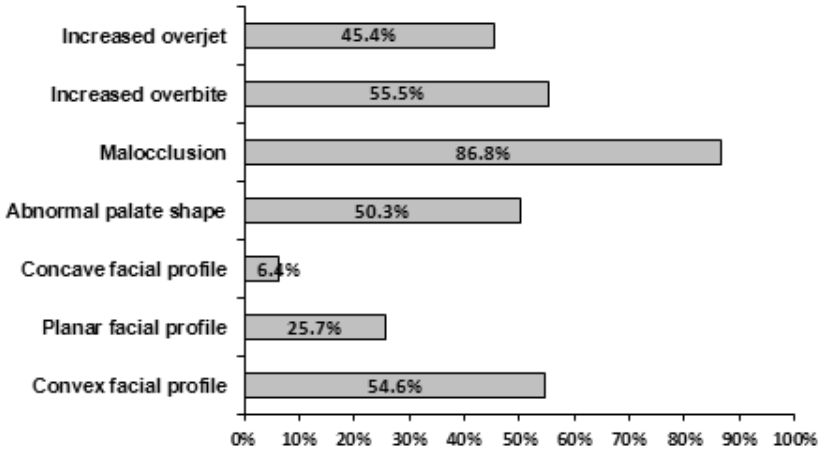


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Figure 2 - Data from the orthodontic evaluation

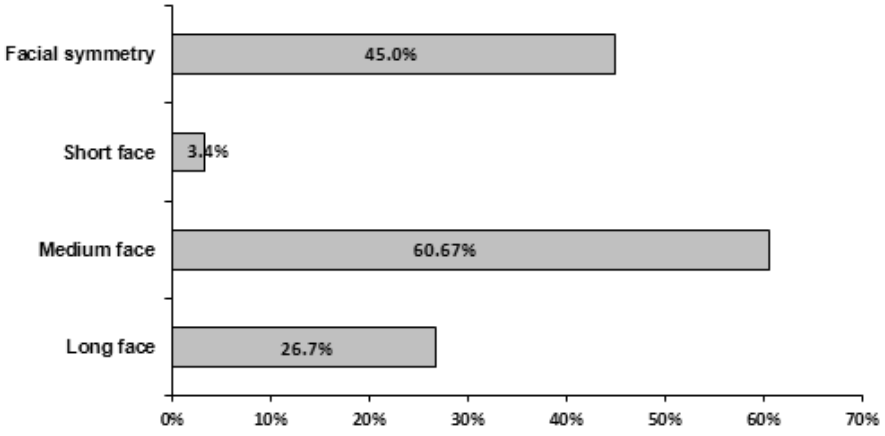

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Figure 3 - Data from facial type and symmetry evaluation

By contrast, the mobility of the lips, tongue, and cheeks; aspect of tongue and cheeks; tone/tension of cheeks, and lingual frenulum were adequate. With regard to the resting posture of the lips, 242 (48.2%) were apart, 144 (28.7%) were sealed, and 102 (20.3%), open. This aspect was not assessed in 14 (2.8%) cases.

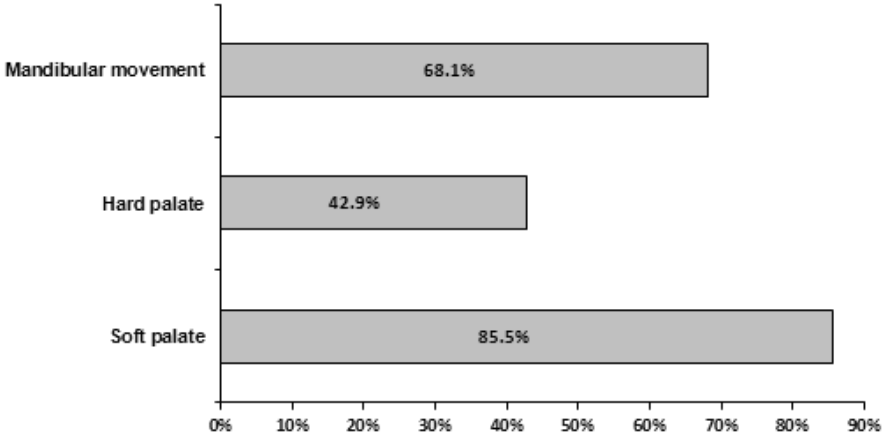
The nasolabial angle of 212 (42.2%) children was between 90º and 110º, 175 (34.9%) had an angle > 90º and for 106 (21.1%) of them the nasolabial angle was < 90º. There was no response to this item in 9 (1.8%) charts.

Table 2 - Data from the orofacial structure evaluation

Structure	n	%	*p*-value[1]
Lips			
Aspect			
Adequate	263	53.4	
Abnormal	230	46.6	0.149
Total	*493*	*100.0*	
Tone/tension			
Adequate	162	34.6	
Abnormal	306	65.4	**<0.001***
Total	*468*	*100.0*	
Mobility			
Adequate	442	91.9	
Abnormal	39	8.1	< 0.001**
Total	*481*	*100.0*	
Habitual posture			
Adequate	144	29.5	
Abnormal	344	70.5	**< 0.001***
Total	*488*	*100.0*	
Nasolabial angle			
Adequate (90 º –110º)	212	43.0	
Abnormal	281	57.0	**0.002***
Total	493	100.0	
Mentolabial angle			
Adequate	252	53.7	
Abnormal	217	46.3	0.116
Total	*469*	*100.0*	
Cheeks			
Aspect			
Adequate	314	64.2	
Abnormal	175	35.8	< 0.001**
Total	*489*	*100.0*	
Tonus/tension			
Adequate	256	55.2	
Abnormal	208	44.8	0.029**
Total	*464*	*100.0*	
Mobility			
Adequate	393	83.8	
Abnormal	76	16.2	< 0.001**
Total	*469*	*100.0*	
Tongue			
Aspect			
Adequate	455	95.0	
Abnormal	24	5.0	< 0.001**
Total	*479*	*100.0*	
Tonus/tension			
Adequate	164	35.6	
Abnormal	297	64.4	**< 0.001***
Total	*461*	*100.0*	
Mobility			
Adequate	427	89.3	
Abnormal	51	10.7	< 0.001**
Total	*478*	*100.0*	
Habitual posture			
Adequate	193	45.6	
Abnormal	230	54.4	0.080
Total	*423*	*100.0*	
Frenulum			
Adequate	383	84.2	
Abnormal	72	15.8	< 0.001**
Total	*455*	*100.0*	

Note: [1]binomial test; ***p < 0.05** indicates significant prevalence of abnormal aspects; ***p* < 0.05 indicates significant prevalence of adequate aspects

Mandibular range of motion (Figure 4) was found to be adequate. The evaluation of the palate (Figure 4) showed that soft palate mobility was adequate while hard palate mobility was impaired. The palate was categorized as high/deep in 227 (45.2%) children, narrow in 137 (27.3%), wide in 13 (2.6%), and low in 3 (0.6%) cases. No evaluation was documented in 224 (44.6%) cases.



Note: [1]binomial test; ***p < 0.05** indicates significant prevalence of abnormal aspects; ***p* < 0.05 indicates significant prevalence of adequate aspects

Figure 4 - Data from mandibular and palatal evaluation

According to the stomatognathic function assessment (Table 3), only the breathing mode was dysfunctional. The following aspects were adequate: 1) breathing: symmetric air escape on the Glatzel mirror; 2) mastication: bite, shape/side, volume, time, and absence of pain and/or clicking; 3) deglutition: lip posture, absence of noise and/or food residue; 4) speech: adequate in most subjects. Deviations in speech were found in 23.9% of the children, phone substitutions in 13.3%, and omissions in 11% of cases. Trismus and excessive salivation occurred in < 1% of cases each.

From the speech-language pathology evaluations derived the following approaches to management: referral to speech therapy in 195 (38.8%) cases, postoperative re-evaluation in 191 (38.0%), or wait for the approach recommendation by other professionals in 32 (6.4%). Only guidance was provided in 4 (0.8%) cases, and the patient was uncooperative in another 4 (0.8%) cases, with the evaluation being completed at a later time. In addition, there were 38 (7.6%) children who did not need speech therapy, 17 (3.4%) who were in therapy elsewhere, and 21 (4.2%) records made no reference to management.

DISCUSSION

Multiple abnormalities can be observed in a mouth breather, such as changes in posture and in the stomatognathic system structures leading to disturbances in dentofacial growth, suction, mastication, deglutition, and speech, which may progress to cardiorespiratory and endocrinological disease; sleep disturbances; mood disorders, and achievement deficits in school[3].

According to the children's medical history, significant complaints in this sample included nocturnal drooling, snoring, and open-mouth breathing-findings in agreement with the literature[4,5,7-9]. The reports of difficulty swallowing solid foods and frequent hoarseness were not statistically significant. Learning difficulties were not identified in our study, although this complaint has been documented in the literature[5,8]. This discrepancy could be due to one of two reasons: either the age range of the evaluated children, as many participants were at the stage of developing literacy, or the fact that both studies reporting learning difficulties investigated a much smaller sample than that of our study, with 142 cases in the first of those studies[5] and 42 in the second[8]. The complaint of frequent headaches was reported in 222 cases (44.6%) in our sample; however, this symptom reached no statistical significance.

Of note, one of the previous studies[5] showed that some symptoms are more frequent depending on the cause of mouth breathing; however, we did not establish these relationships in the present study.

Further, it is worth noting that 2% of the children presented with no complaint of open-mouth breathing (either during the day or night), even

Table 3 - Data from functional evaluation

Function	n	%	*p*-value[1]
BREATHING			
Adequate	92	18.8	
Abnormal	396	81.1	**< 0.001***
Total	*488*	*100.0*	
Glatzel mirror			
Asymmetric	209	44.8	
Symmetric	257	55.1	0.029**
Total	*466*	*100.0*	
MASTICATION			
Bite			
Adequate	401	84.6	
Abnormal	73	15.4	< 0.001**
Total	*474*	*100.0*	
Shape/side			
Adequate	369	79.2	
Abnormal	97	20.82	< 0.001**
Total	*466*	*100.0*	
Volume			
Adequate	327	68.5	
Abnormal	150	31.4	< 0.001**
Total	*477*	*100.0*	
Time			
Adequate	263	56.3	
Abnormal	204	43.7	0.007**
Total	*467*	*100.0*	
Lip posture			
Adequate	218	45.5	
Abnormal	261	54.5	0.055
Total	*479*	*100.0*	
Pain/clicking			
Yes	31	6.8	
No	425	93.2	< 0.001**
Total	*456*	*100.0*	
DEGLUTITION			
Associated movements			
Yes	251	53.9	
No	215	46.1	0.105
Total	*466*	*100.0*	
Lip posture			
Adequate	377	81.8	
Abnormal	84	18.2	< 0.001**
Total	*461*	*100.0*	
Noise			
Yes	35	7.4	
No	440	92.6	< 0.001**
Total	*475*	*100.0*	
Food residue			
Yes	205	43.3	
No	268	56.7	0.004**
Total	*473*	*100.0*	
SPEECH			
Adequate	264	57.6	
Abnormal	194	42.4	0.001**
Total	*458*	*100.0*	
VOICE			
Adequate	230	48.6	
Abnormal	243	51.4	0.581
Total	*473*	*100.0*	

Note: [1]binomial test; ***p* < 0.05** indicates significant prevalence of abnormal aspects; ***p* < 0.05 indicates significant prevalence of adequate aspects

though they had met the MBOC inclusion criteria. Therefore, it is clear that in a few cases the family of a mouth breathing child may not notice important signs of this abnormality.

Studies have shown a variety of causes for mouth breathing[5,7,10,11]. The children whose charts were reviewed in the present study had rhinitis and a positive skin test, as well as nasal mucosa abnormalities and hypertrophic tonsils and adenoids.

With regard to the findings of the orthodontic evaluation, the convex facial profile observed in the present study was found by other authors both among mouth and nasal breathers[12]. The rate of malocclusions was similar to that of other studies evaluating children in general[13,14]. The prevalence of increased overbite in the general population of children is lower[13,14] than that in the present study; this as, therefore, the only characteristic that distinguished the group of mouth breathers.

Mouth breathing can cause facial deformities and dental alignment problems[3]. Reports of malocclusion[5,6,15,16], long face[6], excessive height of the lower third of the face and of the maxillary arch[5] can also be found in the literature. Although anterior open bite can be considered the most prevalent malocclusion in mouth breathers[17], the literature reports that there is no one specific type of malocclusion characteristic of mouth breathing[18]. The most prevalent facial type was the medium face, which corroborates the findings of another study[19]. In the literature, we find reports of a vertical facial growth pattern in mouth breathers [6,20], with increased height of the lower third of the face[5,21,22]. However, facial type categorization is subjective and inter-rater divergence may occur.

Abnormal lip and tongue tone as found in our sample was also shown in other studies [5,11,20,21]. Another finding in our study was inadequate resting lip posture, with most children showing a lips-apart posture, which corroborates other studies[3,10,15,20,23]. However, changes in cheek tension and resting tongue posture, mentioned in the literature[20], were not identified in our study.

Regarding mandible and palate assessments, changes were noted in the hard palate only, as found in other studies[15]. More specifically, increased depth[18] and reduced width[18,24] of the hard palate were noted. It should be noted that the angle of the mandible was not assessed in the present study. Therefore, we were unable to note an obtuse gonial angle as documented by some authors[5,21]. It is suggested that further studies should address this particular aspect.

We observed that some data were lacking in several charts, especially those concerning posture of the body, mandible and palate; this could have influenced the data analysis. Thus, the team needs further instruction in this regard.

The structural evaluation indicated facial asymmetry and altered nasolabial angle, findings that have not been described in other studies, although they have been mentioned in the literature[25,26].

The functional evaluation showed that only the breathing mode was abnormal. It is worth noting that not all patients in the sample were classified as having abnormalities on the speech-language pathology evaluation because a proportion of those children only had nocturnal mouth breathing, and the breathing mode classification was based solely on what the patient manifested at the time of examination. However, it should be stressed that the multidisciplinary diagnosis of all the patients included in the present study was indeed of mouth breathing. No changes were noted with respect to mastication, in contrast to other studies, which detected food residue, noise during mastication, separate lips, premature escape, and reduced mastication time[9,27]. We believe that no abnormalities were detected in our study probably because the patients were monitoring themselves, as they knew they were being evaluated. Hence, they made an effort to keep their lips sealed, avoided chewing too fast, and prevented extraoral escape. The other abnormalities found by those authors were not examined in our study.

In another study, conducted with patients in orthodontic treatment, despite the high prevalence of masticatory abnormalities, there was no significant association when related to breathing mode[21]. However, there are reports in the literature of changes in mastication time, lip posture, and other parameters of mastication[9,27].

The absence of a lip seal during mastication showed a significance level that was very close to the established cut-off point. We believe that some of the children were able to monitor their performance during the assessment, which is in fact commonly observed in clinical practice. A lip seal can be noted in mouth breathing children, although this frequently occurs at the expense of mentalis muscle strain[15].

The evaluation of deglutition identified no noises, food residue, changes in lip posture, or associated movements. The last two of those findings are in contrast to the reports in the literature[20].

The literature reports a relationship between abnormal breathing mode and the presence of speech disorders[18,28]. A study showed that 31.2% of mouth breathers have speech disorders, but the significance of that finding was not ascertained[29]. Another study found that mouth breathing is a risk factor for lisp in speech[30]. However, a study comparing speech disorders in mouth and nasal

breathers[16] found no significant difference, which is consistent with our study results. Among the speech disorders identified in the present study, distortions were the most prevalent—likely as a result of alterations in the stomatognathic system[3], such as changes in the tension and position of the phonatory/articulatory organs.

Finally, it was found that the most frequent speech-language pathology approach to treatment was an indication to speech therapy-a relevant aspect, since speech therapy can contribute to breathing mode correction, facilitate the control of mouth breathing and of allergic rhinitis, and assist in the management of asthma[28]. The second most frequent approach was postoperative re-evaluation, which is related to the high prevalence of adeno-tonsillar hypertrophy in our sample.

Although the initial proposition of the present study was to discuss the abnormalities that had been found, it should be stressed that some data presented in the literature-hence, expected to be found in our study as well-were not confirmed, whether because no significant differences were found or even because there was a greater frequency of adequate parameters in our sample. This might have occurred due to the sample size of the studies. Another limitation that could have influenced the results was the fact that the assessments were conducted by different students, even though they were all trained by the same teacher.

Studies have characterized mouth breathing by the presence of dysfunction in phonatory/articulatory organs[3,11,31-33], such as abnormal resting tongue posture[5,15,21] and speech[3,5,16,21,34-36], mastication[5,9], deglutition[5,36], and voice disorders[5,21,31].

CONCLUSION

Among the mouth breathing children in our study, we noted complaints of an open mouth posture, snoring, and nocturnal drooling. We also observed the following: rhinitis, positive skin test, abnormal nasal mucosa, adeno-tonsillar hypertrophy, deep anterior overbite, malocclusion, convex facial profile, facial asymmetry, reduced lip and tongue tone, incompetent resting lip posture, altered nasolabial angle, high hard palate, and mouth breathing.

Mouth breathing can impact several dimensions of a child's life, as it compromises several aspects of health. It is of paramount importance that these patients receive multidisciplinary evaluation and treatment. Our study is relevant in that it compiles the characteristics identified in mouth breathing children, thereby assisting in the establishment of evaluation guidelines and in the proposition of health promotion and prevention initiatives in orofacial myology.

In forthcoming studies, the data will be stratified according to facial type and occlusion class so that these relationships can be analyzed. We suggest that studies be conducted including a control group to allow more precise data to be obtained.

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RESUMO

Objetivo: descrever os achados miofuncionais orofaciais, bem como os principais problemas otorrinolaringológicos, alergológicos e ortodônticos encontrados em crianças com respiração oral. **Métodos:** análise de prontuários de 502 crianças do Ambulatório do Respirador Oral do Hospital das Clínicas da Universidade Federal de Minas Gerais. Os participantes tinham idades entre 2 e 12 anos (mediana de 6,0 anos), sendo 289 (57,6%) do sexo masculino e 213 (42,4%) do sexo feminino. Foram coletados dados dos prontuários referentes à anamnese geral, avaliação fonoaudiológica, bem como as partes relevantes das avaliações otorrinolaringológica, alergológica e ortodôntica. Os dados foram submetidos à análise estatística. **Resultados:** na anamnese, observou-se prevalência significante de permanência de boca aberta (98,0%), ronco (89,9%) e sialorreia noturna (68,6%). Na avaliação alergológica, verificou-se teste cutâneo positivo (59%) e rinite (57,8%) e na otorrinolaringológica, hipertrofia de adenoide (91,7%) e amígdalas (72,6%), além de mucosa nasal alterada (60,3%). A avaliação ortodôntica indicou presença de má oclusão (86,8%), perfil facial convexo (62,9%) e trespasse vertical aumentado (55,5%). Os dados da avaliação fonoaudiológica indicaram inadequação da posição habitual de lábios (70,5%), tensão de lábios (65,4%) e de língua (64,4%) alteradas, palato duro alto (57,1%), ângulo nasolabial alterado (57,0%) e assimetria facial (55,0%). **Conclusão:** verificaram-se alterações nas avaliações realizadas por todos os profissionais, confirmando o grande impacto da respiração oral na qualidade de vida e, portanto, a necessidade de tratamento multidisciplinar para esses pacientes.

DESCRITORES: Respiração Bucal; Sistema Estomatognático; Avaliação

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APPENDIX 1

MOUTH BREATHING OUTPATIENT CLINIC SPEECH-LANGUAGE PATHOLOGY EVALUATION PROTOCOL

No _____

1) IDENTIFICATION
Patient: _____
Informant: _____Evaluated by: _____

2) COMPLAINT _____
_____

3) COMPLEMENTARY HISTORY
Sleep
a) drools: yes ( ) no ( ) sometimes ( ) doesn't know ( ) during the day ( )
b) wakes up with his/her mouth dry: yes ( ) no ( ) sometimes ( ) doesn't know ( )
c) sleeps on his/her: stomach ( ) back ( ) sideways ( ) doesn't know ( )

Eating
a) breastfeeding: yes ( ) no ( ) until _____ exclusively until _____
b) if he/she is still on the bottle: number/content _____
c) introduction of foods: _____
d) consistency of foods: _____
e) taste/smell: _____
f) chewing: fast ( ) normal ( ) slow ( ) open lips ( ) closed lips ( ) unilateral
( ) bilateral ( ) doesn't know ( ) noisy ( ) TMJ pain ( ) **liquids at meal ( )**
g) swallowing: _____

Oral habits
a) pacifier: yes ( ) no ( ) started _____ until _____ type: orthod. ( ) regular ( )
b) bottle: yes ( ) no ( ) started _____ until _____ type: orthod. ( ) regular ( )
c) finger: yes ( ) no ( ) started_____ until_____ which/how _____
_____
d) teeth grinding: yes ( ) no ( ) started _____ until _____
e) teeth clenching: yes ( ) no ( ) started _____ until _____
f) nail biting: yes ( ) no ( ) started _____ until _____
g) rests his/her face on the hand to sleep: yes ( ) no ( ) sometimes ( ) doesn't know ( )
h) bites objects: yes ( ) no ( ) which _____ started _____ until _____
i) other (which, started and until):_____

Speech
a) changes: yes ( ) no ( )
b) which: _____
Additional information: _____
_____

4) SPEECH-LANGUAGE PATHOLOGY EVALUATION

STRUCTURES	**1st Assessment Date: ___/___/___**	**1 postoperative month Date: ___/___/___**	**3 postoperative months Date: ___/___/___**
Eyes			
Symmetry and dark circles under eyes			

Eye vs. right and left commissure			
Nose			
Morphology			
Nasolabial angle			
Philtrum			
Lips			
Morphology			
Habitual posture			
Tension			
Mobility			
Mentolabial angle			
Cheeks			
Morphology			
Tension			
Mobility			
Mental			
Morphology			
Tension			
Mandible			
Opening			
Lateralization			
Protrusion			
Maximum opening with tongue on incisive papilla			
Masseter muscle			
Temporalis muscle			
Tongue			
Morphology			
Habitual posture			
Tension			
Mobility			
Frenulum			
Palate			
Hard			
Soft			
Facial Type			
Facial height			
Thirds (upper/middle/lower)			
Profile			
FUNCTION	**1st Assessment**	**1 postoperative month**	**3 postoperative months**
Breathing			
Mode			
Glatzel mirror			
Mastication			
Bite			
Pattern			
Mandibular movement			
Volume			
Time to end of deglutition			
Cycle velocity			

Lip posture			
Associated movements/noises			
Pain/clicking			
Temporalis/masseter			
Deglutition			
Associated movements			
Lip posture			
Noises			
Food residue			
Speech			
Abnormalities			
Voice			
Vocal quality			
Resonance			
Pitch			
Loudness			
Velocity			
CPFA[1]			
MPT[2] /a/ ; /i/ ; /u/			
MPT /s/ ; /z/			
S/Z ratio			

[1]CPFA: pneumo-phonic and articulatory coordination; [2]MPT: maximum phonation time

5) Otolaryngological evaluation: _____
_____

6) Orthodontic evaluation: _____
_____

7) Conclusion: _____
_____
_____