

# *Functional Alterations of the Stomatognathic System in Patients with Allergic Rhinitis*

*Catiane Maçaira de Lemos\**, *João Ferreira de Mello Júnior\*\**, *Olavo Mion\*\*\**.

\* Master Degree Student - Speech Doctor at the ENT Department of *HCFMUSP*.

\*\* Teacher at *HCFMUSP*. Assistant at ENT Department of *HCFMUSP*.

\*\*\* PhD by *HCFMUSP*. Assistant at the ENT Department of *HCFMUSP*.

Institution: *HCFMUSP - Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo*.  
Hospital of Medical School of University of São Paulo.  
São Paulo / SP – Brazil.

Study done at the ENT Department of *Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo* –

Address for correspondence: Fga. Catiane Maçaira de Lemos - Rua Padre Estevão Pernet, 783 – Tatuapé – São Paulo / SP – Brazil - Zip code: 03315-000 – Telephone: (+55 11) 2294 - 2725 - E-mail: [catianemacaira@terra.com.br](mailto:catianemacaira@terra.com.br)

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## SUMMARY

### **Introduction:**

The mouth breathing can cause structural and functional alterations on the stomatognathic system. The most frequent causes of oral respiration are nasal and/or pharyngeal obstructions. Amongst nasal obstructions, allergic rhinitis is a disease which has been spreading. Even though there is a direct relation between rhinitis and nasal obstruction and the latter with functional alterations of the stomatognathic system, few are the studies which observed such alterations in patients with rhinitis. Aim: the aim of this essay was to verify the alterations in breathing, chewing and swallowing present in patients with allergic rhinitis and relate it to the intensity of the symptoms of rhinitis.

### **Method:**

85 patients between the ages of 4 and 60 years old were evaluated. All of them underwent both otorhino-laryngological and phonaudiological evaluation. Data referring to the functions of respiration, chewing and swallowing were gathered, as well as data from the medical evaluation. The data were compared and analysed statistically.

### **Results:**

The adolescents displayed a higher frequency on oral respiration during both day and night. It was observed 20% of normal swallowing in children, 23,3% in adolescents, and 20% in adults. The chewing function was altered more frequently in the group of children. We observed significant relation between the degree of nasal obstruction and the intensity of alteration of the evaluated functions. Conclusion: the patient with allergic rhinitis displays functional alterations of the stomatognathic system.

### **Key words:**

rhinitis, stomatognathic system, mouth breathing, nasal obstruction, mastication, deglutition.

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## INTRODUCTION

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Respiratory function is the main subject of the phonoaudiology rehabilitation in the area of oral motricity (1-4).

Nose breathing is fundamental for proper development growth of the craniofacial complex, by providing good performance of the other stomatognathic functions (1,2,4,5,6).

The one who comes into an oral or oralnasal standard of breathing might develop dental or craniofacial changes, alterations on phonoarticulatory and oral activities, and body alteration in some of the cases (1,4-11).

Nasal and/or pharyngeal obstructions are the most frequent causes of oral breathing (1). Rhinitis diseases are the most frequent occurrence among nasal obstructions, some studies have even report their progressive spreading (12).

There are the allergic and non-allergic groups of rhinitis, and these two groups are divided into infective, non-allergic eosinophilic, idiopathic, irritative, hormonal ones, etc (12).

Allergic rhinitis is a nasal mucosa, with IgE in between, after being exposed to antigen substance. Its main characteristics are nasal obstruction (as usual the predominant symptom (13-17)), itching, sneezes and coryza.

According to the literature, there is a correlation between rhinitis and nasal obstruction (14,15,16,17,20) and the latter between morphofunctional alterations of the stomatognathic system (7,8,10,18,19), although few studies have reported such alterations on patients with rhinitis (21).

The target of this study was to verify alteration of respiratory, chewing and swallowing activities which are present in patients with allergic rhinitis from different ages and also to relate them with the intensity symptoms.

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## METHOD

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The current study was approved under protocol #355/06 by the Ethics Committee (CAPPesq) of the HCFMUSP.

This study was transversal-cut-based, in which 85 male and female patients aging from 4 and 60 year were

analyzed. Patients were diagnosed with allergic rhinitis and assisted at *Grupo de Alergia da Divisão de Clínica Otorrinolaringológica* of HCFMUSP (Allergy Department of the ENT clinic).

Patients who presented with neurological, neuromuscular, motor or skeletal alterations, or any other syndrome or disease did not take part in this study, unless patients with allergic rhinitis with nasal obstruction as associated symptom.

Patients were examined by an ENT doctor and data consisted of: age, gender and scores of signs and nasal symptoms (14,15) (Table 1).

Patients then were examined by a speech doctor who established data regarding oral breathing, chewing and swallowing activities and gathered information on patients' eating references.

Respiration was established by observing patient during phonoaudiological evaluation according to information provided by them or their companion.

Respiration was classified as:

- 0) Nasal (day and night).
- 1) Oronasal (day and night).
- 2) Oronasal (day) and oral (night).
- 3) Oral (day and night).

Chewing activity, which was evaluated through a biscuit mastication, was classified as:

- 0) Normal, when lips were closed in bilateral way
- 1) Open mouth.
- 2) Open mouth followed by food crushing with tongue.
- 3) No chewing.

Swallowing, which was evaluated through observation of a glass of water deglutition, was classified as:

- 0) Normal, when closed lips, tongue placed on the palate and no periorbicular muscle use.
- 1) Anterior projection of the tongue.
- 2) Anterior projection of the tongue followed by periorbicular muscle tension or.
- 3) Interposition.

As a complementation of the masticatory standard evaluation, alimentary consistence was determined through information provided by patients or their companion. Such information was classified as:

- 1) Preferably solid.
- 2) Preferably solid with inefficient food chewing (food pieces swallowing).
- 3) Preferably pasty.
- 4) Preferably pasty (presence of choking).

**Table 1. Signs and nasal symptoms scores.**

Symptoms	Signs
Sneezes /itching	Nasal concha Color
0- Absent	0- Pinkish
1- 1 to 4 a day / occasional itching	1- Redish / pale pink
2- 5 to 10 a day / sporadic itching for 30 minutes	2- Red / pale
3- 11 or more / affecting sleep and/or concentration	3- Anemic / blue
Coryza	Oedema of nasal concha
0- Absent	0- Absent
1- Cleaning 1 to 4 times a day	1- Hypertrophy of the inferior or middle concha with mild nasal obstruction
2- Cleaning 5 to 10 times a day	2- Congestion affecting breathing in one or both nasal concha
3- Constant Cleaning	3- Congestion preventing breathing in one or both nasal concha
Nasal obstruction	Secretion
0- Absent	0- Absent
1- Small and does not disturb	1- Humid mucosa appearance
2- Oral respiration during the day	2- Visible secretion in the nasal conchas or in the floor of nasal fossa
3- Does not nose breath / affecting sleep, smelling and voice	3- Profuse / draining
Retro-nasal Secretion	Posterior wall of the oropharynx
0- Absent	0- Normal
1- Secretion sensation in the throat	1- Discreetly red
2- Frequent cleaning of throat	2- Visible Red and lymphoid follicles
3- Cough and discomfort to speak	3- Visible Mucus

At last, patients were divided into three groups, according to age: G1: children from 4 to 11 years old; G2: adolescents from 12 to 18 years old; G3: adults from 19 to 60 years old.

Data regarding respiratory, chewing and swallowing activities were compared in the three age groups through the Probability Ratio Test in order to verify the difference of the variables of each activity among the groups.

The sign and symptoms figures were also compared in the three groups through Kruskal-Wallis test in order to observe significant statistical difference among these score averages.

Spearman's rho test was used to verify the correlation between symptoms intensity of allergic rhinitis and the degree of activity alterations.

## RESULTS

In the 85 evaluated patients, the average age was 7.6 years (+/- 2.3 years) in the children's group; 13.2 years (+/- 1.6 years) in the adolescents' group and 29.2 years (+/- 10.2 years) in the adults' group.

Gender distribution in the groups is displayed on Table 2.

Charts 1 and 2 display comparison of score average achieved during ENT evaluation, regarding signs and symptoms caused by allergic rhinitis (in the analyzed groups).

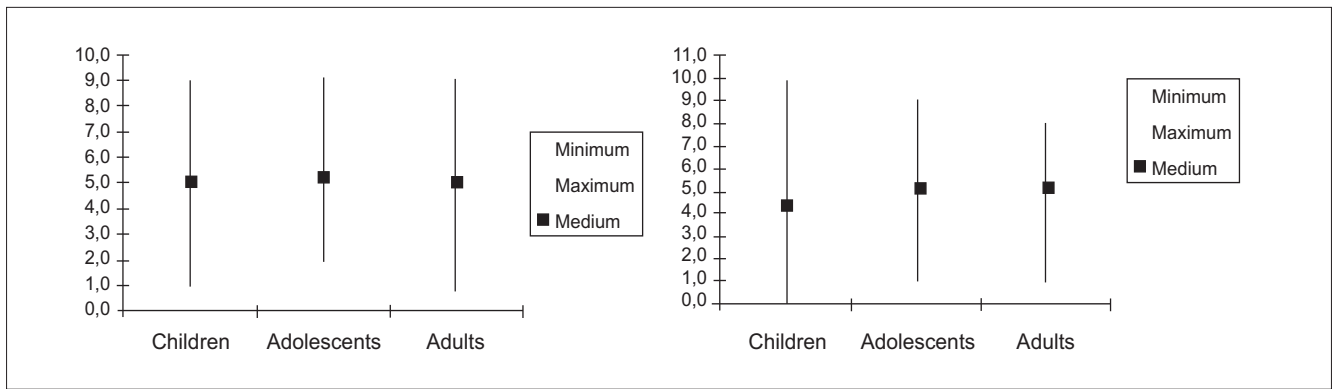
Table 3 displays a higher occurrence of nasal obstruction absence in the children's group and a higher occurrence of nasal obstruction (scoring 3) in the adolescents' group.

Regarding respiration, it was in accordance with nasal obstruction score in the three groups. It was noticed a high occurrence of nasal breathing during night and day

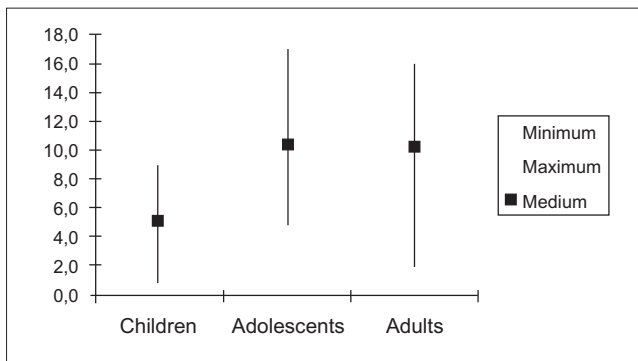
**Table 2. Gender distribution.**

	Children N (%)	Adolescents N (%)	Adults N (%)	Total N (%)
Female	11 36.7	13 43.3	21 84.0	49 57.6
Male	19 63.3	17 56.7	4 16.0	36 42.4
Total	30 100	30 100	25 100	85 100

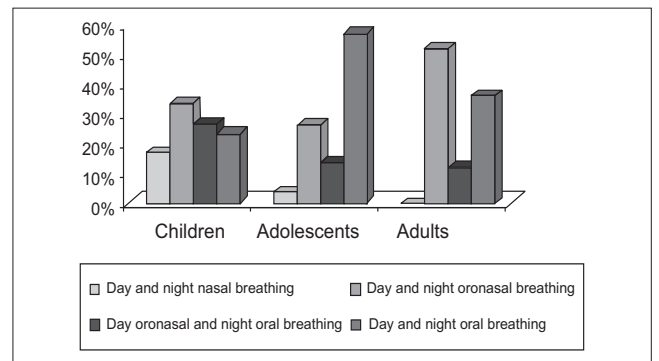
p = 0.002



Graphic 1. Distribution of sign and symptoms scores – Signs:  $p = 0.910$ ; Symptoms:  $p = 0.236$ .



Graphic 2. Distribution of total score -  $p = 0.399$ .



Graphic 3. Distribution of breathing manner -  $p = 0.014^*$ .

**Table 3. Distribution of nasal obstruction scores.**

Score	Children		Adolescents		Adults		Total	
	N	%	N	%	N	%	N	%
0	7	23.3	2	6.7	1	4	10	11.8
1	10	33.3	11	36.7	6	24.0	27	31.8
2	11	36.7	8	26.7	14	56.0	33	38.8
3	2	6.7	9	30.0	4	16.0	15	17.6
Total	30	100	30	100	25	100	85	100

$p = 0.032^*$

in the children’s group and a high occurrence of oral breathing during night and day in the adolescents’ one (Graphic 4).

Normal swallowing was reported in 20% of the children, in 23.3% of the adolescents and in 20% of the adults. Presence of anterior mild projection during swallowing was reported in 43.3% of the children, in 36.7% of the adolescents and in 52% of the adults. Anterior projection associated to excessive use of periorbicular muscles was reported in 23.3% of the children, in 30% of the adolescents and in 24% of the adults. Presence of anterior interposition was reported in

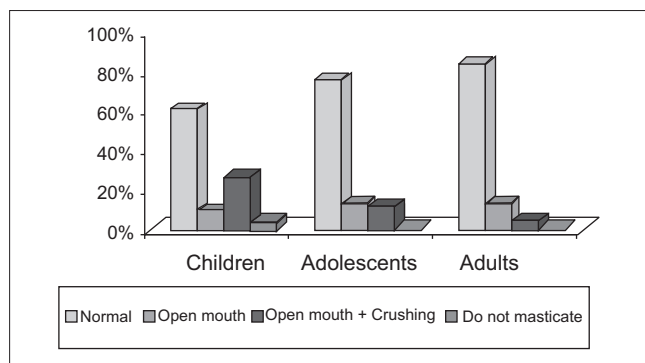
13.3% of the children, in 10% of the adolescents and in 4% of the adults. There was no significant statistical difference among the above data ( $p = 0.861$ ).

Charts 4 and 5 display chewing activity and food consistence preferences among the three groups. It was noticed a high occurrence of open mouth masticatory standard and food crushing in the children’s group and a significant statistical difference in children with pasty consistence food preference.

At last, it was observed the correlation between score increase of nasal obstruction and alteration intensity of breathing, chewing and swallowing activities. Significant correlation for breathing and chewing activities was ( $p < 0.001$ ).

## DISCUSSION

By studying distribution of gender (table 2), it was noticed a higher number of male in the children’s and adolescents’ groups. The same result was found by Di FRANCESCO and col. (22) when studying 142 patients aging from 2 and 16 years. Yet, in the adults’ group the lower of male could be explained due to fewer occurrences of



**Graphic 4.** Distribution of chewing manner -  $p = 0.173$ .

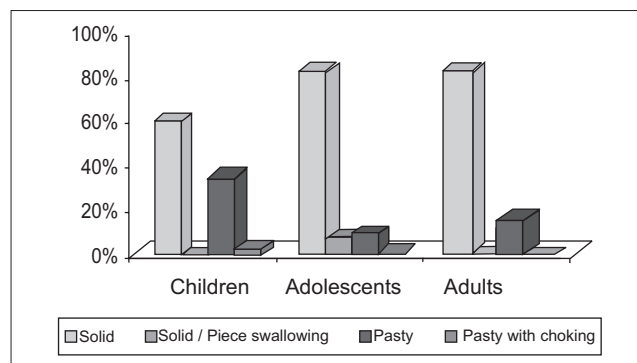
allergic rhinitis symptoms for men and due to less time availability for searching assistance.

To observe and measure signs and symptoms of allergic rhinitis is important due to the fact that such disease is clinically classified as a sum of several of those signs and symptoms (12,16). In the current study, the frequency and intensity of such signs and symptoms did not present with significant statistical difference when compared to the score averages among the evaluated groups (Graphic 1 and 2), by showing that regardless age, patient can present signs and symptoms of same intensity as the ones from allergic rhinitis.

By analyzing distribution of nasal obstruction score (Table 3), the adolescents' group presented percentage rate higher than 3 for such symptom. The same result was reported in the breathing manner study (Graphic 3), when patients of the same age presented percentage rate higher than the exclusive oral breathing manner. It is believed that such results might show the low attendance of patients for therapy suggested by doctors, which does not provide improvement of nasal ventilation and a predominance of oral breathing standard. Though, it was not found studies reporting the same results in the literature.

Several studies have already reported clinical implications and orofacial alteration on patients with oral respiration (8,16,23,24,25), thus, the high occurrence of patients with oronasal and oral breathing, in the current study, prearrange them to functional alterations.

JUNQUEIRA and col (2002) studying patients aging from 2 to 13 years who suffered from adenotonsillar hypertrophy, reported 85.5% of alteration on masticatory activity and 78.1% on swallowing standard. The current study reported 40% of alteration on chewing activity in the children's group (Graphic 4) and 80% of alteration on



**Graphic 5.** Distribution of food consistence preference -  $p = 0.042^*$ .

swallowing standard despite the difference regarding obstruction condition of patients from the above mentioned study.

Food consistence preference analysis is extremely important for oral breathing patients (4-6, 26), as they present with difficulty in chewing solid food due to alteration on masticatory standard. The current study data agree on these findings, mainly for the children's group, in which there is a higher rate of pasty food preference (Graphic 5).

By comparing data of chewing and swallowing alteration in the three groups (Charts 3 and 4), significant statistical difference was not reported, which confirmed the similarity found between the sign and symptom scores and showed that functional alterations are present on patients with allergic rhinitis, regardless age. Such data were confirmed by the correlation found on the scores between nasal obstruction and degree of alterations on breathing manner and chewing standard for all groups.

## CONCLUSION

Based on the result analysis, it is concluded:

- Patients with allergic rhinitis present with alterations of breathing, chewing and swallowing activities.
- The increase on nasal obstruction symptoms is related to the presence of functional alterations.

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