

DELETERIOUS ORAL HABITS IN CHILDREN WITH HEARING IMPAIRMENT

RALUCA DIANA SUHANI¹, MIHAI FLAVIU SUHANI²,
ALEXANDRINA MUNTEAN¹, MICHAELA MESAROS¹,
MINDRA EUGENIA BADEA³

¹Department of Pediatric Dentistry, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania

²Dental practice Ortoelitte, Romania

³Department of Preventive Dentistry, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania

Abstract

Background and aims. Deleterious oral habits represent a serious public health issue. The information available about this problem in children with hearing impairment is insufficient. The purpose of this study was to investigate the prevalence of deleterious oral habits among children with hearing impairment and comparing results against children without hearing impairment.

Method. This epidemiological study was carried out in a sample size of 315 children. We used a random sampling technique that included 150 children with hearing impairment and 165 without hearing impairment. All subjects were submitted to a clinical examination. The parents/legal guardians were asked to complete a questionnaire regarding the deleterious habits of their children.

Results. The data collected indicated a higher prevalence of deleterious oral habits among children with hearing impairment: 53.3% as opposed to 40.6% among children without hearing impairment. There was a higher incidence of malocclusion in children with hearing impairment (79.3%) compared to children without hearing impairment (57%).

Conclusions. This study highlighted the need to establish protocols for preventive orthodontic treatment at an early age, in order to reduce the deleterious oral habits and prevent malocclusion. Dental institutions/clinicians need to implement oral care programs including proper oral education aiming to promote oral health.

Keywords: oral habits, children, hearing impairment

Background and aims

Deleterious oral habits (DOH) are one of the most frequent factors identified by orthodontists that affect the normal growth and development of muscles and jaw bones during childhood and adolescence [1].

The DOH is a practice acquired by frequent repetition

acts. They are conscious at the beginning and become unconscious at some point in the child's development.

DOH include non-nutritive thumb sucking, mouth breathing, tongue thrust swallowing, lower lip aspiration, nail biting and mandible propulsion habit [2].

These harmful oral habits represent the primary cause for malocclusion. They produce an imbalance between the intra and extra oral musculature. The repercussions depend on the age of the subject and also the frequency and

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Address for correspondence: raluca.suhani@gmail.com

intensity with which they occur.

Digit sucking is common in children and is considered normal until the age of three, without having repercussions on the development of the dento-maxillary system. Its persistence will favor the appearance of orthodontic anomalies. Sucking habits inhibit growth of the mandible, produce not only upper protrusion and spacing but also lingualization of the lower teeth. It also increases the risk for gastrointestinal disease [3].

Tongue thrust swallowing is abnormal after the age of five, causing open bite, spacing and protrusion, labial incompetence and phonetic disorders [3]. Tongue thrust swallowing causes labial incompetence, thus conducting mouth breathing. It induces open bite and protrusion of the upper incisors [4]. Effects on the lower incisors are reduced [5]. It may be associated with narrow maxilla, deep palate and II / 1 Angle class disorder [2]. According to existing studies, the prevalence of swallowing with tongue interposition decreases with age [6].

Habitual mouth breathing occurs as a consequence of childhood practices such as tongue thrust swallowing, aspiration of the lower lip, or digit sucking [3].

Oral breathing may be a consequence of nasal obstruction by hypertrophied tonsils, asthma, polyps or tumors which force substitution of the nasal passage with the oral way [3].

There is a close association between mouth breathing and the presence of oral halitosis [7].

Lower lip aspiration determines an increase of the over jet, hyper tonicity of the lower lip and inhibits normal growth of the mandible [3].

The main objective of this study was to determine the prevalence of DOH in children with hearing impairment (HI) and compare results against children without ASI.

Material and methods

Subjects

The study is longitudinal and retrospective. The initial sample consisted of 360 participants selected from the database of the Pediatric Dentistry Department of the Iuliu Hatieganu University of Medicine and Pharmacy through random sampling.

The subjects included in the study were between 4 and 18 years old and had no history of orthodontic treatment. They were included in the study only after their parents/legal guardians signed informed consents.

Forty-five children were excluded from the study. Some of them had undergone orthodontic treatment at the time of examination, others did not present a signed copy of the consent or refused to be evaluated.

Therefore, the study was performed with 315 children, of which 150 with HI and 165 without HI.

Evaluation of the sample

Questionnaire

Data was collected using a closed-ended

questionnaire in order to gather socio-demographic information such as name, age, gender, origin and presence of deleterious oral habits (finger sucking, bottle-feeding, nail biting, object biting, mouth breathing, lip biting, tongue thrust swallowing). Duration and frequency of the habit was also mentioned in the form. The questionnaire was completed by the child's parent/legal guardian.

Clinical evaluation

Participants were clinically examined, about 15 minutes/subject, according to WHO recommendations. Clinical evaluations were performed by an orthodontist and a dentoalveolar surgery intern, under hygienic conditions (medical scrub suits, caps, latex gloves and masks), in the presence of ambient light, using a dental mouth mirror which had been previously sterilized in autoclave conditions at 135 degrees Celsius.

DOH were diagnosed using different methods validated by other studies assessing data from questionnaires [8] and from the clinical evaluation.

Infantile type of swallowing was detected at the time of clinical examination. It is defined as placement of the tongue between the upper and lower incisors or cuspids with no molar contact during swallowing. In order to examine the presence of tongue thrust swallowing, the patients were asked to swallow saliva three times during the same visit. When in doubt, another swallow was requested until the investigator was satisfied with his/her judgment [9].

Mouth breathing was detected using the mirror test. A two-sided mirror is placed below the patient's nostrils and formation of vapors is observed. If it occurs on the lower part of the mirror it indicates mouth breathing whereas on the upper part it indicates nasal breathing [2]. Lip incompetence at rest was observed when the children were watching a cartoon movie while tension of the oral musculature was observed during lip closing at mouth breathers [8].

Digit sucking was diagnosed after finger inspection. We were looking for signs indicating persistent sucking over a longer period of time.

Children who required orthodontic treatment were referred to the Department of Orthodontics of the Iuliu Hatieganu University of Medicine and Pharmacy of Cluj Napoca.

Statistical data analysis

The collected data was electronically introduced in a Microsoft Excel 2012 spreadsheet and then transferred to a Statistical Package for Social Sciences (SPSS) program, version 20.0 (SPSS Inc., Chicago, Illinois, USA) .

The prevalence of DOH and the differences found between children with and without HI was compared using the Fisher test. The presence of DOH was assessed using the same Fisher test followed by the Chi-square test.

Chi-square test was used to compare the prevalence of deleterious habits by age, sex, area of origin and the

presence of HI.

The association between DOH and malocclusion was established using the Spearman correlation indices.

Statistical tests were applied at a significance level of $P < 0.05$.

Results

Mean age of the population was 10.47 years.

Most of them were girls (60%). Depending on the environment of origin, 39.04 % were from a rural background and 47.62% of the study group were children with HI.

The prevalence of DOH was slightly higher in females (47.6%) than males (46%). There were no significant differences between the practice of deleterious habits in relation to gender ($P = 0.215$).

No significant association was observed in the occurrence of DOH correlated with the environment of origin, urban (47.4%) respectively rural (45.5%) ($P = 0.984$).

There was an important difference between the prevalence of deleterious habits in children with HI (53.3%) and those without (40.6%, $P = 0.005$) as seen in Figure 1.

Most commonly reported DOH among children with HI was tongue thrust swallowing (20%), while in children without HI the incidence was only 7.27%, as shown in Table I.

Mouth breathing had the highest prevalence rate (11.5%) among children without HI while in children with

DOH in children with and without sensory impairments (%)

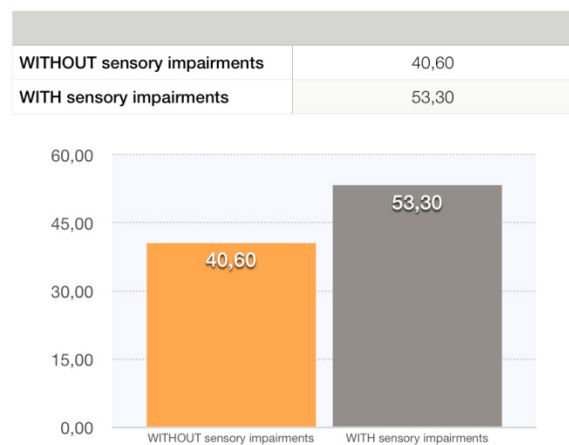


Figure 1. Prevalence of DOH in children with and without HI.

habits rarely identified in subjects older than 12 are digit sucking, lower lip sucking and propulsion of the mandible.

Tongue thrust swallowing had the highest proportion in the mixed dentition period, ranging from 6-12 years old (19.6%).

Thumb sucking had a somewhat high prevalence (12%) among children 4-6 years of age. The propulsion of the mandible was most commonly seen in children with primary dentition.

According to Spearman's ratio there was a reverse correlation ($R = -11.6%$) between the type of DOH and

Table I. Frequency (no,%) of different DOH according to the presence of HI.

DOH		Mouth breathing		Tongue Thrust		Lip Biting		Thumb sucking		Mandible propulsion		Other DOH		More DOH	
	HI	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Without	HI	No		No		No		No		No		No		No	
No=165		19	11.5	12	7.27	7	4.24	7	4.24	6	3.63	1	0	7	4.24
												6.06			
With	HI	No		No		No		No		No		No		No	
No=150		13	8.66	30	20	13	8.66	5	3.33	3	2	3	2	13	8.66

HI the prevalence was less (8.66%).

Similar values were obtained when comparing normal with HI children for the following parameters: thumb sucking 3.33% versus 4.24%, propulsion of the mandible 2% versus 3.63%.

The association of several oral habits is more common in children with HI (8.66%) than of those without HI (4.24%).

No significant association was observed between the type of oral habit practiced in children with HI compared to children without HI ($P = 0.049$).

The correlation value between DOH and the presence of HI was 15.6% at the statistical significance $P = 0.005$, as demonstrated in Table II.

We found a significant correlation ($P = 0.014$) between the type of oral habit and the age when it is practiced.

Mouth breathing was the most frequent oral habit found in participants older than 12 years. On the other hand,

age ($P = 0.04$). The incidence of DOH decreased with age, children aged 4-6 (47%), while in children aged 12 and more it was 34%.

There was a strong association between DOH and malocclusion ($R = 11.8$), and the result is statistically significant ($P = 0.037$).

Two hundred and thirteen children examined were identified with malocclusions (67.7%). We observed a

Table II. Correlation (%) between DOH according to the presence of HI.

		HI	DOH
Spearman's rho	Correlation Coefficient	1.000	.156**
	HI Sig. (2-tailed)	.	.005
	N	315	315
	Correlation Coefficient	.156**	1.000
	DOH Sig. (2-tailed)	.005	.
	N	315	315

** Correlation is significant at the 0.01 level (2-tailed).

higher incidence of dento-maxillary anomalies in children with HI (79.3%) compared to those without HI (57%) as illustrated in Table III.

The highest incidence of dento-maxillary anomalies was observed in children older than 12, 74.5% of them

Kasparaviciene at al. (10.1%) [11,8].

Mouth breathing is one of the main etiological factors responsible for facial growth alterations [17]. Therefore it is extremely important that this parafunction be diagnosed early and proper interventions be made to

Table III. Prevalence of malocclusion in children with and without HI.

		Hearing impairments		Total
		without	with	
no malocclusion	No	71	31	102
	%	43.0%	20.7%	32.4%
Malocclusion	No	94	119	213
	%	57.0%	79.3%	67.6%
Total	No	165	150	315
	%	100.0%	100.0%	100.0%

*Chi-square test

presenting different types of malocclusion. We found a significant correlation between the presence of malocclusion and age ($R=11.4\%, P=0.043$).

Discussion

This study analyzed the prevalence of DOH in children with HI compared to children without HI. Few studies looked into the occurrence of DOH among children [10].

Most important is that our findings revealed a higher prevalence of DOH and malocclusion in children with HI compared to children without HI.

Our findings showed that 55.1% of children aged 6-12 were involved in one or more harmful oral habits. This finding is in agreement with results from Garde et al (51%) in their study made in India [2]. Lower prevalence rates (38.7%) have been reported by Stefanescu et al. [11].

The prevalence of DOH was slightly higher among females living in urban areas. Similar results were observed in studies published by Stefanescu et al [11]. Also, a higher female prevalence percentage was observed by Reyes [12].

Tongue thrust swallowing was found to be the most common habit in children with HI (20%), followed by mouth breathing (8.66%), while in children without HI the prevalence of tongue thrust swallowing was 7.27%. Our results are in accordance with Bhayya DP, who reports that the most common deleterious habits are mouth breathing and tongue thrust swallowing [13], as were in the study performed by Stefanescu et al. [14]. A lower prevalence value of 3.02% for tongue thrust swallowing was found among a children population in Mangalore by Shetty [15].

Hearing impaired children learn speech without audition and may develop a different articulatory coordination [16], which could lead to tongue thrust swallowing.

Oral breathing proved to be the most common deleterious habit (11.5%) in children without HI. Similar results were obtained when we evaluated children with HI (8.66%), as were in the study performed by Stefanescu and

prevent future abnormalities. There are several studies that have associated mouth breathing with malocclusion [18,19].

There were no significant differences in the prevalence values of thumb sucking and mandible propulsion between patients with HI (3.33%, 2%) and those without (4.24%, 3.63%).

A higher incidence rate of thumb sucking was observed by Garde [2] in a study made on children between the ages of 6 to 12. The differences exist because our study assessed the prevalence of thumb sucking in children until the age of 18, knowing that prevalence decreases with age.

Particular situations like fear, hunger, physical and emotional stress may stimulate sucking habits [20].

A harmful oral habit may change over time from finger sucking to nail biting or vice-versa. In conclusion, children who practiced finger sucking in childhood, require attention to prevent subsequent occurrence of any other deleterious habit [10].

Scientific evidence in the field indicates that DOHs are associated with a complex mechanism of compensation and refuge from reality, to such an extent that a child with emotional or psychological issues is seeking to “escape” from personal frustrations, anxiety, insecurity, inner tensions by practicing these habits.

DOH in general and sucking habits in particular have been reported as one of the factors for the onset of malocclusion [21].

Seventy nine percent (79.3%) of subjects with HI had been found as suffering from with a type of malocclusion. This rate surpasses the 60% value described by Tomita et al. [22].

DOH are not the sole factors involved in the etiology of orthodontic problems in children with HI; maternal infections like the Rubella virus can cause deafness and dentofacial deformity.

The high number of children with DOH is proving to be a problem that needs further discussion.

We observed differences in evaluating malocclusion

and DOH between children with HI and those without.

Therefore, investigation of DOH prevalence and its association with malocclusion in HI children is imperative to allow better knowledge from professionals treating these cases, who may then offer counseling to the children's parents.

Conclusions

The results concluded that DOH prevalence and malocclusion in HI children was higher compared to children without HI. Tongue thrust swallowing has a significantly increased value among children with HI.

The high rates of DOH and malocclusion found in our study are partly due to poor oral health promotion. This highlighted the need to implement programs of oral care and health education for preventive orthodontic treatment at an early age. Our aim is to reduce the possible negative consequences, especially preventing the onset of malocclusion.

Data provided baseline information for planning preventive strategies in order to reduce the deleterious oral habits among children with hearing impairments.

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