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Prevalence of mouth breathing among children

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Abstract

Objective: To determine the prevalence of mouth breathing among children aged 3 to 9 years living in the urban districts of the town of Abaeté, MG, Brazil.

Methods: This study assesses a representative, randomized sample of the town's population (23,596 inhabitants). Children were selected by lots according to a random number table until 370 had been enrolled; this number had been determined by statistical calculation. A protocol for anamnesis and clinical assessment of the patients was specially developed for this project, since no preexisting instruments could be found in the literature that had been validated and were appropriate for the purpose. Data were analyzed using SPSS version 10.5.

Results: The prevalence of mouth breathing was found to be 55%, or 204 children.

Conclusion: Further studies are needed to validate a questionnaire for the clinical diagnosis of mouth breathers at the primary care level.

J Pediatr (Rio J). 2008;84(5):467-470: Prevalence, mouth breathing, child.

Introduction

Respiration is one of the body's vital functions and under physiological conditions, breathing takes place through the nose. The mouth breathing syndrome (MBS) is when a child stops breathing exclusively through the nose and begins mixed breathing i.e. the nose is supplemented by the mouth. According to the literature, exclusively oral breathing patterns are rare or non-existent.[1] mouth breathing syndrome is characterized by disorders of speech organs and joints due to the predominately oral breathing pattern, generally combined with facial deformities, abnormal positioning of teeth and body posture, and with the potential to progress to cardiorespiratory and endocrine disease, sleep and mood disorders and poor performance at school. Furthermore, MBS is related to genetic factors, unhealthy oral habits and nasal obstructions of varying severity and duration.[2]

Mouth breathers can be classified as one of three types: *organic* mouth breathers have some type of mechanical obstruction making nose breathing more difficult; *purely functional* mouth breathers continue breathing through the mouth even after all mechanical, pathological or functional obstacles have been removed; and *special needs* mouth breeders have some type of neurological dysfunction that is responsible for their mouth breathing (MB).[3]

Mouth Breathing can cause abnormal posture and can affect stomatognathic system structures which can result in abnormal growth involving, teeth, face, respiration, suction, mastication, deglutition and speech. The main orofacial effects are: forward displacement of the head, a long and narrow face, open, or pursed, and dry lips, short upper lip with reduced function, voluminous and everted lower lip and a hypotonic tongue in a lower position than normal. There is maxillary atresia with a high arched palate, open bite and crossbite, orofacial musculature is hypotonic, the nose is flattened and the nostrils are small, the upper teeth protrude and

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the angle of the mandible undergoes rotational displacement in the clockwise direction.[4-6]

Breastfeeding plays an important protective role, since it promotes correct development of the facial musculature and other stomatognathic system structures. Non-nutritional sucking, such as prolonged thumb-sucking, has been linked to dental malocclusion problems.[7] Pacifiers and artificial nipples, which are often used to quiet babies, can interfere with breastfeeding and negatively affect oral motor function, and as such play a significant role in MBS.[8]

Mouth breathing can be related to a variety of causes, including enlarged adenoids, tonsils and nasal concha, obstructive nasal septum displacement, allergic rhinitis, nasal or facial deformities and, more rarely, by foreign bodies.[9]

The objective of this study was to determine the prevalence of mouth breathing among children aged from 3 to 9 years and resident in the urban districts of the town of Abaeté, MG, Brazil.

Methods

This was a population-based study approved by the Pediatrics Department and the Research Ethics Committee at the Medical Faculty of the Universidade Federal de Minas Gerais. The town of Abaeté had a population of 23,596 inhabitants, with 20,073 (85.1%) of these living in the its urban neighborhoods. There were 2,927 children in the age range from 3 to 9 years of age, with 2,490 of these living in the urban areas, accounting for 10.6% of the entire population.[10]

The sample comprised 370 children selected at random from households in the town's urban areas. The calculation was based on the following parameters: a population of 2,490 children, an expected prevalence of 30.0%, a design effect of 1, a 95% confidence level and a 10% larger sample than calculated in order to compensate for possible losses.

The urban area consists of 487 blocks in 10 neighborhoods. Seventy-one of these blocks were uninhabited or fall into "special categories," such as schools, hospitals, military bases and others. The remaining 416 blocks contained 7,461 households, with an average of 18 residences per block. The mean number of inhabitants per block was 48, and the mean number of inhabitants per household was 2.7.[11] With the objective of increasing the representativeness of the sample, only one child was enrolled from each residence.

The interviewers visited 1,538 households clustered in 106 blocks. Inhabited blocks were assigned numbers from 1 to 416 and a random number table was used to choose the first 90 blocks. Extra blocks were then chosen by lots using the same system until enough had been chosen to ensure the sample of 370 children would be achieved. These blocks were then regrouped into their 10 neighborhoods, which were numbered from 1 to 10 and the sequence of fieldwork visits was determined by lots.[12]

Children were excluded from the study if they had heart disease, pneumonia or other severe comorbidities that could affect the results of the study. Children were not included if their parents did not sign a free and informed consent form or if they were younger than 3 or older than 9.

Two nursing students from the Universidade Presidente Antônio Carlos (UNIPAC), in Bom Despacho, MG, were trained by the researcher to carry out the interviews and apply the socioeconomic questionnaire. The interviewers visited a previously defined number of homes on each weekday. At each household the parents or guardians were invited to take part and, if they agreed, they signed a free and informed consent form. In 16 cases permission was not granted. The questionnaire was developed by the authors to obtain socioeconomic, demographic and environmental data on the study population.

Children were referred for clinical assessment by the researcher, carried out at the Casa da Criança e da Gestante e Centro de Apoio à Mulher, which is a specialist center for women's and children's health run by the Municipal Health Department (Secretaria Municipal de Saúde) of Abaeté. This pediatric clinic is part of the Brazilian National Health Service (Sistema Único de Saúde – SUS), which means that everybody, irrespective of social class, had the same chance of taking part in the study, as long as parental authorization was granted.

The patients and/or their guardians were given the right to take part or not as they wished with no type of penalty or restriction whatsoever resulting from a decision to drop out.

The clinical examination was carried out by the researcher, who is a pediatric physician. Clinical diagnosis of MB was made according to a patient history and clinical examination protocol specially designed for this research and making it possible to reproduce this study.

During anamnesis, the child's parent was asked about the following clinical manifestations; the child snores, sleeps with the mouth open, drools on the pillow, has a blocked nose every day (major signs); has an itching nose, an intermittently blocked nose, difficulty breathing at night or agitated sleep, somnolence or irritability during the day, difficulty swallowing or is slow to swallow food, more than three episodes of throat or ear infection or sinusitis (confirmed by a doctor) during the previous 12 months, difficulty learning at school or repeated years (minor signs). The patient history was considered compatible with MB if two major signs were present or if one major sign was combined with two or more minor signs.

During the clinical assessment, the presence of the following features were noted: craniofacial abnormalities (adenoid facies), high arched palate, open bite (without thumb and/or pacifier sucking), hypertrophy of nasal concha, obstructive displacement of the nasal septum, enlarged tonsils and labial cleft (major signs); thoracic abnormalities, postural abnormalities, disorders of the tympanic membranes, speech disorders, nasal voice (minor signs). The clinical examination

Table 1 - Environmental and socioeconomic factors

Variable	p*
Frequency with which house is cleaned	0.041
Sex	0.168
Was breastfed	0.677
Attended daycare	0.175
Attended school	0.060
Number of children in same house	0.065
Educational level of parent or guardian	0.474
Age of residence (time since built)	0.173
Type of floor in residence	0.319
Smokers in residence	0.838
Domestic animals	0.749
Cuddly toys or books in bedroom	0.824
Color	0.703

* Significant at $p < 0.05$.

findings were considered compatible with MB if two major signs were present or if one major sign was combined with two or more minor signs.

Statistical analysis was performed using SPSS version 10.5 to apply Pearson's chi-square test, with results considered significant at $p < 0.05$.

Results

The 370 children in the sample included 193 boys and 177 girls, with a mean age of 5.9 years (±1.9). Of these, 204 were diagnosed as mouth breathers, which was 55% of the whole sample. The evaluation resulted in 189 children with both history and clinical examination compatible with MB, while nine had clinical assessment compatible with MB alone and six had history suggestive of MB, but normal clinical examination.

Table 1 lists the results of analysis of the socioeconomic and environmental data.

Discussion

Few articles were found on the prevalence of MB in a review of the literature indexed in MEDLINE, LILACS, JPED and Google Scholar and published from the year 2000 onwards. The studies that do exist were carried out with small samples of convenience, at specialist clinics or departments. This study carried out in Abaeté therefore provides new information and data from a study of a representative sample of the population.[13]

One possible limitation of this study is the lack of a validated instrument in the specialist literature for the clinical diagnosis of MB.

In Venezuela a prevalence of 63% was observed in a sample of 389 children aged between 5 and 14 and enrolled at a single school.[14] In Delhi, in India, a study assessing oral habits among 5,554 children aged 5 to 13 years and attending school found a 6.60% prevalence of MB.[15] In Brazil, a study carried out in Pernambuco[1] with children aged 8 to 10 years enrolled on the Santo Amaro Project, observed an MB prevalence of 53.3%. The prevalence of MB described in the literature covers such a wide range that comparisons are problematic.

When diagnosing MB, both anamnesis and clinical examination must be focused on the principal clinical manifestations, since parents tend to believe that their children's mouth breathing is normal or unimportant.

It can be concluded that the prevalence of MB was elevated in this study, but there was no statistical association with sex, socioeconomic condition or age group. Further studies are needed to validate a questionnaire for clinical diagnosis of MB at the primary care level.

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