



## The Approach to the Children with Mouth Breathing and Chronic Dyspnea in Times of the COVID-19 Pandemic

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The aim of this manuscript was to discuss the best way to management dyspnea in children with chronic oral breathing, in times of COVID-19 pandemic.

Descriptors: Oral Health; Mouth Breathing, Dyspnea, Coronavirus.

In mid-December 2019, a disease caused by infection with severe acute respiratory syndrome coronavirus-2, which began in Wuhan, China, has spread throughout the country and many countries around the world [1].

It was more prevalent among adults more than or equal to 15 years of age in the early stages of the outbreak, and the proportion of confirmed cases among children was relatively small. But the number of child infection cases has increased significantly, especially in younger age groups and, therefore, should be given high attention [2].

Although information regarding the epidemiology of COVID-19 in children has accumulated, relevant comprehensive reports are lacking. Children are a very special group, largely due to close family contacts, and may be susceptible to cross-infection [2,3].

The new Coronavirus identified in Whuan at the end of 2019 (SARS-CoV-2) belongs to the Beta Coronavirus genus and is responsible for the new Coronavirus 2019 pandemic (COVID-19). Infected children may be asymptomatic or present fever, dry cough, fatigue, gastrointestinal symptoms, na high C-reactive protein value and abnormalities of chest X-ray (bronchial wall thickening). Almost half of these patients required hospitalizations in Pediatric Units and a minor patient's in Intensive Care Unit [3].

The average incubation period for COVID-19 in children is approximately 6.5 days, which is longer than the 5.4 days reported in adults. The average number of secondary infections transmitted within the family was 2.43. The duration of nasal and pharyngeal detoxification in children is 6 to 21 days (average 12 days) [3,4].

For cases with severe pneumonia caused by COVID-19, the most common symptoms were dyspnea (87.5%), fever (62.5%) and cough (62.5%). In laboratory, white blood cells count was significantly higher in severe children than non-severe children. Levels of inflammation bio-makers such as hsCRP, IL-6, IL-10 and D-dimer elevated in severe children compared with non-severe children on admission. The level of total bilirubin and uric acid clearly elevated in severe children compared with non-severe children on admission. All of severe children displayed the lesions on chest CT (Computer Tomo, more lung segments were involved in severe children than in non-severe children, which was only risk factor associated with severe COVID-19 pneumonia in multivariable analysis [4,5].

Lower respiratory tract infection was less prominent in children as evidenced by the relatively low prevalence in chest pain/discomfort and dyspnea. Similar to SARS, younger children had a less aggressive clinical course, compared with adolescents [5]. Although dyspnea is not widely documented in children in COVID-19, the condition of respiratory distress is one of the most serious problems faced by affected individuals. And in this context, there is a special group of children: the chronic mouth or oral breathes.

Oral breathing (OB) arises by replacing NB (Nasal Breathing) due to genetic factors, inadequate oral habits or nasal obstruction of variable severity and duration. There are several causes of OB (oral breathing), however, they can be grouped into two classes: mechanical obstructive and the non-obstructive. Among the obstructive mechanics, the hypertrophy of the palatine and pharyngeal tonsils and deviations or deformities of the nasal septum are defined.<sup>6</sup> Mechanical obstructions, such as pharyngeal tonsil hypertrophy and palatine tonsils were related to the decrease in maximum tongue pressure in oral breathing children [7].

Other conditions such as presence of foreign body, tumors, traumas, polyps, atresia, hypertrophic nasal conchae and chronic rhinitis may cause oral breathing [8]. The child who chronically breathes through the mouth might also have difficulties with func-

tional capacity, compromised respiratory system, damaging lung ventilation with lower thoracic expansibility and, consequently, may develop a weakness of the respiratory muscles [9].

Oral Breathing (OB) may also inhibit nasal afferent nerves (trigeminal autonomic and sympathetic nerve), which regulate depth of breathing and airway caliber. Nasal block increases resistance and decreases lung compliance, thereby restraining thoracic expansion and alveolar ventilation [9].

Chronic and persistent mouth or OB has been associated with postural changes. Despite the fact that posture changes in OB causes decreased respiratory muscle strength, reduced chest expansion and impaired pulmonary ventilation with consequences in the exercise capacity, few studies have verified all these assumptions [9]. **In addition it was suggested than** children with Obstructive Sleep Apnea/Hypopnea Syndrome (OSAHS) who have the symptoms of “snoring, mouth breathing and suffocating during sleep”, had poor had poor immune function, with occurrence of oxidative stress and systemic inflammatory status [10].

According to what has been previously reported, it is suggested a greater monitoring of chronic mouth breathing children, particularly at this time of the COVID-19 pandemic and more specific studies on the topic.

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