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Assessment of Breathing Pattern among Mouth Breather Child: An Institutional Based Study.

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ABSTRACT

Background: Chronic mouth breathing in children leads to pathological adaptations in the postural and morphological characteristics of the stomato-gnathic system. Such unfavourable developmental changes predispose the child to many problems, including obstructive sleep apnea, which is now a growing public concern. Hence; we planned the present study to assess breathing pattern among mouth breather child. **Methods:** 30 children were selcted, 15 of which were mouth breathers (MB) and 15 of which were nose breathers (NB). The age of the patients ranged from 8-10 years. In this study, the following variables of the respiratory cycle were analyzed by the plethysmography: tidal volume (Vt), respiratory frequency (f), minute ventilation (VE), ratio of time to peak inspiratory flow to inspiratory time (PifT/Ti), mean inspiratory flow (Vt/Ti), rib cage contribution towards Vt(%RC/Vt), and phase angle (PhAng). **Results:** A total of 10 subjects were present in both the groups each. The mean age of subjects on group MB was 8.89 years and in group NB was 9.11 years. Number of male patients in group MB was 6 and in group NB was 5. The variables in MB and NB groups were comparable and statistically non-significant. **Conclusion:** From the results of the present study, this can be concluded that there was no significant difference in the breathing pattern between nose breathers and mouth breather children.

Keywords: Mouth breathing, Nose breathing, pulmonary.

INTRODUCTION

Nasal breathing is the primary mode of air intake for humans, and it is essential for a supply of properly cleansed, moistened and warmed air for the lungs. If the primary airway is blocked, mouth breathing becomes obligatory to get air into the lungs.[1,2] Chronic mouth breathing in children leads to pathological adaptations in the postural and morphological characteristics of the stomato-gnathic system. Such unfavourable developmental changes predispose the child to many problems, including obstructive sleep apnea, which is now a growing public concern.[3,4] During mouth breathing (MB), accessory muscle overuse leads to a predominance of chest wall motion during inspiration, and forward head posture (FHP) is the most commonly adopted postural compensation among MB individuals. Depending on its duration, MB can cause functional, structural, pathological, postural, occlusive and behavioral changes. As to behavioral alterations, we stress: restless sleep, irritability, difficulty concentration followed by a reduction in school performance and impaired sports skills, amongst others.[5,6] Hence, the present study was conducted to assess breathing pattern among mouth breather child.

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MATERIALS AND METHODS

The present study was conducted in the Department of Physiology, Dr. S.N. Medical College, Jodhpur, Rajasthan, India. For the study, we selected 30 children, 15 of which were mouth breathers (MB) and 15 of which were nose breathers (NB). The age of the patients ranged from 8-10 years. In this study, the following variables of the respiratory cycle were analyzed by the plethysmography: tidal volume (Vt), respiratory frequency (f), minute ventilation (VE), ratio of time to peak inspiratory flow to inspiratory time (PifT/Ti), mean inspiratory flow (Vt/Ti), rib cage contribution towards Vt(%RC/Vt), and phase angle (PhAng). The data was compiled and subjected to statistical analysis.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the

significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

[Table 1] shows the demographic variables of the group MB and NB. A total of 10 subjects were present in both the groups each. The mean age of subjects on group MB was 8.89 years and in group NB was 9.11 years. Number of male patients in group MB was 6 and in group NB was 5. [Tables 2] shows breathing pattern (time variables) and thoracoabdominal motion data in MB and NB groups. The variables in MB and NB groups were comparable and statistically non-significant. [p>0.05, [Figure 1]

Table 1: Demographic variables

Variables	Mouth Breather	Non Breather
Number of subjects	10	10
Mean age (years)	8.89	9.11
Number of male subjects	6	5

Tables 2: Breathing pattern (time variables) and thoracoabdominal motion data in MB and NB groups

Variables	MB	NB	p-value
Respiratory frequency (bpm)	21.12	20.1	0.12
PifT/Ti (%)	59.34	58.64	0.64
RC/Vt (%)	38.87	39.12	
PhAng	13.89	13.11	0.85

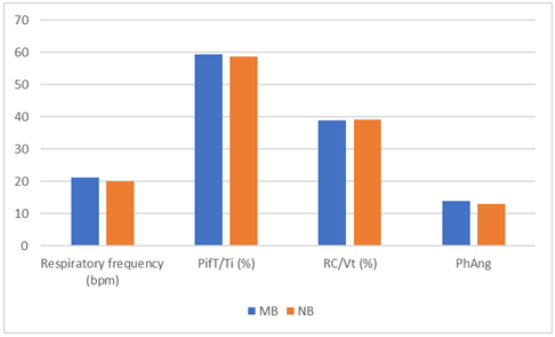

Figure 1: Breathing pattern (time variables) and thoracoabdominal motion data in MB and NB groups

DISCUSSION

According to the literature, mouth breathing may cause changes in the respiratory pattern, such as an increase in respiratory frequency, associated with a reduced amplitude and the need to use accessory inspiratory muscles to overcome the high nasal resistance.[6] The present study showed minimal changes in the respiratory variables in both mouth breather kids and nose breather kids. The results were compared to previous studies. Silveira Wd et al analyzed the posture of mouth-breathing children and studying the existence of correlations between posture and pulmonary volumes. They evaluated the posture and pulmonary function of 17 mouth-breathing children and of 17 nasal-breathing children by means of photogrammetry and forced spirometry. When compared to nasal-breathing, mouth-breathing subjects presented an increment in head projection and cervical lordosis, forwarded gravity center and reduced pulmonary volumes. There was an association between head projection and forced vital capacity, and between postural alterations and age. It was concluded that mouth-breathing children have postural alterations which increases with age and also reduced spirometry values. The vital capacity reduction correlates negatively with head projection. Conti PB et al investigated associations between mouth breathing (MBr), nose breathing (NBr) and body posture classification and clinical variables in children and adolescents, by comparing patients with mouth breathing syndrome with a control group of similar age. Children aged 5 years or more were recruited to one of two groups: healthy controls (NBr) or an MBr group. The MBr group comprised patients with a diagnosis of mouth breathing syndrome confirmed by clinical examination by a physician plus nasal endoscopy. The control group comprised healthy volunteers of the same age, with NBr confirmed by medical examination. All participants underwent postural assessment. Data were analyzed using the Mann-Whitney nonparametric test, the chi-square test and Fisher's exact test, to a significance level of 0.05%. A total of 306 MBr and 124 NBr were enrolled. Mouth breathers were more likely to be male, have more frequent and more severe nasal obstruction and larger tonsils than NBr. Mouth breathers also exhibited higher incidence rates of allergic rhinitis, of thoracic respiratory pattern, high-arched palate and unfavorable postural classifications with relation to the control group. Postural classification scores were directly proportional to nasal obstruction and male sex. It was concluded that postural problems were significantly more common among children in the group with mouth breathing syndrome, highlighting the need for early interdisciplinary treatment of this syndrome.[7,8]

Neiva PD et al assessed the methodological quality of studies and determine if there is an association between mouth breathing and postural disorders in children. Databases comprised MEDLINE, CINAHL, PEDro, LILACS, EMBASE and Cochrane Central Registrar of Controlled Trials. Searches were until March 2016 and included studies that evaluated postural disorders in children diagnosed with mouth breathing. The Downs and Black checklist was used to evaluate the quality of the evidences. Ten studies were included totaling 417 children from 5 to 14 years. Two studies used the New York State Postural Rating Scale, seven used photography and one used motion capture to measure posture. The methods used to analyze the data included the Postural Analysis Software (SAPO), Fisiometer, ALCimagem and routines in

MATLAB program. Quality assessment resulted in low scores (<14) for all the studies. The main areas of weakness were a clear description of the participants, of the methods used to access posture, of the principal confounders and lack of power analysis. External and internal validity were also threatened by the lack of a representative sample and blinding of the participants and assessors, respectively. The review provided low evidence that mouth-breathing pattern in children between the ages 5-14 years is associated with postural deviations. Teresinha S.P. Lopes et al determined the prevalence of mouth breathing and to associate the history of breastfeeding with breathing patterns in children. This was an observational study with 252 children of both genders, aged 30 to 48 months, who participated in a dental care program for mothers and newborns. As an instrument of data collection, a semi-structured questionnaire was administered to the children's mothers assessing the form and duration of breastfeeding and the oral habits of non-nutritive sucking. To determine the breathing patterns that the children had developed, medical history and clinical examination were used. Statistical analysis was conducted to examine the effects of exposure on the primary outcome (mouth breathing), and the prevalence ratio was calculated with a 95% confidence interval. Of the total sample, 43.1% of the children were mouth breathers, 48.4% had been breastfed exclusively until six months of age or more, and 27.4% had non-nutritive sucking habits. Statistically significant associations were found for bottle-feeding and oral habits of non-nutritive sucking, with an increased likelihood of children exhibiting a predominantly oral breathing pattern. A statistically significant association was also observed between a longer duration of exclusive breastfeeding and a nasal breathing pattern presented by children. They concluded that an increased duration of exclusive breastfeeding lowers the chances of children exhibiting a predominantly oral breathing pattern.[9,10]

CONCLUSION

From the results of the present study, this can be concluded that there was no significant difference in the breathing pattern between nose breathers and mouth breather children.

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