Harsukh Educational Charitable Society
International Journal of Community Health and Medical Research
Journal home page: www.ijchmr.com doi: 10.21276/ijchmr
Official Publication of "*Harsukh Educational Charitable Society*" [Regd.]
ISSN E: 2457-0117 **ISSN P:**2581-5040 **RNI No. -** PUNENG/2017/75049 **Index Copernicus value 2016 =** 52.13

Original Article

Comparison Of Breathing Pattern In Mouth Breather And Normal Child

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ABSTRACT
Background: Breathing brings oxygen in to lungs. Nasal breathing is considered to be normal whereas mouth breathing are often associated with problems like dryness of mouth etc. Both nasal as well as mouth breathing provides oxygen to lungs however there is difference in oxygen level absorption. **Aim:** The aim of this study was to compare the breathing pattern in mouth breather and normal healthy child. **Material and method:** The sample size selected for present study was 60 subjects. Samples were divided in two groups, study group included 30 children with mouth breathing habit and control group consisted of 30 children normal breathing. Plethysmography was used to analyze variables like, tidal volume (Vt), respiratory frequency (*f*), minute ventilation (VE), inspiratory duty cycle (Ti/Ttot), mean inspiratory flow (Vt/Ti), rib cage motion (%RC), inspiratory phase relation (PhRIB), expiratory phase relation (PhREB), and phase angle (PhaseAng). Pulse oximetry was used for peripheral oxygen saturation. Stastical analysis was done. **Result**: a total of 60 samples were included 30 in each group. A total of 4,822 respiratory cycles were analyzed, 2,512 of which corresponded to MB and 2,310 to NB. No statistical difference was found in respiratory pattern of both groups. **Conclusion:** we conclude that mouth and nasal breathing are very similar in children
Key words: Breathing Pattern, Mouth Breathers, Nasal Breather, Respiratory Rate

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This article may be cited as: Mittal S, Jaiswal MK. Comparison Of Breathing Pattern In Mouth Breather And Normal Child HECS Int J Comm Health Med Res 2018; 4(3):43-45

INTRODUCTION

Lungs are the main part of our respiratory system. Main function of lung is to ensure gas exchanges with the environment, and the thoracic wall, which moves as a result of continual muscle action. [1]Nasal breathing is considered to be the normal physiological breathing pattern for all age groups.[2,3] nose serves three important functions during respiratory process, it helps in heating, filtering, and moistening the air that is inhaled.[4] Obstruction in upper respiratory tract , partially or completely blocked nasal tract can lead to an altered pattern of breathing i.e. mouth breathing.[5] Nasal polyp, deviated nasal septum, chronic cold, enlarged tonsils etc. can cause mouth breathing.[6]Several factors influence the breathing pattern, such as age, sex, respiratory overload, neuromuscular diseases, positioning, lung diseases associated with increased airway resistance and chronic obstructive pulmonary disease (COPD).[7] Studies have shown that mouth breathing may causes increase in respiratory frequency, associated with reduced amplitude and the need to use accessory inspiratory muscles to overcome the high nasal resistance.[8-14] So we aimed to compare the breathing pattern in mouth breathers and normal breathers.

MATERIAL AND METHOD

A total of 60 patients were included in the study. Of the 150 patients 40 were males and 20 were females. Patients aged more than 4 years were included in the study. A detailed examination was carried out for each patient. 30 Patients with mouth breathing habit were selected for the study and 30 with normal breathing. Ethical committee clearance was obtained before initiating the study. A written informed consent was obtained from parents/gaurdians. A thorough description regarding the study was given to patients. Clinical history like demographics details, including age, gender, body mass index and past medical history were recorded.

Inclusion Criteria

1. Mouth breathers
2. Nasal breathers
3. Patients with upper respiratory tract obstruction

Exclusion Criteria

1. Patients not willing to participate

2. Patients with mental disorders
3. Patients with cleft lip/palate

Sample were divided in two groups, Study group- n=30 (mouth breathers) and Control group- n=30 (nasal breathers). Research was carried out with the help of plethysmography. The volume and timing of breathing patterns was observed. 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

Data analysis

Data was collected safely. Data so collected was subjected to analysis using Statistical Package for Social Sciences (SPSS) Version 15.0. Non parametric data has been represented as frequencies and percentages. All variables that were significantly different were recorded at a $p < 0.005$ level.

RESULTS

Out Of the 60 patients selected for the study, 40 were male's i.e. 66.6% and 20 were females i.e. 33.3% (Table 1). Sample was divided in two groups (Graph1). Study group consisted of 30 children with mean age mean age of 7.85±0.82 years, mass of 32.34±6.02kg, height of 1.32±0.09m, BMI of 18.17±2.32kg/m2, SpO2 of 96.42±1.52% and HR of 86.12±9.53bpm. Of the 30 subjects in study group 10 suffered from allergic rhinitis, 5 with deviated nasal septum, and 8 with enlarged tonsils, 2 with nasal polyp and 5 with adenoid hypertrophy (Graph 2). Control group consisted of 30 children mean age of 8.18±0.81 years, mass of 33.53±7.47kg, height of 1.38±0.09m, BMI of 18.36±2.32kg/m2, SpO2 of 97.85±1.52%, and HR of 86.40±9.53bpm. Based on the results of present study, a total of 4,822 respiratory cycles were analyzed, 2,512 of which corresponded to MB and 2,310 to NB. The Mean of respiratory cycle was found to be 95 cycles per child. Table 1 displays the variables in the respiratory pattern of children in both the groups. There was no significant difference was observed in variables of both the groups (TABLE 2). However plethysmographic records of mouth-breathing children showed a steady trace which indicates calm breathing without asynchrony, and a trace with atypical curves of the thoracoabdominal motion observed when the children performed active nasal aspiration, making asynchrony evident.

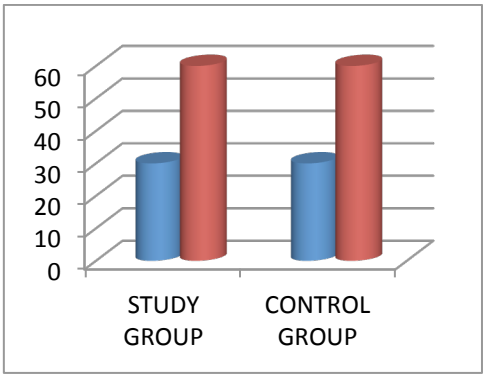
DISCUSSION

Clinicians encounter patients with mouth breathing habit very often still there is lack of data in literature about the breathing pattern in mouth breathers and nasal breathers. Brant TCS et al in the year 2008 studied the breathing pattern and thoracoabdominal motion of mouth-breathing children aged between eight and ten years and to compare these characteristics with those of nose-breathing children of the same ages. They reported that no statistically significant differences were observed between the groups, for the variables studies. Results of our study are in agreement with authors however thoracoabdominal motions were not considered in present study.[15] Another study in 2010 described the breathing pattern and thoracoabdominal motion of healthy individuals, taking age and sex into consideration. The authors reported that comparison between the sexes showed that, in the age groups 20 to 39 and 60 to 80 years, women presented significantly lower values for Vt, VE, and Ti/Ttot than men, and there was no significant difference in the age group 40 to 59 years.

Table 1: Demographic characteristics of patients

Gender	PATIENTS	PERCENTAGE
Male	40	66.6%
Female	20	33.3%

Graph 1: Distribution Of Group



Graph 2- Riskfactors Observed In MB

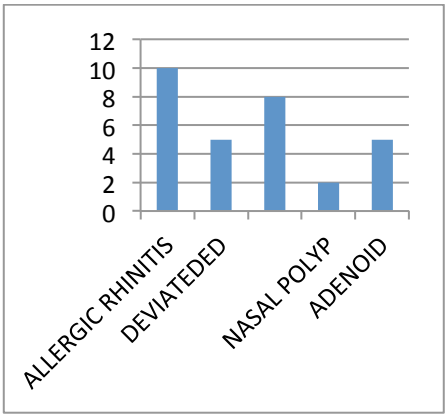


Table 3: Breathing Pattern In Mouth-Breathing And Nose Breathing Children.

Variables	MB	NB	p value
Vt (ml)	205.47±91.34	201.89±57.84	0.744
f (bpm)	20.55±2.30	21.86±4.01	0.296
VE (l/min)	4.88±1.62	5.06±1.11	0.375
Vt/Ti (ml/s)	176.28±71.06	184.07±43.17	0.388
PifT/Ti (%)	56.88±6.71	59.74±6.49	0.745
RC/Vt (%)	36.65±8.09	38.87±10.90	0.678
PhAng (°)	15.82±8.58	16.25±8.91	0.560

Comparisons between the age groups showed that participants aged 60 to 80 presented significantly greater PhRIB and PhaseAng than participants aged 20 to 39 years, without significant differences in the breathing pattern.[16] There is lack of data in literature in regards to pattern of respiration in children. In present study of the 30 patients from study group it was found that 10 were suffering from allergic rhinitis, 5 from deviated nasal septum, 8 from enlarged tonsils, 2 from nasal polyp and 5 from adenoid hypertrophy. In present a total of 4,822 respiratory cycles were analyzed, 2,512 of which corresponded to MB and 2,310 to NB. The Mean of respiratory cycle was found to be 95 cycles per child. In our study among all variables greater discrepancy was observed in Vt, possible explanation could be that children lungs are in developing stage. Few studies have shown that there in difference in between men and women concerning the respiratory pattern in adults.[16] However no such results were found in current study for children. Limitation of current study includes small sample size and gender factor was not considered in our study.

CONCLUSION

Within the limitation of present study we conclude the mouth breathing pattern is very similar to nasal breathing. No statistical difference was evident among both groups. However further study with a larger sample is recommended.

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Source of support: Nil **Conflict of interest:** None declared