Section: Paediatrics

Original Research Article

IMPACT OF OBESITY IN ASTHMATIC CHILDREN IN A TERTIARY CARE CENTRE

S. Bharathi[1], T. Sivabalan[2], Nithiyanantham. R[3]

[1]Associate Professor, Department of Paediatrics, Trichy SRM Medical College, Trichy, India.
[2]Associate Professor, Department of Paediatrics, Dhanalakshmi Srinivasan Medical College, Siruvachur, India.
[3]Associate Professor, Department of Paediatrics, Trichy SRM Medical College, Trichy, India.

Received : 12/12/2022
Received in revised form : 03/02/2023
Accepted : 22/02/2023

Keywords:
Obesity, Bronchial Asthma, Severity, Children.

Corresponding Author:
Dr. Nithiyanantham.R
Email: nithiy83 @gmail.com

DOI: 10.47009/jamp.2023.5.2.358

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 1717-1720

Abstract

Background: The global prevalence of bronchial asthma is in increasing trend .The children having bronchial asthma have various clinical presentations. The prevalence of obesity among children is also increasing. The aim of the study is to assess the relationship between obesity and asthma. **Materials and Methods:** This study was conducted among the children presenting with symptoms of bronchial asthma in the Pediatric OPD in SRM medical college and Hospital, Trichy .The study was done for a 6 month period from August 2022 to February 2023. The baseline characteristics like age, gender, religion, were obtained. Allergic history to food and dust were ruled out. History of atopy and allergic disorders were elicited. Clinical examination was done properly and anthropometric measurements were recorded. Forced expiratory volume in first second (FEV1) and FEV1/FVC was assessed using spirometry. After collecting the data it was entered in MS Excel Windows 10.Statistical analysis was done in SPSS 23.Continuous data were expressed in terms of Mean± Standard deviation and Categorical variables were expressed in terms of numbers (percentages).Chi square test was used for Test of Association for Categorical variables. Anova test or Student t test was used for Test of Association for Continuous variables. P value of <0.005 is considered to be statistically significant. **Result:** The majority of the study participants were in the age group of 5-10 years Group 1 60(67%) and Group 2 11(55%) .Male preponderance was observed, Group 1 - 56(62%) and Group 2 13(65%). Study participants residing in urban are were found to be more. The mean FEV1 of Group A was found to be 89.9±4 and that of Group B was found to be 81.2±5.8 and it was found to be statistically significant.The mean FEV1/FVC of Group A was found to be more 88.6±3.7 compared to Group B 76.5±6.9 and it was found to be statistically significant. Mild persistent asthma was more common in both the groups. In Group 1 Children with asthma and without obesity, majority of the study participants has asthma in well controlled level. In Group 2 majority have uncontrolled asthma 17(85%) and 10% have partly controlled asthma .There is a difference between the groups and it is found to be statistically significant. **Conclusion:** Poor asthma control is also observed in children with obesity and children without obesity had significant association with asthma. Multidisciplinary approach has to be implied to the child with obesity to assess their immunological and pneumological aspects. So that we can intervene with personalized and tailored treatment at the earliest possible.

INTRODUCTION

The major public health problem behind the metabolic, cardiovascular and the respiratory diseases are overweight and obesity. The prevalence of obesity in children tends to increase dramatically in both developed and developing countries.[1,2] The respiratory system is affected by obesity by mass loading which results in reduction in the chest wall compliance and changes in the airway resistance.[3] The common lung disorders among children is Asthma, Reversible air way obstruction, wheezing, dyspnoea, coughing, bronchial hyper responsiveness , reversible air way obstruction are the characteristics.[4] The presentation of asthma presents in children varies like wheezing, dyspnea, reversible airway obstruction, bronchial hyper responsiveness and reversible airway obstruction.[4]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

It is severe especially in the early morning and night. There is a change in the prevalence rates of asthma in children ranging from 11.1-11.6% to 13.2-13.7%.[5]

A multicenter study states that the prevalence of asthma is slightly increasing all around the world inspite of striking differences among the countries.[6] In many epidemiological studies it is found that obesity and prevalence of asthma are strongly connected.[7] Presence of inflammation is common in both the conditions i.e obesity and asthma.[8] Obese asthmatic patients are often known to be severe and poorly controlled.[9,10,11] The aim of the study was to assess the severity, level of control of asthma in children without obesity and with obesity.

MATERIALS AND METHODS

Study Setting

This study was conducted among the children attending with symptoms of bronchial asthma in the OPD in SRM medical college and Hospital, Trichy by the Department of Pediatrics. The study was done for a period from August 2022 to Feb 2023.

Study Design

Cross sectional-Analytical study

Sample Size

The study participants fulfilling the inclusion and the exclusion criteria were included in the study throughout the study period. The final attained sample was 110. The study participants were grouped into two based on asthma without obesity (Group 1) and asthma with obesity (Group 1).

Inclusion Criteria

- Age group of the study participants 5-15 years of both sexes
- Children having symptoms diagnostic of bronchial asthma in the past and improvement following inhalational therapy

Exclusion Criteria

- Children less than 5 years
- Children who have undergone recent hospitalization
- Children with congenital cardiac and lung abnormalities
- Neurologically impaired children
- Children having medical conditions other than asthma like Pulmonary TB, Juvenile Diabetes Mellitus

Data Collection Method

After obtaining the Institutional Ethical Committee clearance, the study was started after obtaining patients informed assent from their parents**.** The study participants recruited during the study period was 110. The baseline characteristics like age, gender, religion, consanguinity, type of family, parents education, occupation, income and residence were obtained. Birth history, birth order, gestational age, birth weight and breast feeding were obtained.

Allergic history to food and dust were ruled out, history of previous hospitalization, age of onset, previous hospitalization history. Symptoms and treatment history, number of vists to doctor, number of school days missed were obtained. History of atopy and allergic disorders were elicited.

Clinical examination was done properly and anthropometric measurements like height, weight and BMI were recorded. Forced expiratory volume in first second (FEV1) and FEV1/FVC was assessed using spirometry. If BMI was found to be more than 30 then the children were considered as obese. After collecting the data it was entered in MS Excel Windows 10. Statistical analysis was done in SPSS 23. Continuous data were expressed in terms of Mean± Standard deviation and Categorical variables were expressed in terms of numbers (percentages). Chi square test was used for Test of Association for Categorical variables. Anova test or Student t test was used for Test of Association for Continuous variables. P value of <0.005 is considered to be statistically significant.

RESULTS

The study participants were divided into two groups based obesity. Group A based on asthma without obesity (Group 1) and asthma with obesity (Group 2).Group A consist of 90 study participants and Group B consist of 20 study participants.

Table 1: Baseline characteristics of the study participants in both groups

Baseline characteristics	Group 1 Asthma without Obesity (90)	Group 2 Asthma with Obesity (20)	P value
Age **5-10 years** **11-15 years**	 **60(67%)** **30(33%)**	 **11(55%)** **9(45%)**	**0.32**
Sex **Male** **Female**	 **56(62%)** **34(38%)**	 **13(65%)** **7(35%)**	**0.40**
Residential status **Urban** **Rural**	 **50(56%)** **40(44%)**	 **11(55%)** **9(45%)**	**0.48**
Socioeconomic status **Lower Middle** **Upper class**	 **59(66%)** **31(34%)**	 **13(65%)** **7(35%)**	**0.48**
Family H/O atopy			

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Present **Absent**	**15(17%)** **75(83%)**	**11(55%)** **9(45%)**	**0.001***
Number of Exacerbations	**18(20%)**	**9(45%)**	**0.009***

The demographic profile of both the groups were compared in Table 1.The majority of the study participants were in the age group of 5-10 years Group 1 60(67%) and Group 2 11(55%) .Male preponderance was observed , Group 1 -56(62%) and Group 2 13(65%). Study participants residing in urban are were found to be more. Most of the study participants were in lower middle class (Group 1-66% and Group -65%) . These variables were found to be statistically not significant. Family history of atopy was found to be 55% in Group 2 and 17% in Group 1. The difference was found to be statistically significant. Exacerbations and episodes were also found to be more in Group 2 (45%) compared to Group 1(20%) which is found to be statistically significant.

Table 2: Mean FEV1 and FEV1/FVC of asthmatic patients with and without comorbidity

Mean values	**Group 1** **Asthma without Obesity** **(90)**	**Group 2** **Asthma with obesity** **(20)**	**P value**
FEV1	**89.9±4**	**81.2±5.8**	**<0.001***
FEV1/FVC	**88.6±3.7**	**76.5±6.9**	**<0.001***

The mean FEV1 of Group A was found to be 89.9±4 and that of Group B was found to be 81.2±5.8.There was a difference and it was found to be statistically significant.The mean FEV1/FVC of Group A was found to be more 88.6±3.7 compared to Group B 76.5±6.9.There was difference between the groups and it was found to be statistically significant.

Tables 3: Asthma severity in children with obesity and without obesity

Variables	**Mild persistent Asthma**	**Moderate persistent Asthma**	**Severe persistent Asthma**	**Intermittent Persistent Asthma**
Group 1-Children with asthma without obesity	**49(54.4%)**	**24(26.6%)**	**2(2%)**	**15(17%)**
Group-2 Children with asthma with obesity	**9(45%)**	**6(30%)**	**3(15%)**	**2(10%)**

Mild persistent asthma was more common in both the groups. The severe persistent asthma was found to be more in Group 2 (15%) compared to Group 1(2%).Though there is difference between the groups it was not found to be statistically significant.

Table 4: Level of asthma control among the study participants

Variables	**Partly controlled**	**Well controlled**	**Uncontrolled**	**P value**
Group 1-Children with asthma without obesity	**9(10%)**	**81(90%)**	**0(2%)**	
Group-2 Children with asthma with obesity	**2(10%)**	**1(5%)**	**17(85%)**	**<0.001***

In Group 1 Children with asthma and without obesity, majority of the study participants has asthma in well controlled level. None of them were observed as uncontrolled. In Group 2 majority have uncontrolled asthma 17(85%) and 10% have partly controlled asthma. There is a difference between the groups and it is found to be statistically significant.

DISCUSSION

Many studies in human have been done to assess the relationship between obesity and airway inflammation or allergy. This may be due to the relationship between obesity, metabolic syndrome, cardiovascular disorders and systemic inflammation.[12] In our study we have 110 children. The majority of the study participants were in the age group of 5-10 years Group 1 60(67%) and Group 2 11(55%). Male preponderance were observed Group 1 -56(62%) and Group 2 13(65%). Study participants residing in urban are were found to be more. Most of the study participants were in lower middle class (Group 1-66% and Group -65%). These variables were found to be not statistically significant. Family history of atopy was found to be 55% in the Group 2 and 17% in Group 1. Exacerbations and episodes were also found to be more in Group 2 (45%) compared to Group 1(20%) which is found to be statistically significant. These results were in concordance with the results of Adarsh E et al study.[13]

In our study the mean FEV1 of Group A was found to be 89.9±4 and that of Group B was found to be 81.2±5.8. There was a difference and it was found to be statistically significant. The mean FEV1/FVC of Group A was found to be more 88.6±3.7 compared

ISSN (O): 2687-5365; ISSN (P): 2753-6556

to Group B 76.5±6.9.The results were similar to Adarsh E et al study[13] and Galluci et al study.[14] The study states that the pulmonary functions tends to decline in children with asthma, but it affects more in children with obesity.

Mild persistent asthma was more common in both the groups. The severe persistent asthma was found to be more in Group 2 (15%) compared to Group 1(2%). Adarsh E et al study also showed similar results. In contrast to our results Leonard et al[15] study shows severe persistent asthma in 42.9% followed by moderate persistent asthma 22.4%. Moderate asthma was found to be predominant in Balaji et al study(37%).[16] GINA assessment for asthma control was used for the study participants and they were assessed for a month. In our study Group 1 Children with asthma and without obesity, majority of the study participants has asthma in well controlled level. None of them were observed as uncontrolled. In Group 2 majority have uncontrolled asthma 17(85%) and 10% have partly controlled asthma. There is a difference between the groups and it is found to be statistically significant. The results were in concordance with sharmilee et al[17] study and adarsh E et al study. Genova et al study states that obese children has worse control, more frequent and severe exacerbations and worse control.[18]

CONCLUSION

Our study concludes the severity of asthma increases in obese children than non obese children. Poor asthma control is also observed in children with obesity and obesity had significant association with asthma. Multidisciplinary approach has to be applied to the child with obesity to assess their endocrinological and immunological aspects,so that we can intervene with personalized and tailored treatment at the earliest possible. Thus children with obesity have to be frequently assessed for their adherence to treatment and correct use of inhaler devices.

Funding

None of the authors received funding for this study

Competing Interest

There is no competing interest

Authors Contribution

All authors in our study contributed to the data collection of the patients

Acknowledgement

The authors like to thank the Dean of the Medical College, Head of the Department of Pediatrics, SRM Medical College, Trichy, Tamil Nadu.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556