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Original Research Paper

# A comparative study of Peak expiratory flow rate (PEFR) values in Healthy School going Children and Asthmatic Children aged 7 to 12 Years attending Paediatric OP at a Tertiary care Hospital, Eluru.

Paediatrics

**KEYWORDS:** : PEFR, Taussig et al,post nebulization

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## ABSTRACT

**BACKGROUND:** The present study aims to compare the PEFR of 80 asthmatic children with PEFR of 300 normal school going children of same age ,sex and height. **METHODOLOGY**:The study is conducted in 2 groups normal healthy school going children group of 7 to 12 years and asthmatic children group of 7 to 12 years .300 normal healthy school going children are selected from schools in and around Eluru on basis of systematic randomization using Taussig et al[3]criteria.80 asthmatic children attending pediatric op over one year at tertiary care hospital ,Eluru were selected in the same age group .oral informed consent was taken from parents/guardians in both groups.PEFR readings of asthmatic children were compared with normal healthy school going children of same age ,sex and height. The data was analysed using SPSS software and results were obtained. **RESULTS:** Asthma is more common in younger age groups, in urban areas and male children. Asthma is more common in upper class(45%) and middle upper class(20%) compared with other classes. The main risk factors for asthma are family history of asthma, history of smoking habits in the family and personal history of atopy(P Value<0.05 ). The association between type of fuel used for cooking and education of parents with asthma is found to be not statistically significant. Most common presenting feature/complaint of asthma is wheeze. The main triggering factor for asthma is cold and dust combined followed by dust alone .Majority (48.7%) of cases are intermittent asthma and mild persistent asthma combined, followed by moderate persistent asthma(42.5%),whereas least%(8.7%) of cases are severe persistent asthma. An improvement of PEFR 20-25% post nebulization is seen most commonly in intermittent asthma and mild persistent asthma(85.2%).An improvement of PEFR 26 to 30% post nebulization is seen most commonly in moderate persistent asthma(54.5%).An improvement of PEFR >31% post nebulization is seen most commonly in moderate persistent asthma(70.8%) followed by severe persistent asthma. **CONCLUSION** :. Asthma is more common in younger age groups, in urban areas and male children. The main risk factors for asthma are family history of asthma, history of smoking habits in the family and personal history of atopy(P Value<0.05 ). Most common presenting feature/complaint of asthma is wheeze. The main triggering factor for asthma is cold and dust combined followed by dust alone

**INTRODUCTION :**

Asthma is a heterogenous disease, defined by history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. Approximately 300 million individuals are currently suffering from asthma worldwide and 10 per cent of it i.e. 30 million in India.About 15 million disability-adjusted life years are lost annually due to asthma; asthma, therefore, represents 1 per cent of the total global disease burden[1]. The peak expiratory flow rate (PEFR) measurement is simple, reproducible and reliable way of judging the degree of airway obstruction in various obstructive pulmonary diseases, especially asthma .As no physician can understand the status of progress of diabetes mellitus without doing simple blood sugar test, PEFR can be used as pulmonary function test in the same way (swaminathan,1999)[2] for asthma.This study aims to construct a normal Peak Expiratory Flow curve in both sexes in the age group of 7 to 12 years according to height and to assess its use in bronchial asthma.

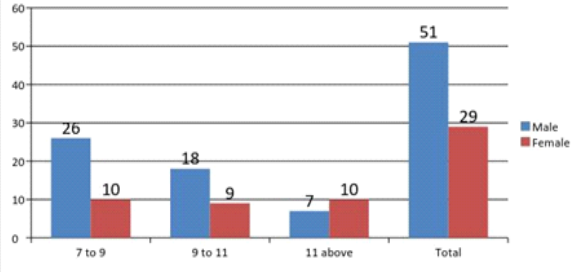
**METHOD**:

After obtaining institutional ethical committee clearance, study started with 2 groups Healthy school going children group (7 to 12 years) of urban and rural areas of Eluru and asthmatic children group (7 to 12 years) attending pediatric OP, at a tertiary care hospital, Eluru. Study period is November 2014 to July 2016 and is a Cross sectional and comparative study. Children fulfilling the criteria as suggested by Taussig et al[3], were included in the normal healthy school going children group. In the first phase of study 300 normal healthy school going children in the age group of 7 to 12 years in and around Eluru town are selected on random basis .Oral informed consent taken from school authorities and parents of the students. . Age was taken as completed years on the school records. The anthropometric measurements taken were weight and height. These children will be examined and a proforma will be filled for each child. PEFR was measured by Mini Wright's Peak Flow Meter. The children will be asked to stand up, hold the peak flow meter and made to affix their lips tightly over the nozzle of the peak flow meter to prevent any air leak. They will be asked to blow as hard as they can, after deep inspiration, through the nozzle. Best of the three readings of peak expiratory flow rate will be taken from each child. A graph will be plotted with these values with height(cm) on the X axis and PEFR(L/min) on the Y axis for both sexes. A normal reference curve will be hence obtained.

In the second phase of study all known cases of asthma who attended the pediatric OP, at a tertiary care hospital, Eluru will be taken up in the age groups of 7 to 12 years and in both sexes. Informed consent will be taken from the parents/guardians of the children. These children will be examined and a proforma will be filled for each child. PEFR of each child will be measured for three readings and the best value will be taken for each child. These values will be compared in relation to the reference values of normal school going children.

The data was analysed using SPSS software and results obtained.

**RESULTS: GRAPH 1:DISTRIBUTION OF ASTHMATIC CHILDREN ACCORDING TO AGE AND SEX**




In present study, overall asthma is more common in boys(63.7% )than girls(36.3%).Asthma is more common in younger age group of 7 to 9 years compared to other age groups of 9 to 11 years and 11 years and above.

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**TABLE 1: DISTRIBUTION OF ASTHMA CASES ACCORDING TO RESIDENCE**

| Residence | asthma Cases (%) |
|---|---|
| Urban | 51 (63.75) |
| Rural | 29 (36.25) |

In this study out of total 80 asthmatic cases 63.7%of cases are from urban area and 36.2% of cases are from rural area,showing a urban predominance of asthma.

**TABLE 2: H/O OF TOBACCO SMOKING IN THE FAMILY IN ASTHMATIC CHILDREN AND SCHOOL GOING CHILDREN**

| H/O of tobacco smoking in the family | Cases | Controls |
|---|---|---|
| Present | 56 | 68 |
| Absent | 24 | 232 |

In this study history of tobacco smoking in the family of asthmatic children compared with normal children is found to be a significant risk factor for asthma as p value < 0.00057 using ANOVA test.

**TABLE 3: FAMILY HISTORY OF ASTHMA IN ASTHMATIC CHILDREN AND SCHOOL Going children**

| H/O of asthma in the family | Cases | Controls |
|---|---|---|
| Present | 63 | 24 |
| Absent | 17 | 276 |

In this study family history of asthma of asthmatic children compared with normal children is found to be a significant risk factor for asthma as p value < 0.000292 using ANOVA test.

**TABLE 4: PERSONAL H/O ALLERGY /ATOPY IN ASTHMATIC CHILDREN AND SCHOOL GOING CHILDREN**

| PERSONAL ALLERGY/ATOPY H/O | Cases | Controls |
|---|---|---|
| Present | 53 | 25 |
| Absent | 27 | 275 |

In this study personal history of allergy/atopy of asthmatic children compared with normal children is found to be significant risk factor for asthma as p value < 0.000303 using ANOVA test.

**TABLE 5: Type of fuel used for cooking in asthmatic children and school going children**

| Type of fuel used for cooking | Cases | Control |
|---|---|---|
| Gas | 60 | 208 |
| Wood | 20 | 92 |
| mean ± SD | 1.25 ± 0.435 | 1.306 ± 0.461 |

In the present study the association between type of fuel used for cooking and asthma is found to be not statistically significant(p value>0.154).

**TABLE 6: Education status of parents in asthmatic children and school going children**

| Education status of parents | Cases Father | | Control Father | | Cases Mother | | Control Mother | |
|---|---|---|---|---|---|---|---|---|
| Literate | 61 | | 199 | | 25 | | 145 | |
| Illiterate | 19 | | 101 | | 55 | | 155 | |
| mean ± SD | 1.23 | ± | 1.33 | ± | 1.68 | ± | 1.51 ± 0.50 | |
| | 0.42 | | 0.47 | | 0.466 | | | |

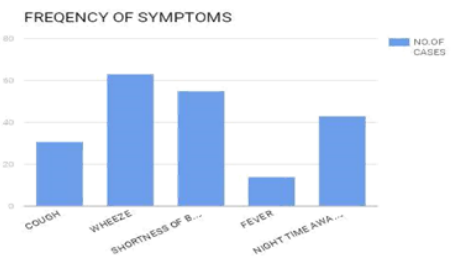
In the present study the association between education status of parents and asthma is found to be not statistically significant.

**TABLE 7:SOCIO ECONOMIC CLASS DISTRIBUTION OF ASTHMATIC CASES**

| Socio economic class | PEFR >70%OF NORMAL | PEFR 40 to 69%OFNORMAL | PEFR <40%OFNORMAL | Total |
|---|---|---|---|---|
| Upper Class | 16 | 15 | 5 | 36 |
| Upper middle class | 7 | 8 | 1 | 16 |
| Middle/lower middle class | 3 | 2 | 0 | 8 |
| Upper lower class | 3 | 4 | 0 | 7 |
| Lower class | 10 | 5 | 1 | 13 |
| Total | 39 | 34 | 7 | 80 |

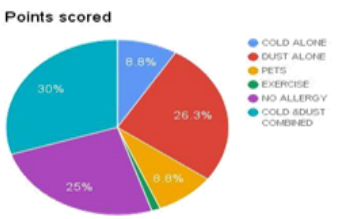
In the present study upper class (45%) has the highest distribution of asthmatic cases followed by upper middle class(20%).

**Graph 2:presenting features/complaints of asthma**




In this study,the most common presenting feature/complaint of asthma is wheeze 78.7%followed by shortness of breath 68.7%,whereas fever is the least common presentation 17.5%

Pie chart 1:Triggering factors of asthma




In the present study the most common triggering factor for asthma is cold and dust combined(30%),followed by dust alone(26.3%).

**TABLE 8: DISTRIBUTION OF PEFR READINGS IN ASTHMATIC CHILDREN IN VARIOUS AGE GROUP**

| Age | PEFR 70 to100%ofnormal | PEFR40to69%of normal | PEFR< 40%ofnormal | Totalnumber ofcases |
|---|---|---|---|---|
| 7-9YEARS | 21 | 11 | 4 | 36 |
| 9-11YEARS | 10 | 15 | 2 | 27 |

| | | | | |
|---|---|---|---|---|
| 11YEARS &above | 8 | 8 | 1 | 17 |

In the present study out of the total 80 cases,majority (48.7%) of cases are are intermittent asthma and mild persistent asthma(PEFR 70-100% of normal),followed by moderate persistent asthma(42.5%)(PEFR 40-69% of normal),whereas least% (8.7%) of cases are cases are severe persistent asthma(PEFR <40% of normal).

**TABLE 9:DIFFERENT PERCENTAGES OF IMPROVEMENT IN PEFR POST NEBULISATION VS TYPES OF ASTHMA**

| PEF R % | 20 to 25% improvement post nebulisation | 26 improvement post nebulisation | to 30 % >31% improvement post nebulisation |
|---|---|---|---|
| PEFR>70% normal height | 29 | 10 | 0 |
| PEFR -69% of normal for height | 5 | 12 | 17 |
| PEFR <40% of normal height | 0 | 0 | 7 |

In the present study an improvement of PEFR 20-25% post nebulisation is seen most commonly in intermittent asthma and mild persistent asthma(85.2%)

An improvement of PEFR 26 to 30% post nebulisation is seen most commonly in moderate persistent asthma(54.5%)

An improvement of PEFR >31% post nebulisation is seen most commonly in moderate persistent asthma (70.8%) followed by severe persistent asthma(29.2%).

**DISCUSSION:**

Asthma is more common in the younger age group of 7 to 9 years than other age groups 9 to 11years and above 11years. In a study conducted by Ranbir Pal et al [7], childhood asthma is more prevalent among younger children of age 6 to 7 years than children of age 13 to 14 years. Higher prevalence of asthma in the younger age group was consistent with the widely believed concept of "children growing out of allergic diseases." In present study asthma is more common in boys and in urban areas. Jain Et al,[8]attributed it to increased bronchial lability in males. Asthma is more common in urban area when compared to rural area . Ranbir pal et al[7] in his study found urban predominance in cases of bronchial asthma.

\The main risk factors for asthma are family history of asthma, history of smoking habits in the family and personal history of atopy(P Value<0.05 ). Paramesh H Et al [9] observed that if one parent is having asthma the incidence of asthma is 18 %, in case of one sibling is having asthma incidence is 1.65 % and where grandparents is having asthma incidence is 4 %. Ober Et al10 concluded that the clinical relationship among asthma, allergic rhinitis, atopic dermatitis, so called "allergic triad" is well known. Several longitudinal studies provide evidence for sequential development of "atopic march" during childhood .

The present study found no association between education of parents and type of housing with asthma. . In the study by Pokharel et al[12] factors associated with the presence of symptoms of asthma were passive smoking, pets at home, and absence of windows in living rooms; whereas, history of worm infestation, fuel used for cooking, location of kitchen did not attain statistical significance.Jain et al[8] found no significant association between literacy level of parents and prevalence of asthma which is similar to present study.

In present study, most common precipitating /triggering factor for asthma is cold and dust combined(30%),followed by dust alone(26.2%).Srinivasa k et al [11], in his study found that cold air(48%)is the most common precipitating factor of asthma. The differences in precipitating factors in % may be due to different selection of population in these studies and their genetic underpinnings. In present study, most common presenting feature/complaint of asthma is wheeze 78.7%followed by shortness of breath 68.7%,whereas fever is the least common presentation 17.5%. Srinivasa k et al[11] in his study found cough (100%) and Wheeze (100%) are the most common presenting complaints of asthma where as fever (12%) is the least presenting complaint of asthma .The difference in presenting features of asthma may be due to the phenotypic variants of asthma.

Majority (48.7%) of cases are intermittent asthma and mild persistent asthma combined,followed by moderate persistent asthma(42.5%),whereas least%(8.7%) of cases are severe persistent asthma. An improvement of PEFR 20-25% post nebulization is seen most commonly in intermittent asthma and mild persistent asthma(85.2%).An improvement of PEFR 26 to 30% post nebulization is seen most commonly in moderate persistent asthma(54.5%).An improvement of PEFR >31% post nebulization is seen most commonly in moderate persistent asthma(70.8%) followed by severe persistent asthma.

**CONCLUSION:** :. Asthma is more common in younger age groups, in urban areas and male children. The main risk factors for asthma are family history of asthma, history of smoking habits in the family and personal history of atopy(P Value<0.05 ). Most common presenting feature/complaint of asthma is wheeze. The main triggering factor for asthma is cold and dust combined followed by dust alone

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