



RESEARCH ARTICLE

A STUDY TO ASSESS THE OCCURRENCE OF ASTHMA AND ITS RISK FACTORS AMONG CHILDREN WITH RESPIRATORY SYMPTOMS IN A SELECTED DISTRICT HOSPITAL OF WEST BENGAL

Tannistha Maji and Smt. Mitali Adhikary

Manuscript Info

Manuscript History

Received: 15 November 2022

Final Accepted: 18 December 2022

Published: January 2023

Key words:-

Occurrence, Asthma, Risk Factors, Children, Respiratory Symptoms

Abstract

Objective: Asthma is the most common chronic childhood disease being increasingly diagnosed in recent years. The objective of study was to determine the occurrence and risk factors of asthma and their association.

Methods: The conceptual model adopted was based on epidemiological triad. Consecutive sampling technique was done to select 203 children of age group 6 to 12 years attending OPD in Diamond Harbour District Hospital. The measuring tool used were record analysis, structured and semi structured interview schedule and physical assessment recording proforma. Validity of tool was done by seven experts. Reliability was established by inter rater method.

Results: The occurrence of asthma was 21.2%. On analysis among risk factors exposure to tobacco smoking during pregnancy (OR 3.76), needed NICU admission (OR 3.1) low birth weight (OR 3.58), first born child (OR 2.5), hospitalization before 2 yrs of age due to RTI (OR 9.76), family H/O different allergic symptoms (OR 6.31), family H/O of asthma (OR 14.29), residence near busy road (OR 2.25) and industrial area (OR 5.02), overcrowding (OR 2.22), damp in bedroom (OR 2.02) presence of domestic animal (OR 2.72) had significant association. Smoke producing and mixed type cooking fuel (OR 7.46), overweight (OR 12.8), seasonal variation (OR 12.1) and different triggering factors (OR 17.59) were significantly associated.

Conclusions: The occurrence of asthma was 21.2% which was much higher than previously reported. Age group 6-9 yrs was commonly affected. In this study males (26%) had higher asthma occurrence than the females (13.8%) and it was statistically significant ($p=0.037$). The male: female ratio is 1.26: 1. Family history of asthma or allergy, previous hospitalization due to RTI, exposure to smoke and smoking were found to be significant risk factors for development of asthma.

Copy Right, IJAR, 2023,. All rights reserved.

Introduction:-

Everyday our bodies take in more air than any other substances. According to Global Asthma Report 2018 out of 1.31 billion people, 6 percent children suffer from asthma in India. The word 'asthma' is Greek, meaning 'breathless' or 'to breathe with open mouth'. It is a multifactorial disease and is the result of interaction between a genetically determined predisposition to allergen and environmental factors that serve to enhance inflammation to

the lower airway.¹ Although asthma remains primarily a wheezing disease, not all children who wheeze progress to develop asthma at a later age. Wheezing among infant and toddlers especially during the first 2 years of life poses a diagnostic difficulty, which can be a major concern to both physicians and parents. Some children appear to have limited wheezing episodes while others have recurrent episodes that persist into adolescence. Most of these children are labeled with a diagnosis of asthma.² Although some 50% of preschool children have wheezing, only 10%–15% have a diagnosis of “true” asthma by the time they reach school age.³ Higher rate of asthma is illustrated in children of school age in several studies.

Methods:-

A descriptive study was designed with a sample size of 203 children of age group 6-12 years. Literature search for data sources was done through an extensive search in indexed journals and website based reports. This study is a questionnaire based study carried out in OPD of a District Hospital. The questionnaire was asked to children with respiratory symptoms with the help of their parents. Selection of asthma were based upon the Physician's diagnosis by analysis of OPD tickets. After obtaining consent the participants were interviewed as per the questionnaire to collect data regarding epidemiological factors, risk factors and BMI also recorded. The statistical analysis was done by using SPSS software. The study protocol was approved by Institutional Ethics Committee. Chi square test of significance were carried out to test the differences between proportions. To determine independent effect of various risk factors, regression analysis was performed and adjusted OR with their 95%CI is reported $p < 0.05$ was considered as significant.

Results:-

The tabulated data were analyzed by using chi square test and odds ratio. Among these 203 study population asthma was 43 that is 21.2% and non asthma is 160 which is 78.8%. On analysis, the socio demographic variables found to be statistically significant was male gender (odds ratio[OR]= 2.2; confidence interval[CI]=1.039-4.684), Data also shows that maximum numbers are moderate persistent 37.2% and mild intermittent 34.9% followed by mild persistent 25.6%. Least common type is severe persistent that is 2.3%. Most common symptoms among the asthma cases were wheeze (83.7%) and nocturnal exacerbation (93%). The others are recurrent cough (60.5%), allergic rhinitis (55.8%). Atopic dermatitis (44.2%) also an important presenting history among the asthma children. Non asthma cases were also presented with recurrent cough (56.9%), wheeze (44.4%), nocturnal exacerbation (3.8%), atopic dermatitis (2.5%) and allergic rhinitis (7.5%) but much lowered than that.

Table 1:- Age and sex distribution of the participant.

Socio demographic variables	Male	Female
Age		
a) 6-9 yrs(116)	68(58.6)	48(41.4)
b) 9-12 yrs(87)	55(63.2)	32(36.8)
Total =203	123(60.6)	80(39.4)

According to modified BG Prasad scale, out of 203 study participant 15(7.4%) belonged to the upper class. Eighty four (41.4%) belonged to middle class, eighty(39.4%) belonged to lower middle class and the remaining 24 (11.8%) belonged to the lower class. Among socio demographic variables researcher found statistically significant relation between nuclear type of family (OR 2.93), broken family (OR 10.39), and lower socio economic status(OR 5.769) with the occurrence of asthma. Researcher has studied socio economic status by using modified BG Prasad scale. It is supported by Paramesh H⁴ and Kaur S, D. Behera, D. Gupta, S. K. Verma⁵.

On analysis, significant association is found with asthma are low birth weight (OR 3.585), NICU admission (OR 3.160). The current study also found that the presence as well as the number of episodes of LRTI in infancy was associated with an increased prevalence of asthma in children and it causes hospitalization under 2 yrs of age for respiratory problem (OR 9.764). This is supported by George CE, Chopra H, Garg S. K., Bano T, Jain S et al⁶ who found low birth weight and the occurrence of LRTI in infancy (odds ratio [OR] = 14.11) to be associated with asthma.

Table 2:- Association between occurrence of asthma with atopy and allergic symptoms.

n=203

n_{asthma}=43n_{no asthma}=160

Variables	Asthma	No asthma	Chi square	df	Odds ratio	95% CI	P value
Food allergy							
a) Yes	11	16	7.137*	1	3.094	1.312-7.296	0.008
b) No	32	144					
Skin rash which come and go off and on							
a) Yes	8	5	13.549*	1	7.086	2.186-22.968	0.000
b) No	35	155					
Sneezing or running nose							
a) Yes	16	13	23.413*	1	6.701	2.896-15.507	0.000
b) No	27	147					
Itching of eyes							
a) Yes	13	6	28.018*	1	11.122	3.918-31.575	0.000
b) No	30	154					
Family H/O allergic symptoms							
a) Yes	21	21	26.342*	1	6.318	2.973-13.426	0.000
b) No	22	139					
Family H/O asthma							
a) Yes	17	7	40.190*	1	14.291	5.399-37.830	0.000
b) No	26	153					

 χ^2 df(1) = 3.84, p < 0.05 significant*

Overcrowding is seen in majority (55.8%) of house of the asthma children .They also have poor ventilation (62.8%). Damp in room (46.5%) is also not negligible. Till now 9.3% use kerosene lamp as source of light among the asthma children. Furry domestic animal is present in 23.3% of asthma cases whereas 67.4% of the asthma cases used to cook within room. Presence of separate kitchen (OR 0.437) and kitchen window (OR 0.35) had protective effect.

Discussion:-

Bronchial asthma is a chronic respiratory illness of Global importance. In current study the occurrence of asthma is 21.2% among 6-12 years old children with respiratory symptoms. The median age of the sample is 9 yrs. In 6-9 yrs the occurrence is 20.7% and in 9-12 yrs it is 21.8%. This finding is supported by the study of Paramesh H⁴ where prevalence of asthma was 19.34% among the school children in heavy traffic region. In this study occurrence of asthma is more in males (OR 2.206). Many asthma prevalence studies done across the globe have reported a male predominance of the disease. The male predominance is also reported by Bai P, Naik G, Ravikumar P⁷ but not statistically significant (P = 0.51950), Narayanappa D, Rajani HS, Mahendrappa KB, Ravikumar VG⁸ and George CE, Chopra H, Garg S. K., Bano T, Jain S et al⁹ (P = 0.78). This fact may be related to a greater degree of bronchial lability in males.

The present study reveals that most of the parents of asthma patients have secondary education (father 55.8% and mother 46.5%).Only 2.3% of parents are illiterate. There is no significant association between parental education and asthma like the study of Jain A, Vinod Bhat H, Acharya D¹⁰.

In this study, majority of mothers of asthma children gave their child birth before 25 years of age but the association is not significant. 46.5% mother of asthma children are exposed to tobacco smoking during pregnancy which is significantly associated with asthma and supported by Bai P, Naik G, Ravikumar P⁷.

Many studies have reported a significant association of asthma and caesarian delivery; but this study does not show the significant association between caesarian delivery and asthma (P > 0.05).

The present study reveals significant relationship between family history and asthma (OR 14.29). Most of the studies show correlation with this factor. Paramesh H⁴ observed that the incidence of asthma in children, if one parent is having asthma, is 18%, in case of one sibling having asthma, the incidence is 1.65% and where grand parents have asthma, the incidence is 4%. Cheraghi M, Dadgarinejad A and Salvi S¹¹ showed a positive family history of atopy emerged to be the strongest risk factor for development of asthma (adj. OR: 6.55; CI: 4.59–9.35). Jain A, Vinod Bhat H, Acharya D¹⁰ showed prevalence of asthma was almost thrice (18.8%) among children with a family history of asthma/ allergy compared to that of those without a family history of asthma (6.3%). This association was found to be statistically significant ($\chi^2=20.45$, $df=1$, $p=0.0001$). Kaur S, D. Behera, D. Gupta, S. K. Verma⁵ also supported the fact. The clinical relationship among asthma, allergic rhinitis and atopic dermatitis, the so-called (“allergic triad”), is well known. The vast majority (80%) of patients with asthma have allergic rhinitis, whereas 19%-38% of patient with allergic rhinitis have co existing asthma. In this study also most of the asthma children have any of the symptoms such as food allergy (25.6%), atopic dermatitis (18.6%), allergic rhinitis (37.2%) and the relationship is statistically significant. Narayanappa D, Rajani HS, Mahendrappa KB, Ravikumar VG⁸ and Narayana PP, Prasanna MP, Narahari SR, Guruprasad AM¹² also found the similar relationship. A study conducted by Qureshi UA, Bilques S, ul Haq I, Khan MS, Qurieshi MA et al¹³ reported that the family history of asthma (odds ratio [OR] =8.174; confidence interval [CI] =4.403–15.178), seasonal cough (OR = 4.266; CI = 2.336–7.791), allergic rhinitis (OR = 2.877; CI = 1.414–5.852), atopic dermatitis (OR = 6.597; CI = 2.72–16.004) were found to be statistically significant. Food allergy is a proven risk factor in asthma and can increase morbidity in asthma children. Among 6-12 year old children in this study, 25.6% of children with reported food allergy had asthma, where 74.4% without reported food allergy had asthma. It is supported by Mathew AC, Prince TG, Remees R¹⁴ where having food allergies (OR=2.36, 95% CI 1.19 - 4.68) significantly associated with asthma.

In this study residence near busy road (OR 2.252) and industrial area (OR 5.029) have significant association with asthma and it is supported by Paramesh H⁴ where he found that frequent passage of trucks through the street near home (odds ratio [OR]: 95% CI, 1.7 [1.2-2.4]) were independently associated with occurrence of recent wheezing.

Another important finding of the current study is significant association of asthma with age of house without maintenance, overcrowding (OR 2.22), inappropriate window and damp in room (OR 2.02). Mathew AC, Prince TG, Remees R¹⁴ found poor ventilation as a risk factors. Cheraghi M, Dadgarinejad A and Salvi S¹⁰ showed association of dampness at home (adj. OR:1.59; CI: 1.07–2.38), with asthma. Inadequate ventilation in homes may lead to increased dampness, which in turn facilitates growth of fungus and moulds which can induce asthma symptoms. Poor ventilation can also predispose to viral infection of the respiratory tract.

The study has observation that significant association is present between habit of cooking within room/or no separate kitchen and use of smoke producing cooking fuel with asthma. Cheraghi M, Dadgarinejad A and Salvi S¹⁰ also found the association of absence of separate kitchen (adj. OR:2.33; CI: 1.35–4.02), and use of bio mass fuel for cooking (adj. OR: 2.49; CI: 1.07–8.04). Bai P, Naik G, Ravikumar P⁷ also found association with smoke producing cooking fuel.

This study also shows association with association of asthma with type of blanket and furry domestic animal. Sharma SK, Banga A¹⁵ supports the association with presence of domestic animal like cat. Mathew AC, Prince TG, Remees R¹⁴ found pillows made up of wool, foam or synthetic material were significantly associated (OR= 2.7).

It is observed in this study that exposure to passive smoking is a significant risk factor (OR 2.235) for asthma. It is supported by several studies such as Sharma SK, Banga A¹⁵ who reported maternal smoking (OR: 95% CI, 1.5, [1.1-2.1]), paternal smoking (OR: 95% CI, 1.3 [1.0-1.8]), total number of cigarettes smoked by both parents of more than seven per day (OR: 95% CI, 1.9 [1.3-2.7]) were independently associated with occurrence of recent wheezing (in the last 12 months). Paramesh H⁴ and Cheraghi M, Dadgarinejad A and Salvi S¹⁰ reported in the study that the presence of smoker at home (adj. OR: 1.48; CI:1.00–2.20) was one of the strongest risk factor associated with childhood asthma. It was also supported by Jain A, Bhat VH, Acharya D¹¹. Therefore smoking cessation by parents and relatives would benefit their child's health status.

Association with seasonal variation is an important observation of this study and it is supported by Narayana PP, Prasanna MP, Narahari SR, Guruprasad AM¹³.

In this study exposure to different triggering factors like infection, exercise, smoke and dust, strong smell, fear and drug cause exacerbation of asthma. GINA 2015¹⁶ and epidemiological survey and risk factor analysis of asthma in China discussed about the presence of triggering factors and occupational allergens. Salvi SS, Apte KK, Dhar R, Shetty P, Faruqi RA et al¹⁷ also found the significant role of different triggering factors.

Another important finding of this study is significant association of asthma with high BMI or obesity. Studies like Ohman MJ, Inger K, Xiao-Mei, Maignus W, Anna B¹⁸ found obesity as a significant risk factor.

Conclusion:-

Bronchial asthma is an important health problem among school going children. In the present study, children with respiratory symptoms presented commonly with wheeze (83.7%) and nocturnal exacerbation (93%). Rural areas had higher prevalence compared to urban areas. Male predominance is seen. Absence of breast feeding and viral lower respiratory infections may all be involved in the etiology of childhood asthma. Age groups 6-9 years were commonly affected. This study reveals asthma prevalence is significantly associated with epidemiological factors such as family history of allergy, lower socioeconomic status, and use of fire wood for cooking.

Strength of the study:

It is a community based study and probably new initiative done on the occurrence of asthma and its risk factors in children with respiratory symptoms from rural areas of West Bengal.

Limitations

Asthma was diagnosed clinically by the Physician but not confirmed by any investigations.

Future scope

The study can be further expanded in a large geographical area with a large sample size to get a more generalized picture.

Acknowledgement:-

I am immensely grateful to Prof. Smritikana Mani, Principal, College of Nursing, Medical College and Hospital, Kolkata-73 who taught me to toddle through the difficult terrains of research. She has always supported me during this study from the very moment of its inception, and I found her able guidance pioneering me whenever I stumbled at some arduous point.

References:-

1. Asthma Insights and Reality in Europe (AIRE) study. Eur Respir J. 2007; 16(5):802-7.
2. Bracken MB, Belanger K, Cookson WO, Triche E, Christiani DC, Leaderer BP . Genetic and perinatal risk factors for asthma onset and severity: a re-view and theoretical analysis. Epidemiology Rev 2002; 24: 176-189.
3. Singh D, Sobti PC, Arora V, Soni RK. Epidemiological study of asthma in rural children. Indian J Community Med 2002; 27:167-70.
4. Paramesh H. Epidemiology of Bronchial Asthma in India. Indian J Pediatr 2002;69:309- 12.
5. Kaur S, D. Behera, D. Gupta, S. K. Verma. Demographic and Environmental factors in patients of bronchial asthma. Indian J Allergy Asthma Immunol. 2008; 22(2): 85-89.
6. George CE, Chopra H, Garg S. K., Bano T, Jain S, Kumar A. International Journal of Contemporary Pediatrics. 2014 Nov; 1(3):160-163.
7. Bai P, Naik G, Ravikumar P. Study of prevalence of bronchial asthma in school children of 6–12 years of age in rural schools of Tumakuru district. Indian Journal of Allergy, Asthma and Immunology. July-December 2017; Volume 31(2):56-60.
8. Narayanappa D, Rajani HS, Mahendrappa KB, Ravikumar VG. Prevalence of asthma in urban school children in Jaipur, Rajasthan. Indian Pediatr 2012; 49:835-6.
9. George CE, Chopra H, Garg S. K., Bano T, Jain S, Kumar A. International Journal of Contemporary Pediatrics. 2014 Nov; 1(3):160-163.
10. Jain A, Bhat VH, Acharya D. Prevalence of bronchial asthma in rural Indian children: A cross sectional study from South India. Indian J Pediatric 2010; 77:31-5.

11. Cheraghi M, Dadgarinejad A, Salvi S. A cross sectional study to find prevalence and risk factors for childhood asthma in Pune City, India. *ISRN Public Health*, vol. 2012, Article ID 361456, 8 pages, 2012. doi:10.5402/2012/361456.
12. Narayana PP, Prasanna MP, Narahari SR, Guruprasad AM. Prevalence of asthma in school children in rural India. *Ann Thorac Med* 2010; 5:118-9.
13. Qureshi UA, Bilques S, Ul Haq I, Khan MS, Qurieshi MA, Qureshi UA. Epidemiology of bronchial asthma in school children (10–16 years) in Srinagar. *Lung India* 2016; 33:167-73.
14. Mathew AC, Prince TG, Remees R. Prevalence and risk factors of asthma in school going children in south India. *Nepal Journal of Epidemiology* 2012; 2(1):171-78.
15. Sharma SK, Banga A. Prevalence and risk factors for wheezing in children from rural areas of North India. *Allergy Asthma Proc* 2007;28: 647-53.
16. Pocket Guide for Asthma Management and Prevention in Children 5 Years and Younger | GINA. Available from: <http://www.ginasthma.org/Pocket-Guide-for-Asthma-Management-and-Prevention-in-Children-5-Years-and-Younger>.
17. Salvi SS, Apte KK, Dhar R, Shetty P, Faruqi RA, Thompson PJ, Guleria R. Asthma Insights and Management in India: Lessons Learnt from the Asia Pacific - Asthma Insights and Management (AP-AIM) Study. *Journal of The Association of Physicians of India*. September 2015; Vol. 63:36-43.
18. Ohman MJ, Inger K, Xiao-Mei, Maignus W, Anna B. Early childhood overweight and asthma and allergic sensitization at 8 years of age. *Lancet* 2011;129:70-76.