Original Article

Prevalence And Determinants Of Childhood Asthma: A Study From Western India.

Mohnish N. Tundia[1*], Atul V. Trivedi[2], Dhara V. Thakrar[3]

[1*,3]Associate Professor, C. U. Shah Medical College, Surendranagar, Gujarat, India
[2]Associate Professor, Government Medical College Bhavanagar, Gujarat, India

***Corresponding Author:** Dr. Mohnish N. Tundia

*Associate Professor, C. U. Shah Medical College, Surendranagar, Gujarat, India, Phone (or Mobile) No.: 91-8200758331, Email:mohnishtundia86@gmail.com
DOI:10.47750/pnr.2023.14.S01.174

Abstract

Background: Asthma is a common disease worldwide with significant ethnic and regional variations. This study will provide evidence about the prevalence of asthma and will highlight level of problem in community.

Objectives: To estimate prevalence of asthma and its determinants

Methods: This study was conducted in school-going children of standard 5 to 8 in Bhavnagar city in 2015. Sample size was 1428. All schools of Bhavnagar city were listed and required number of schools were selected randomly and approached for consent. Study forms were filled up by personal interview and physical examination followed by house to house visits. Data entry and analysis were done using software Epi info 7. Chi square test was calculated.

Results: Total prevalence of asthma was 9% (129/1428). Out of these, 61.18% were female and 38.82% were male children. It was found 36.43% in age group of 11 years and 47.3% in children of lower socio economic class. In out study, 28.68% had history of smoking by any family member ($p < 0.05$). No significant association was fount between asthma and family history, pets, type, place, cross ventilation in kitchen.

Conclusion: Female children are 1.58 times more likely to develop asthma than male children. Children whose family members smoke are 2.35 times more likely to develop asthma.

Key words: Asthma, Prevalence, Gender, Passive Smoking

INTRODUCTION

Asthma is a common disease worldwide with significant ethnic and regional variations. An increasing morbidity and mortality, as well as health care burden from asthma has been recognized lately. There has been a change in the epidemiology and clinical spectrum of asthma with an apparent increase in the overall prevalence. The prevalence of asthma worldwide is around 200 million with a mortality of around 0.2 million per year. Asthma is the most common chronic disease among children causing substantial morbidity. Increases in the rates of hospital admission and primary care contacts for asthma in childhood have led to concern that the prevalence or severity of wheezing illness may be increasing in children. [1, 2]

In India, rough estimates indicate prevalence 10% to 15% in 5 to 11 year old children. An estimated 57,000 deaths were attributed to Asthma in 2004. There has been a constant increase in asthma prevalence worldwide in the last two decades, and the same is being observed in India. There is a wide variation found in the prevalence of asthma within Southern Asia. There has been a marked increase in the prevalence of asthma in Southern Asia reported over the last two decades with up to threefold increase in children3. There were only few data on asthma prevalence from developing countries. Then after the International Study of Asthma and Allergies in Childhood (ISAAC), has provided valuable data on the prevalence of the symptoms of childhood asthma, rhino-conjunctivitis and eczema for international comparison from countries with different socio-economic backgrounds. [3-5]

The urban environment has a number of features that could have adverse effects on children's respiratory health, especially during the first few years of life when the lung and immune system are rapidly developing. It is possible that asthma risk is high because of exposure to adverse conditions, such as pollutants, cockroach or mouse allergens, stress, or the development of obesity. Environmental tobacco smoke (ETS) exposure from parents and the use of biomass fuels are also related to the severity of asthma and emergency department visits of asthmatic children. Lack of social support, lower educational level is also associated with increased risk of prevalent and incident chronic bronchitis and asthma. Poorly controlled asthma is associated with significant morbidity and socio-economic problems such as the absenteeism from school/work, loss of productivity/wages, poor quality of life and economic burden1. [1, 6, 7]

Studies have reported higher incidence of psychosocial adaptation problems in children with asthma, particularly severe asthma, than children in the general population. This has been ascribed to adverse developmental impact of having a chronic health problem, increased demands on the family and dysfunctional familial interactional patterns. Asthma can result not only in impaired lung function of inadequately treated patients, but also in impaired quality of life for the sufferer. [8,9]

With this back ground, current study was carried out with objectives: to find out prevalence and determinants of childhood asthma which will help in further etiological research and to obtain measures for assessment of future trends in prevalence. Looking at current scenario and increase in number of asthmatic conditions in children with lack of data at state level this study will highlight level of problem in community and thus will help health planner and policy makers to channelize resources to address this problem at community level. The prevalence rate of asthma in this study will help to obtain baseline measures for assessment of future trends in prevalence and severity of childhood asthma.

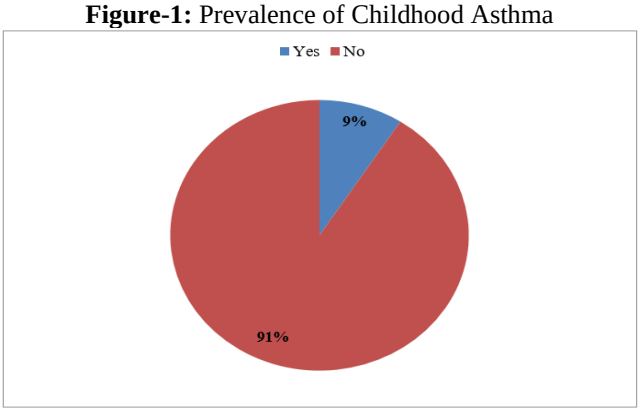
METHODS:

The present study was carried out in Bhavnagar city, Gujarat. Cross sectional study was conducted in Schools of urban area of Bhavnagar Municipal Corporation (BMC). Study duration was from November 2014 to August 2015. As of 25% prevalence was found from various studies, it was taken 25 and calculated sample size from the formula $4PQ/ L^2$ was 1260 including 5% non response rate. To overcome recall bias and sampling error, final sample size of 1428 was taken.

Study was submitted for ethical and IRB approval to Institutional Review Board, Govt. Medical College, Bhavnagar. Out of total 17 wards of Bhavnagar, 6 were selected by Multi Stage Sampling Method. Personal interviews were done with all the subjects defined under study protocol. All schools of Bhavnagar city were listed and required number of schools was selected randomly. Out of the total schools selected from six wards, 12 schools were running under BMC and two schools were private. Selected schools were approached for consent to conduct this study in their premises. After consent from school authorities school children were approached for parent's written consent. After obtaining it, study form was filled up by personal interview and physical examination. Whenever necessary, parents were communicated for further clarification and getting right information. The school going children in this study were not clinically assessed for asthma. In this study asthma prevalence was based on self-reports of the parents of children, so there might be chances of misreporting of asthma status of their children. This study was carried out by interviewing the respondents, so there may be chances of interviewer bias and respondent's bias. These might be the limitations of current study. Data entry and analysis were done using software Epi info 7. Chi square test was calculated.

RESULTS

Figure-1: Prevalence of Childhood Asthma



Prevalence of asthma in school going children was 9.03%. (Figure-1)

Table-1: Association of Childhood Asthma with Socio-demographic variables (N=1428)

Variables	Childhood Asthma		Total (%)	X^2 (p)
	Present (%) n=129	Absent (%) n=1299		
Gender				
Male	50 (38.82%)	647 (49.85%)	697 (48.81%)	$X^2 = 5.732$
Female	79 (61.18%)	652 (50.15%)	731 (51.19%)	$p < 0.05$
Age				
9	02 (1.55%)	29 (2.23%)	31 (2.17%)	
10	20 (15.50%)	290 (22.32%)	310 (21.71%)	
11	47 (36.43%)	324 (24.94%)	371 (25.98%)	$X^2 = 12.929$
12	39 (30.23%)	337 (25.94%)	376 (26.33%)	$p < 0.05$
13	21 (16.28%)	298 (23.0%)	319 (22.3%)	
14	00(0.00%)	21 (1.6%)	21 (1.5%)	
SE Class				
Class-1	0 (0.00%)	18 (1.39%)	18 (1.26%)	
Class-2	03 (2.33%)	39 (3.00%)	42 (2.94%)	
Class-3	12 (9.30%)	84 (6.47%)	96 (6.72%)	$X^2 = 3.7506$
Class-4	61 (47.29%)	585 (45.03%)	646 (45.24%)	$p > 0.05$
Class-5	53 (41.09%)	573 (44.11%)	626 (43.84%)	

Table-1 shows socio-demographic profile of participants and its association with asthma. In present study prevalence of asthma was found more in girls (10.81%) than in boys (7.17%) in Bhavnagar. Maximum prevalence was observed in children of age of 11 years and that was 36.43%, followed by 1.55 %, 15.50%, 16.28% and 30.23% in age groups of 09, 10, 13-14 and 12 years respectively. Prevalence of asthma was observed higher in female children (61.18%) as compared to male children (38.82%). Most of the children in study were from middle or lower Socio-economical class. Prevalence of asthma was also found higher in this class. It was found that 47.29% of students having asthma were from class-4 according to Socio-economical classification whereas the prevalence was 2.33%, 9.30% and 41.09% in class-2, 3 and 5 respectively. Age and gender were found to be associated significantly with childhood asthma.

Table-2: Association of Childhood Asthma with environmental variables (N=1428)

Environmental variables	Childhood Asthma		Total (%)	X^2 (p)
	Present (%) n=129	Absent (%) n=1299		
Smoking by family member				
Present	37 (28.68%)	191 (14.70%)	228 (15.97%)	$X^2 = 17.08$
Absent	92 (71.32%)	1108 (85.30%)	1200(84.03%)	p <0.05
Family h/o Asthma				
Yes	24 (18.60%)	168 (12.93%)	192 (13.45%)	$X^2 = 3.2436$
No	105 (81.40%)	1131 (87.07%)	1236 (86.55%)	p >0.05
Pets in house				
Yes	10 (7.75%)	63 (4.85%)	73 (5.11%)	$X^2 = 2.0374$
No	119 (92.25%)	1236(95.15%)	1355 (94.89%)	p >0.05

Table-2 shows Association of Childhood Asthma with environmental variables. It shows that Out of all asthmatic school going children (N=129), 37 (28.68%) had history of smoking by any family member. Observed difference was statistically significant. Out of total asthmatic children, 18.60% had positive family history, while 12.93% children were non asthmatic even with positive family history. Observed difference was non-significant. Out of all asthmatic school going children (N=129), 10 (7.75%) children had pets in their house. No significant association was found for that.

Table-3: Association of Childhood Asthma with type, place and ventilation in kitchen

Environmental variables	Childhood Asthma		Total (%)	X^2 (p)
	Present (%) n=129	Absent (%) n=1299		
Cross ventilation in kitchen				
Present	86 (67.67%)	808 (62.20%)	894 (62.61%)	$X^2 = 0.999$
Absent	43 (33.33%)	491 (37.80%)	534 (37.39%)	p >0.05
Types of kitchen				
Modern	48 (37.21%)	473 (36.41%)	521 (36.48%)	$X^2 = 0.0321$
Traditional	81 (62.79%)	826 (63.59%)	907 (63.52%)	p >0.05
Place of kitchen				
In living room	78 (60.47%)	821 (63.20%)	899 (62.96%)	$X^2 = 0.377$
Separate	51 (39.53%)	478 (36.80%)	529 (37.04%)	p >0.05

Out of total children, 48 (37.21%) had modern kitchen, 51 (39.53%) had separate kitchen and 88 (66.67%) had cross ventilation in their kitchen. Association was not found to be significant. (Table-3)

DISCUSSION

Asthma is an important public health problem in today's ever developing society. Asthma in children not only resulted in death but also affect their study by school abstinence due to breathlessness, who will become burden for family and the society as well. Since asthma is an important cause of morbidity, this study was taken up to find out prevalence, risk factors and its effect on daily activities of children. The present study shows 9% prevalence of asthma in school going children of 5 to 8 standard in Bhavnagar city which is consistent with other study carried out at different time and place. Same prevalence was observed in study from Uttar Pradesh. Lower prevalence was observed in studies by Cheraghi M et al and Narayana P et al. The reason for this difference can be the difference time and geographical areas. In this study the prevalence of asthma was more in children between the age-group of 11-12 years (66.66%) as compare to children of age-group between 9-10 years (17.05%). There are several other studies which showed constant prevalence of childhood asthma for all age groups defined under study protocol. Cheraghi M et al. in their study in Pune in 2008-2009 found that prevalence was 7% in 6-7 years of age and 6.3% in 10-13 years of age.[10-12]

In present study prevalence of asthma was found more in girls (10.81%) than in boys (7.17%) in Bhavnagar. In current study, female children are 1.58 times more likely to develop asthma than male children. This result of current study is not matched with the similar kind of community based study, which shows more prevalence in boys. In a study Jain A et al. found 12.1% prevalence of asthma in male children and 8.4% in female children in 2008-09 in Manipal. Behl R et al. found 3.1 and 1.4 percent prevalence of asthma in boys and girls respectively in Shimla in 2009. Most of the children in current study in Bhavnagar were from middle or lower Socioeconomical class. Prevalence of asthma was also found higher in this class. It was found that 47.29% of students having asthma were from class-4 according to Socioeconomical classification. Observed difference found no statistical association between Socioeconomical class of family and asthma causation. The result of this study is steady with **Al–dawood K et al**. who also did not found significant association

between Socioeconomical class and development of asthma in children. In their study they found that 15 % schoolboys were belonging to upper socio-economic class families as against 51 % and 34 % in the middle and lower socioeconomic classes, respectively.[13-15]

Out of all asthmatic school going children (N=129), 28.7% had history of smoking by any family member, 18.6% had positive family history of asthma, 7.8% children had pets in their house, 66.7% had cross ventilation in their kitchen, 37.2% had modern kitchen, 39.6% had separate kitchen. Out of all these data the observed difference was significant statistically only between smoking by family member and asthma in children. Those children's whose family members smoke are 2.35 times more likely to develop asthma in childhood than those children whose family members do not smoke. These results are consistent with several other studies. Pokharel et al found significant association with passive smoking (0.004). There was no association with family history of asthma (0.17). Cheraghi et al in their study in Pune in 2008-2009 found that the prevalence of asthma in children was associated significantly with presence of smoker at home.[11,16]

CONCLUSION

Present study concludes that the prevalence of asthma in school going children was 9.03%. Girls had shown higher prevalence as compare to boys. The prevalence was more in age group of 11-12 years. Children from lower socio economical class were affected more than the higher social class children. Observed difference was statistically significant between Smoking by family members and asthma in children. Other parameters like family history of asthma, pets in hose, cross ventilation in kitchen, type and place of kitchen had not statistically significant difference with asthma in child.

Recommendations

So, there is a need to give education and spread awareness regarding causative factor of asthma. We should view asthma as an issue that needs urgent attention aimed at reducing health, social and economic impacts. Life style modification can be one measure for awareness. We should avoid contact with the factors responsible for its exacerbations. Intensify asthma awareness campaigns about the impact of asthma. To provide health education to public regarding causes of asthma, prohibition of smoking at public and private places. School teachers can perform a major role by giving education regarding good hygiene.

Limitations

Following are the limitations of this study:

- The school going children in this study were not clinically investigated with various laboratory test for asthma.
- Asthma prevalence was based on self-reports of the parents of children, so there might be chances of malreporting of asthma status of their children and recall bias.
- This study was carried out by interviewing the respondents, so there may be a chances of interviewer bias and respondents bias.

ACKNOWLEDGMENT

We are thankful to school management to give permission to carry out study in their premises. We are also thankful to children and their parents to take participation in this study.

Financial Support: None declared

Conflict Of Interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Govt. Medical College, Bhavnagar

REFERENCES

1. Asthma guidelines.pdf [Internet]. [cited 2015 Jul 31]. Available from: http://www.indiachest.org/pdf_files/Asthma%20guidelines.pdf
2. PT=49(934-937) AJ11.pdf [Internet]. [cited 2015 Aug 1]. Available from: http://sphinxsai.com/vol3.no2/pharm/pharmpdf/PT=49(934-937)AJ11.pdf
3. WHO | Bronchial asthma [Internet]. WHO. [cited 2015 Sep 13]. Available from: http://www.who.int/mediacentre/factsheets/fs206/en/
4. Masoli M, Fabian D, Holt S, Beasley R, Global Initiative for Asthma (GINA) Program. The global burden of asthma: executive summary of the GINA Dissemination Committee Report. Allergy. 2004 May 1;59(5):469–78.
5. Lai CKW, Beasley R, Crane J, Foliaki S, Shah J, Weiland S, et al. Global variation in the prevalence and severity of asthma symptoms: phase three of the International Study of Asthma and Allergies in Childhood (ISAAC). Thorax. 2009 Jun;64(6):476–83.
6. Gern JE. The Urban Environment and Childhood Asthma Study. J Allergy Clin Immunol. 2010 Mar;125(3):545–9
7. Jindal SK. Effects of smoking on asthma. J Assoc Physicians India. 2014 Mar;62(3 Suppl):32–7
8. Pal R, Dahal S, Pal S. Prevalence of Bronchial Asthma in Indian Children. Indian J Community Med Off Publ Indian Assoc Prev Soc Med. 2009 Oct;34(4):310–6.
9. 11. 324-328.pdf [Internet]. [cited 2015 Aug 1]. Available from: http://www.kumj.com.np/issue/15/324-328.pdf
10. Sharma CM. Prevalence of asthma in school children of rural areas of Kanpur, Uttar Pradesh. JEMDS. 2013;29(2):5298-01.
11. Cheraghi M, Dadgarinejad A, Salvi S, Cheraghi M, Dadgarinejad A, Salvi S. A Cross-Sectional Study to Find Prevalence and Risk Factors for Childhood Asthma in Pune City, India. Int Sch Res Not Int Sch Res Not. 2012 Apr 24;2012, 2012:e361456
12. Narayana PP, Prasanna MP, Narahari SR, Guruprasad AM. Prevalence of asthma in school children in rural India. Ann Thorac Med. 2010;5(2):118–9.

13. Animesh Jain HVB. Prevalence of Bronchial Asthma in Rural Indian Children: A Cross Sectional Study from South India. Indian J Pediatr. 2010;77(1):31–5.
14. Behl RK, Kashyap S, Sarkar M. Prevalence of bronchial asthma in school children of 6-13 years of age in Shimla city. Indian J Chest Dis Allied Sci. 2010 Sep;52(3):145–8.
15. Al-Dawood KM. Schoolboys with bronchial asthma in Al-Khobar City, Saudi Arabia: are they at increased risk of school absenteeism? J Asthma Off J Assoc Care Asthma. 2002 Aug;39(5):413–20.
16. Pokharel PK, Kabra SK, Kapoor SK, Pandey RM. Risk factors associated with bronchial asthma in school going children of rural Haryana. Indian J Pediatr. 2001;68(2):103–6.