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Prevalence of Bronchial Asthma among Secondary School Students

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Abstract

Background: Bronchial asthma, a prevalent chronic respiratory condition, poses a significant health concern among secondary school students in Bangladesh, particularly in the bustling urban centers with associated environmental challenges. ***Objective:*** This study aimed to determine the prevalence of bronchial asthma and its associated factors among secondary school students. ***Method:*** This cross-sectional study, conducted from January to June 2023, aimed to assess the prevalence of bronchial asthma among 250 secondary school students (aged 10-15 yrs) in Bangladesh. The study employed a structured questionnaire, including the International Study of Asthma and Allergies in Childhood (ISAAC) asthma questionnaire, to collect socio-demographic details and assess asthma prevalence. ***Results:*** The findings revealed a mean age of 12.9 years, with an equal distribution of males and females. Notably, 11.6% had been diagnosed with asthma by a doctor. Factors such as sex, age, monthly family income, history of childhood pneumonia, and passive smoking exposure showed significant associations with bronchial asthma. Logistic regression analysis identified being male (OR=2.32, p=0.042), a history of childhood pneumonia (OR=3.10, p=0.007), and maternal asthma (OR=2.739, p=0.032) as predictors of bronchial asthma. The prevalence was higher in males and those with a history of childhood pneumonia or maternal asthma. ***Conclusion:*** This study emphasizes the need for comprehensive health initiatives targeting the identified risk factors to mitigate the impact of bronchial asthma on the health and academic performance of secondary school students in Bangladesh. Addressing childhood pneumonia and reducing passive smoking exposure are crucial strategies for preventing the development of bronchial asthma in this vulnerable population.

Keywords: Bronchial Asthma, Secondary School Students, ISAAC Questionnaire, Childhood Pneumonia, Passive Smoking.

INTRODUCTION

Bronchial asthma, a chronic respiratory condition characterized by airway inflammation and constriction, holds significant prevalence among secondary school students in Bangladesh. This South Asian nation, with its bustling urban centers and environmental challenges, presents a complex landscape contributing to respiratory health concerns among adolescents. The prevalence of bronchial asthma in this demographic has become a focal point for health studies due to its potential impact on academic performance and overall well-being [1-6].

Studies conducted in Bangladesh have highlighted the noteworthy rates of bronchial asthma among secondary school students. Factors such as air pollution, exposure to indoor allergens, socio-economic disparities, and lifestyle habits play crucial roles in exacerbating this condition [6-10]. Understanding the prevalence and determinants of asthma within this demographic is vital not only for early identification and intervention but also for the development of targeted prevention strategies. Addressing these challenges is integral to promoting a healthier environment and better respiratory health outcomes for secondary school students across Bangladesh [11-14].

Recognizing the prevalence of bronchial asthma among secondary school students in Bangladesh underscores the need for comprehensive health initiatives. By delving into the underlying factors contributing to this condition, researchers and policymakers can formulate targeted interventions, raise

awareness, and implement measures to mitigate the impact of asthma on the health and academic pursuits of adolescents in the country.

OBJECTIVE

To assess the prevalence of bronchial asthma among secondary school students.

METHOD

In a cross-sectional study conducted from January to June 2023, 250 secondary school students (both boys and girls, from class VI to X) were purposefully chosen from Brahmanbaria-based secondary school. The sample size was determined using a precision-based formula.

Data collection utilized a structured questionnaire, specifically the International Study of Asthma and Allergies in Childhood (ISAAC) asthma questionnaire. This comprehensive questionnaire had two parts: Part A encompassed socio-demographic details of students and parents, educational background, smoking history, childhood illnesses, and parental medical history. Part B focused on the core asthma questionnaire containing eight queries. Asthma prevalence was determined by recent wheezing episodes in the past 12 months and whether they had received a doctor's diagnosis or treatment for asthma during that period.

Stringent ethical protocols were adhered to throughout the study. The research proposal gained approval from the Ethical Committee of the Diabetic Association of Bangladesh. Written consent was obtained from the school's Headmaster before commencing data collection. Students were briefed on the study's purpose, methods, potential risks, and benefits before obtaining their written informed consent.

The amassed data was meticulously managed and analyzed using SPSS version 23. The prevalence of bronchial asthma was computed along with its 95% confidence interval. Additionally, statistical analyses, including Chi-square tests and logistic regression models, were employed to explore associations between bronchial asthma and various risk factors identified within the student population.

RESULTS

The study included a population with a mean age of 12.9 years and an almost equal distribution of males (51%) and females (49%). The median monthly family income was Tk 15,000 with a range of Tk 4,000-50,000. A majority of the fathers had a high school education (40.4%), while 50.4% had graduate and above qualifications. Mothers predominantly had a high school education (58.4%). Smoking prevalence was low among respondents (1.2%) and mothers (0.8%), while 25.6% of fathers reported smoking. A notable proportion had a history of childhood pneumonia (16.8%), and 11.6% had been diagnosed with asthma by a doctor.

Tabble-1: Demographic profile of the study group

Characteristics	Number (n)	Percentage (%)
Age (Mean±SD) in years	12.9 ± 1.2	-
Sex		
Male	128	51
Female	122	49
Monthly family income (Median) in Tk	15,000 (4,000-50,000)	-
Respondents father education level		
Primary education	17	6.8
High school	101	40.4
Graduate & above	126	50.4
Others	6	2.4
Respondents mother education level		
Primary education	24	9.6
High school	146	58.4
Graduate & above	77	30.8
Others	3	1.2
Smoking status of respondents		
Yes	3	1.2
No	247	98.8
Respondenst' father smoking status		
Yes	64	25.6
No	186	74.4
Respondents' mother smoking status		
Yes	2	0.8
No	248	99.2
No	221	88.4

Figure-1 shows History of childhood pneumonia of respondents. A notable proportion had a history of childhood pneumonia (16.8%)

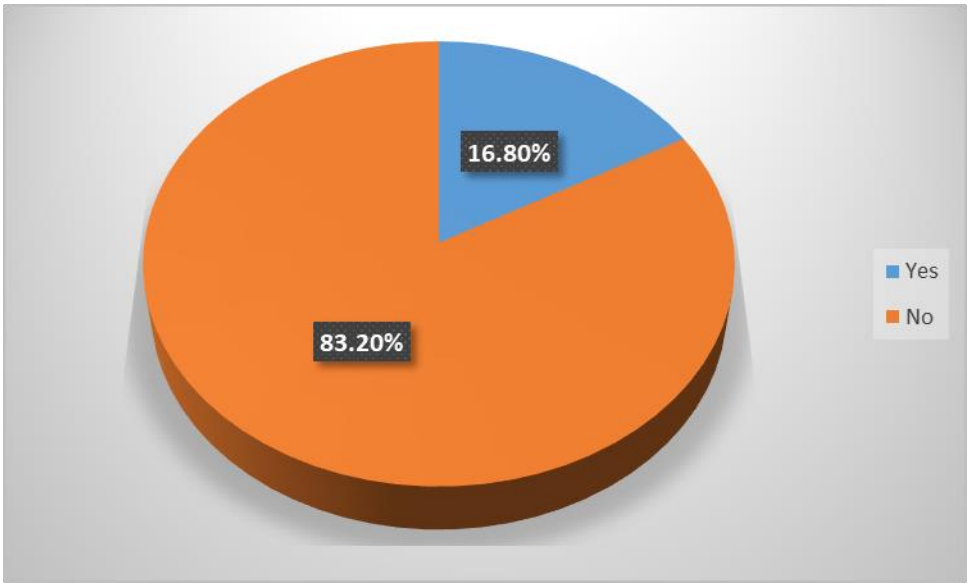

Figure-1: History of childhood pneumonia of respondents

Figure-2 shows 11.6% had been diagnosed with asthma by a doctor.

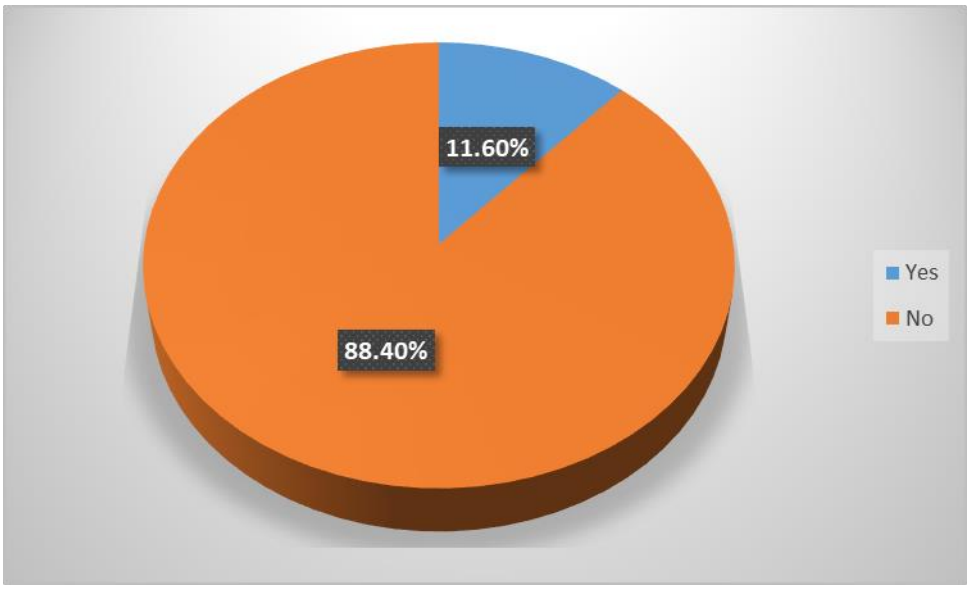

Figure-2: Respondents' asthma diagnosed by doctor

The analysis of factors associated with bronchial asthma revealed several significant findings. There was a statistically significant association between sex and bronchial asthma, with a higher prevalence among females (15.6%) compared to males (7.4%), as indicated by the chi-square test ($\chi2 = 4.14$, $p = 0.042$). Age distribution also showed a significant association, with the highest prevalence observed in the 10-12 age group (13.3%). Monthly family income did not show a significant association. A history of childhood pneumonia was significantly associated with bronchial asthma ($\chi2 = 7.33$, $p = 0.007$), while paternal asthma history showed a marginally significant association ($\chi2 = 4.57$, $p = 0.032$). Additionally, passive smoking exposure was significantly associated with bronchial asthma ($\chi2 = 4.30$, $p = 0.038$). Other factors, such as paternal and maternal eczema, and maternal asthma history, did not show statistically significant associations.

Table-2: Factor associated with bronchial asthma (n=250)

Factor	Bronchial asthma n (%)	No bronchial asthma, n (%)	Chi-square value	P value
Sex	20 (15.6)	108 (84.4)	4.14	0.042*
Male Female	9 (7.4)	113 (92.6)		
Age (years) 10 -12	8 (9.1)	80 (90.9)		0.471
13 -15	21 (13.3)	137 (86.7)	1.50	
16 -18	0 (0)	4 (100)		
Monthly family income (Tk)	7 (8)	80 (92.0)	1.64	0.20
<15000	22 (13.5)	141 (86.7)		
>15000	10 (23.8)	32 (76.2)	7.33	0.007*
History of childhood pneumonia	19 (9.1)	189 (90.9)		
Yes No	3 (21.4)	11 (78.6)	1.39	0.212
History of paternal asthma	26 (11.0)	210 (89.0)		
Yes No	7 (23.3)	23 (76 .7)	4.57	0.032*
History of maternal asthma	22 (10.0)	198 (90.0)		
Yes No	1 (16.7)	5 (83.3)	0.15	0.527
History of paternal eczema	28 (11.5)	216 (88.5)		
Yes No	1(22.0)	4 (80.0)	0.35	0.463
History of maternal eczema	28 (11.4)	217 (88.6)		
Yes No	3 (33.3)	6 (66.7)	4.30	0.038*
Passive smoking Yes	26 (10.8)	215 (89.2)		
No				
*Indicate significant				

The logistic regression analysis, aiming to predict factors associated with bronchial asthma in a sample of 250 individuals, identified several significant associations. Being male was associated with a 2.32 times higher odds of bronchial asthma (95% CI: 1.01-5.33, p = 0.042). A history of childhood pneumonia showed a stronger association, with individuals having 3.10 times higher odds of bronchial asthma (95% CI: 1.32-7.29, p = 0.007). Maternal asthma history was also a significant predictor, with an odds ratio of 2.739 (95% CI: 1.05-7.11, p = 0.032). These results suggest that being male, having a history of childhood pneumonia, and maternal asthma history are important factors in predicting the likelihood of bronchial asthma in the studied population.

Table 3: Logistics regression analysis to predict factor associated with bronchial asthma (n=250)

Dependent variable	Independent variable*	Odds ratio	95% CI	P value
Bronchial asthma	Male	2.32	1.01 -5.33	0.042
	Childhood pneumonia	3.10	1.32 -7.29	0.007
	Maternal asthma	2.739	1.05 -7.11	0.032

DISCUSSION

Prevalence of bronchial asthma among secondary school students in Brahmanbaria city was found to be 11.6%. This prevalence was higher than the prevalence observed in an earlier study conducted in 2000 in urban and rural areas in Brahmanbaria district [15]. Another study conducted in rural Bangladeshi children found that the prevalence of bronchial asthma was 16.1% in the year 2001. It was higher than our study, because they conducted this study in the area where the incidence of acute respiratory infections (ARI), diarrhea and malnutrition was high [16]. In our study the prevalence of bronchial asthma among secondary school students was high which may be explained by different level of air pollution, exposure to allergens and climate condition [17]. Global warming has also got important role play in the increasing of allergic disorders worldwide over the last three decades. Increased temperature and carbon dioxide (CO_2) production due to climate change result in increased production of pollens and fungal spores that could exacerbate symptoms of allergic diseases.

In this study bronchial asthma was found higher in male respondents than female respondents. The exact reason for male predominance is not known but several explanations have been offered. Male predominance may be related to a greater degree of bronchial lability in males. Airways in boys are smaller in comparison to their lung sizes when compared to girls [18]. In a study conducted in Newzealand showed higher rates of sensitivity to indoor allergens among males aged 13 years than their female counterparts as assessed by the skin prick test [19]. May be boys are more exposed to air pollution than girls, because they spend in outside than girls. Similar result was found in India and Japan [20-21]. This study found that the school children had higher risk for bronchial asthma who suffered from pneumonia at early childhood life. In Bangladesh, acute lower respiratory infections (ALRI) are major cause of

morbidity and mortality [22]. These children have higher risk of developing asthma in subsequent years [23]. Among various infectious agents during early life, respiratory syncital virus (RSV) is well known to cause asthma in later life [24,26]. The study did not examine the etiologic agents. The results of the present study are compatible with these observations, indicating the need for attention to post ALRI wheezing to curve the increase of wheezing in children.[25] This study found significant association between maternal asthma and children bronchial asthma. There are many studies which found history of maternal asthma is associated with bronchial asthma among children [16,20]. That influences is more on children than paternal influence, particularly in children less than five years of age possibly due to trans-placental transfer of allergens or cytokines to the fetus [27]. Passive smoking was significantly associated with bronchial asthma among secondary school students. Passive smoking is likely to be the cause of the greater bronchial irritability and the increased bronchial obstruction, which are leads to asthmatic symptom among students [28]. The association between socio-economic status and bronchial asthma was not statistically significant in this study. However the study conducted by K Zaman et al and observed association between monthly family income and bronchial asthma. These factors may cause poor nutrition and predispose for pneumonia which contributes to the subsequent development of wheezing [16]. This study did not find any significant association between age, parental eczema, and paternal asthma with bronchial asthma among school students. This study had some limitations, such as, use of ISAAC questionnaire for the diagnosis of bronchial asthma rather than utilizing tests for bronchial hyperresponsiveness and the study was conducted in a secondary school student only.

CONCLUSION

In summary, this study underscores a heightened prevalence of bronchial asthma among secondary school students in Brahmanbaria city. Factors such as maternal asthma, childhood pneumonia history, and exposure to passive smoking emerge as significant risk indicators for bronchial asthma among this demographic. Furthermore, males exhibit a greater susceptibility to developing bronchial asthma compared to females. Addressing childhood pneumonia and curtailing passive smoking are crucial focal points for minimizing the likelihood of subsequent bronchial asthma development.

Efforts aimed at preventing childhood pneumonia and mitigating exposure to passive smoking are imperative considering the study's findings. Globally, there's a dearth of comprehensive studies focusing on interventions to prevent bronchial asthma. Incorporating health education interventions could potentially play a pivotal role in averting bronchial asthma among secondary school students. This emphasizes the urgent need for targeted preventive strategies and educational initiatives to curb the escalating prevalence of bronchial asthma in this vulnerable population.

REFERENCE

1. Fact sheet of asthma, available at: http://www.who.int/mediacentre/factsheets/fs307/en/ accessed on June 21,2011
2. Behl, R. K., Kashyap, S., & Sarkar, M. (2010). Prevalence of bronchial asthma in school children of 6-13 years of age in Shimla city. *The Indian journal of chest diseases & allied sciences*, *52*(3), 145.
3. The Indian journal of chest diseases & allied sciences 210; 52(3): 145. Sibbald, B., Horn, M.E., (1980), Brain Genetic factors in childhood asthma. Thorax ; 35(9): 671.
4. Colley, J. R. T., Holland, W. W., & Corkhill, R. T. (1974). Influence of passive smoking and parental phlegm on pneumonia and bronchitis in early childhood. *The Lancet*, *304*(7888), 1031-1034.
5. Pullan, C. R., Toms, G. L., Martin, A. J., Gardner, P. S., Webb, J. K., & Appleton, D. R. (1980). Breast-feeding and respiratory syncytial virus infection. *British medical journal*, *281*(6247), 1034.
6. Webb, M. S., Henry, R. L., Milner, A. D., Stokes, G. M., & Swarbrick, A. S. (1985). Continuing respiratory problems three and a half years after acute viral bronchiolitis. *Archives of disease in childhood*, *60*(11), 1064.
7. Burney, P. G., Chinn, S., & Rona, R. J. (1990). Has the prevalence of asthma increased in children? Evidence from the national study of health and growth 1973-86. *BMJ: British Medical Journal*, *300*(6735), 1306.
8. International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee, T. (1998). Worldwide variation in prevalence of symptoms of asthma allergic rhinoconjunctivitis, and atopic eczema: ISAAC. *Lancet (London, England)*, *351*(9111), 1225-1232.
9. Anderson, H. R., Butland, B. K., & Strachan, D. P. (1994). Trends in prevalence and severity of childhood asthma. *Bmj*, *308*(6944), 1600-1604.
10. Lemanske Jr, Busse WW, Allergic disorders 6. Asthma. J Allergy Clin Immunol 2003; 111(2).
11. Pal, R., Dahal, S., & Pal, S. (2009). Prevalence of bronchial asthma in Indian children. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, *34*(4), 310.
12. Woolcock, A. J., Konthen, P. G., & Sedgwick, C. J. (1984). Allergic status of children in an Indonesian village. *Asian Pac J Allergy Immunol*, *2*(1), 7-12.
13. Sino-Jpn J Allergol immunol 1985;(2): 97.
14. Asthma data, available at : http:// www.chestheart.org, accessed on May 5, 2010.
15. Kabir, M. L., Rahman, F., Hassan, M. Q., Ahamed, F., & Mridha, M. A. (2005). Asthma, atopic eczema and allergic rhino-conjunctivitis in school children. *Mymensingh medical journal: MMJ*, *14*(1), 41-45.

16. Zaman, K., Takeuchi, H., Yunus, M. D., El Arifeen, S., Chowdhury, H. R., Baqui, A. H., ... & Iwata, T. (2007). Asthma in rural Bangladeshi children. *The Indian Journal of Pediatrics*, *74*, 539-543.
17. Beggs, P. J. (2004). Impacts of climate change on aeroallergens: past and future. *Clinical & Experimental Allergy*, *34*(10), 1507-1513.
18. Tepper, R. S., Morgan, W. J., Cota, K., Wright, A., Taussig, L. M., & Pediatricians, G. H. M. A. (1986). Physiologic growth and development of the lung during the first year of life. *American Review of Respiratory Disease*, *134*(3), 513-519.
19. Sears, M. R., Burrows, B., Flannery, E. M., Herbison, G. P., & Holdaway, M. D. (1993). Atopy in childhood. I. Gender and allergen related risks for development of hay fever and asthma. *Clinical & Experimental Allergy*, *23*(11), 941-948.
20. Nishima, S., Chisaka, H., Fujiwara, T., Furusho, K., Hayashi, S., Hiraba, K., ... & Tanaka, O. (2009). Surveys on the prevalence of pediatric bronchial asthma in Japan: a comparison between the 1982, 1992, and 2002 surveys conducted in the same region using the same methodology. *Allergology international*, *58*(1), 37-53.
21. Ranabir Pal, R. P., Sanjay Dahal, S. D., & Shrayan Pal, S. P. (2010). Prevalence of bronchial asthma in Indian children.
22. Zaman, K., Baqui, A. H., Yunus, Sack, R. B., Bateman, O. M., Chowdhury, H. R., & Black, R. E. (1997). Acute respiratory infections in children: a community-based longitudinal study in rural Bangladesh. *Journal of tropical pediatrics*, *43*(3), 133-137.
23. Sazawal, S., & Black, R. E. (1992). Meta-analysis of intervention trials on case-management of pneumonia in community settings. *The Lancet*, *340*(8818), 528-533.
24. Henderson, J., Hilliard, T. N., Sherriff, A., Stalker, D., Shammari, N. A., Thomas, H. M., & ALSPAC Study Team. (2005). Hospitalization for RSV bronchiolitis before 12 months of age and subsequent asthma, atopy and wheeze: a longitudinal birth cohort study. *Pediatric allergy and immunology*, *16*(5), 386-392.
25. Sigurs, N., Gustafsson, P. M., Bjarnason, R., Lundberg, F., Schmidt, S., Sigurbergsson, F., & Kjellman, B. (2005). Severe respiratory syncytial virus bronchiolitis in infancy and asthma and allergy at age 13. *American journal of respiratory and critical care medicine*, *171*(2), 137-141.
26. Stein, R. T., Sherrill, D., Morgan, W. J., Holberg, C. J., Halonen, M., Taussig, L. M., ... & Martinez, F. D. (1999). Respiratory syncytial virus in early life and risk of wheeze and allergy by age 13 years. *The Lancet*, *354*(9178), 541-545.
27. Litonjua, A. A., Carey, V. J., Burge, H. A., Weiss, S. T., & Gold, D. R. (1998). Parental history and the risk for childhood asthma: does mother confer more risk than father?. *American journal of respiratory and critical care medicine*, *158*(1), 176-181.
28. Murray, A. B., & Morrison, B. J. (1988). Passive smoking and the seasonal difference of severity of asthma in children. *Chest*, *94*(4), 701-708.