Original Research Article

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Prevalence of asthmatic respiratory complications among the rural community of Tangail area in Bangladesh

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ABSTRACT

Background: Asthmatic respiratory complications appear to be a notable public health consequence and associated with mortality, morbidity and economic burden worldwide. Globally several epidemiological studies have been conducted to assess the prevalence of asthmatic respiratory complications. As far our knowledge very few population based study have been conducted in Bangladesh to assess the magnitude of asthmatic respiratory complications focusing the rural community. Therefore the study was undertaken to assess the prevalence of asthma and related respiratory complications in the rural community of Tangail area in Bangladesh.

Methods: This human population based cross-sectional survey study was conducted during the period of August to December 2016 on some villagers of Tangail area in Bangladesh using a pre-standardized questionnaires called "IUATLD -1984 bronchial symptoms questionnaires", designed by the International Union Against Tuberculosis and Lung Diseases (IUATLD). The demographic data of the study subjects were collected by interviewing the subjects and the data were analyzed using SPSS software.

Results: The results demonstrated that a substantial proportion of study subjects showed the main characteristic symptoms of asthma i.e., wheeze last 12 months is about 18.27%, shortness of breath (SOB) without strenuous work were 21.84%, nocturnal SOB 14.70%, morning cough 13.26%, nocturnal cough 17.25% and morning phlegm 10.37%. Overall 9.69% of the subjects were found to be asthmatic. Female study subjects showed more asthmatic complications than male subjects and in the higher aged group asthmatic symptoms were more prevalent.

Conclusions: Among the study subjects, asthmatic complications were found to be substantial. Further clinical study is necessary to confirm the findings.

Keywords: Asthma, IUATLD, Bangladesh, Public health

INTRODUCTION

There is no clear, universally acceptable definition of asthma because of the absence of any gold standard for asthma.¹ It is a chronic inflammatory disorder of the airways characterized by recurrent episodes of wheezing, breathlessness, chest tightness, and cough, particularly at night or in the early morning (National Asthma Education and Prevention Program, 2007).² A variety of expert

groups defined asthma. All definitions have their central criteria as a physiologic phenomenon: reversible bronchospasm or increased airway responsiveness.³ Over the last 40 years, there has been a sharp increase in the global prevalence, morbidity, mortality and economic burden associated with asthma. An estimate suggests that, approximately 300 million people worldwide currently have asthma, and its prevalence increases by 50% every decade.⁴ Prevalence are high (>10%) in developed

countries and rates are increasing in developing regions as they become more westernized. The most striking increases are seen among children although the disease is also on the increase in the elderly. Worldwide, approximately 180,000 deaths annually are attributable to asthma.⁵ In developing regions (Africa, Central and South America, Asia, and the Pacific), asthma prevalence continues to rise sharply with increasing urbanization and westernization.4 In Asia, increased prevalence is likely to be particularly dramatic in India and China. In India the overall prevalence of asthma is 2.38%.6 In Bangladesh asthma appears to be a substantial public health problem. In an estimate it has shown that 7 million people including 4 million children in Bangladesh suffering from asthma related symptoms and the prevalence of asthma is 6.9%.7

To assess the prevalence of asthma different questionnaires are available. The International Union against Tuberculosis and Lung Diseases (IUATLD) sponsored the development of a standard questionnaire to be used in prevalence studies of asthma in adults. The validity and reproducibility of this questionnaire were found to be satisfactory in several studies. ^{8,9} It was used in the European Community Respiratory Health Survey (ECRHS), a multicenter 2-stage prevalence study supported by the European Commission.

Several epidemiological studies have been conducted worldwide to assess the prevalence of asthma. ¹⁰⁻¹⁴ Some research group focused on clinical parameters of asthma and some groups focused on asthmatic symptoms. Very few population based study have been conducted to determine the magnitude of asthma problem in Bangladesh. As far our knowledge very few studies have been conducted to assess the symptoms based prevalence of asthma especially in rural community in Bangladesh. Thus, the study was aimed to determine the prevalence of asthma and asthma related respiratory complications in the rural community of Tangail area in Bangladesh.

METHODS

Ethical consideration

For the study, Institutional permission was taken from the Department of Biotechnology and Genetic Engineering of Mawlana Bhashani Science and Technology University, Bangladesh.

Study areas and study subjects

This was cross-sectional prevalence study which quantifies the distribution of asthma and asthmatic respiratory complications among rural community of Bathuly-sadi village of Basail upazila of Tangail district in Bangladesh (Figure 1) during the period of August to December 2016. All the study populations were between age ranges 15-60. Each study individuals have given their written consent and have their freedom to withdraw

themselves at any time from the study. The subjects who participated in this study gave their written approval and all sorts of confidentialities and rights of the study subjects were stringently maintained.

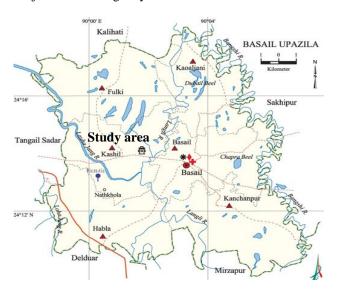


Figure 1: Study area.Source: en.banglapedia.org/index.php?title=Basail_Upazila

Preparation of questionnaires

The International Union against Tuberculosis and Lung Diseases (IUATLD) sponsored the development of a standard questionnaire to be used in prevalence studies of asthma in adults (IUATLD -1984 bronchial symptoms questionnaires). The validity and reproducibility of this questionnaire were found to be satisfactory in several studies. 15,16 It was used in the European Community Respiratory Health Survey (ECRHS), a multicenter 2stage prevalence study supported by the European Commission.¹⁷ The questionnaire was translated in Bengali with the help of a University English teacher and the medical terms were checked with the help of a clinical doctor. The questionnaire contains 14 separate questions and the questions were easily understandable. Rather the study individual had the opportunity to discuss with ensure trained team member anytime during answering the questions.

Data collection

For data collection, door to door visit was conducted by some trained members of the research team. The members described the objective of the research and requested the individuals to participate the research spontaneously. Some public-representatives also helped the research team to convince the villagers to participate the survey. The villagers, who were convinced, were supplied with the questionnaires and requested to fill up the form. The team member collected the data in case of the villagers who did not have any formal education. Moreover the trained members of the research team explained any technical term to each individual. The team

members stayed for couple of days in the village for data collection. The BMI and Blood pressure of the study subjects were measure as described in our another study. 18

Exclusion criteria

Rural people having known hepatitis B positive, prescription of hepatotoxic and anti-hypertensive drugs, malaria, kalazar, and hepatic, renal or cardiac diseases were excluded from this study.

Statistical analysis

Statistical analyses for the study were performed using the Statistical Packages for Social Sciences (SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) Software. The mean age, sex, BMI of the study subjects were assessed by Chi-square test. The prevalence of symptoms was counted with frequency and chi-square tests. Graphical representations of the results were done with Microsoft Excel program.

Sidilistical artalysis

RESULTS

Table 1: General characteristics of the study subjects.						
Parameters	All subjects (n=245)	Male (n=150)	Female (n=95)			
Age (mean±SE)	38.09 ± 0.99	38.63±1.14	37.33±1.83			
Occupation [n (%)]						
Farmers	38 (15.5)	38 (25.3)	0.00			
Small Business	44 (18.0)	44 (29.3)	0.00			
Students	40 (16.3)	22 (14.7)	18 (18.9)			
Job	19 (7.8)	19 (12.7)	0.00			
Housewife	77 (31.4)	0.00	77 (81.1)			
Others	27 (11)	27 (18.00)	0.00			
Education [n (%)]						
No formal Education	43 (17.6)	30 (20)	13 (13.7)			
PSC	111 (45.3)	53 (35.3)	58 (61.1)			
SSC	47 (19.2)	27 (18.00)	20 (21.1)			
HSC	31 (12.7)	27 (18)	4 (4.1)			
Under Graduate	13 (5.2)	13 (8.7)	0.00			
Income/month (mean±SE)	11,795±718					
Smoking [n (%)]						
Yes	53 (21.6)	53 (35.3)	0.00			
No	192 (78.4)	97 (64.7)	95 (100)			
SBP (mean±SE; mmHg)	132.50±1.34	131.83±1.50	133.56±2.53			
DBP(mean±SE; mmHg)	81.02 ± 0.65	81.69± 0.81	79.96±1.08			

Data were presented as mean ±SE, BMI: Body Mass Index; DBP: Diastolic Blood Pressure; SBP: Systolic Blood Pressure.

 23.32 ± 0.25

Prevalence of asthma symptoms among the study subjects

BMI (mean±SE; kg/m²)

The result showed that a substantial proportion of study subjects show the main characteristic symptoms of asthma (wheeze last 12 months) which is about 18.27%.

The prevalence of other asthma definitions were: morning chest tightness (18.27%), shortness of breath (SOB) without strenuous work were 21.84%, attack of SOB after exercise preceding 12 months of the study was 32.98%, nocturnal SOB 14.70%, morning cough 13.26%, Nocturnal cough 17.25% and morning phlegm 10.37%. 7.56% study subjects were confirmed as asthmatic either

 23.30 ± 0.44

General characteristics of the study subjects

Table 1 shows the general characteristics of the study subjects of Bathuli-Sadi village of Bashail Upazila of Tangail district. Of the total 245 study subjects, 150 were male and 95 were female. The average age (Mean±SE) of the study subjects were 38.09±0.99 years. The average ages of male were 38.63±1.14 years and the average age of female were 37.33±1.83 years respectively. Occupationally maximum male study subjects were engaged in small business (29.3%) and farming (25.3%), some were students and the remaining portions were engaged in job and others (rickshaw-puller, driver, electrician, mechanics etc). Among the females 81.1% were housewives and remaining were students (18.9%). We also collected data for smoking of the study subjects and found that 35.3% male subjects were smoker. No female study subjects were found to be smoker because generally Bangladeshi women do not habited to smoke. Maximum portion of the study subjects completed their primary level education (45.3%). Gross family income of the study individuals were 11,795 taka. The mean BMI of the study subjects in the study area were 23.32 ± 0.25 .

 23.34 ± 0.30

by clinical doctors or by quacks. Among which 7.14% subjects routinely takes asthma medications. The study

results are summarized in Figure 2.

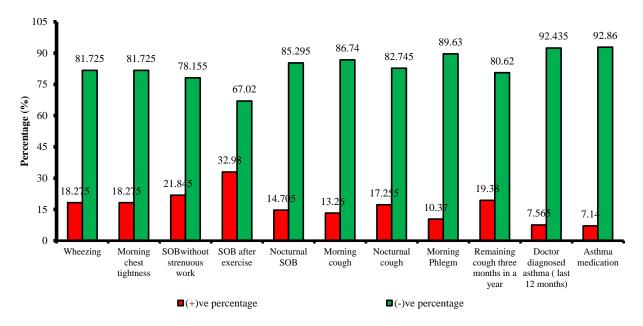


Figure 2: Prevalence of asthma symptoms, attacks and medication use among rural community in the 12 months preceding the survey.

Table 2: Prevalence of asthma symptoms among male and female study subjects in last twelve months.

	<u> </u>	<u>.</u>
Questions	Female (n=95)	Male (n=150
Wheezing	25.07	15.30
Morning chest tightness	21.50	15.89
Shortness of breath (SOB) without strenuous work	24.14	21.50
SOB after exercise	36.72	31.70
Nocturnal SOB	17.93	13.60
Morning cough	17.93	17.00
Nocturnal cough	10.71	10.79
Morning phlegm	11.64	15.30
Remaining cough three months in a year	19.72	19.29
Doctor diagnosed asthma	7.14	7.90
Asthma medication	7.14	7.39

Prevalence of asthma symptoms among male and female study subjects in last twelve months

Results in Table 2 indicated that, female study individuals were more prone to have asthmatic respiratory complications than the male study subjects. For wheezing the prevalence was 15.30% in male and 25.07% were in female. 21.50% female shows morning chest tightness where 15.89% male showed the symptoms. 24.14% female subjects showed shortness of breathe without any strenuous work where the prevalence of these symptoms in male was 21.50%. 17.93% female subjects showed nocturnal SOB which was also higher than the male subjects. 17.93% female study subjects have morning cough where its prevalence in male were 17.00%.

Breathing condition of the study subjects

The study subjects were asked about their breathing condition. The results (Figure 3A) indicated that maximum portion of the study subjects (52.3%) never or rarely feel trouble in breathing, 36.30% shows regular trouble with breathing but is complete recoverable and in case of 11.4% subjects their breathing never quite right. Figure 3B showed the response of the study subjects in response to dust. They were asked about their response when they are in dusty part of the house or with animals (for instance dogs, cats or horses) or near feathers (including pillows, quilt and eiderdowns). The results indicated that 23.6% study subjects showed the symptoms of cough, nasal fluid and phlegm, 19.8% chest

tightness, 17.3% shows shortness of breath and 9.30% showed skin rash or itching.

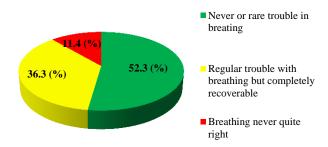


Figure 3A: Breathing condition of the study subjects.

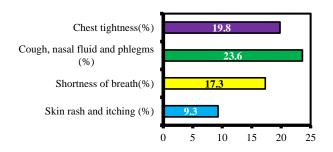


Figure 3B: Response of the study subjects in response to dust.

Major asthma definitions among different age groups among the study subjects

To assess the prevalence of asthma in different age groups, the study subjects were divided into 3 groupsage 15-30 in group A, age 31-45 in group B and age 46-60 in group C. Different asthmatic respiratory complications among 3 groups are represented in Table 3. The result indicated that group C (age 46-60) showed highest prevalence of asthmatic respiratory complications and group A (age 15-30) showed the lowest prevalence of asthmatic respiratory complications.

Prevalence of asthma among study subjects

Asthma is characterized by four major symptoms include episodes of recurrent wheezing, shortness of breath, chest tightness, and coughing. Symptoms are usually worse at night and in the early morning or in response to exercise or cold air. Taking these signature features of asthma, the proportion of asthmatic and non-asthmatic proportion among the study subjects were computed and the results showed that 9.69% of the subjects were asthmatic and remaining 90.31% were non-asthmatic (Figure 4).

Table 3: Major asthma definitions among different age groups among the study subjects.

Group A (Age 15-30) Group B (Age 31-45) Group C

Questions	Group A (Age 15-30) n=100		Group B (Age 31-45) n=65		Group C (Age 46-60) n=76	
Prevalence (%)	Yes	No	Yes	No	Yes	No
Wheezing	19.0	81.0	21.5	78.5	22.0	78.0
Morning chest tightness	17.0	83.0	23.1	76.9	25.0	75.0
Shortness of breath (SOB) without strenuous work	25.0	75.0	26.2	73.8	25.7	74.3
SOB after exercise	35.0	65.0	35.4	64.6	47.4	52.6
Nocturnal SOB	16.0	84.0	12.3	87.7	25.0	75.0
Morning cough	23.0	77.0	13.8	86.2	22.4	77.6
Nocturnal cough	13.0	87.0	13.8	86.2	9.2	90.8
Morning Phlegm	15.0	85.0	15.4	84.6	17.1	82.9
Doctor diagnosed Asthma	7.0	93.0	6.2	93.8	13.2	86.8

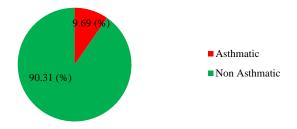


Figure 4: Proportion of asthmatic and non-asthmatic study subjects.

DISCUSSION

In Bangladesh, asthma appears to be a substantial public health problem. Asthma is governed by genetic and environmental factors, known as clinically and pathologically heterogeneous. Very few symptoms based systematic surveys have been conducted so far in Bangladesh. Hassan et al found that, among total population of 6161 in Dhaka city the prevalence of asthma were 6.8%. In another study Hassan et al observed that, among 5642 Bangladeshi people the asthma prevalence were 6.9%. This population based

study confirms that the prevalence of asthma symptoms is very high among rural community in Bangladesh. Obel et al reported that, the mean age of respondents was 36.7 years, and the prevalence of asthma were 6.9% where present study reveals the asthmatic prevalence was 9.6% (Figure 4). Moreover, the study subjects showed wheezing complication (about 18.27%) which is the main symptom of bronchial asthma. The prevalence of other featured asthma definitions were: morning chest tightness (18.27%), shortness of breath (SOB) without strenuous work were 21.84%, attack of SOB after exercise last 12 months 32.98%, nocturnal SOB 14.70%, morning cough 13.26%, nocturnal cough 17.25%, morning phlegm 10.37% (Figure 2). However the results of our study differ from other symptom based epidemiological survey. This may be due to the multi-factorial nature of asthma where genetic variation, geographic localization, environmental pollution, dietary behavior, socioeconomic other factors contribute asthmatic and complications. ²³⁻²⁶ Another contributory considerations are the variations of study methodology and different questionnaire utilized for survey. Some study also conducted on clinical and pathophysiological determination of asthma. All the symptoms may not be generalized for all study subjects who are positive for the individual symptoms but these all together implies that a substantial proportion of our study subject are in greater asthma risk. Recent studies reported that the prevalence of asthma was highest among non-Hispanic blacks, women, and persons with less than a high school education and in rural parts of the state (south and northwest Georgia).²⁷

Asthmatic prevalence, asthma mortality and asthmatic respiratory complications vary with age. In a nationwide survey conducted in Britain, Strachan et al reported that, with increasing age, morbidity related to wheezing declined to a greater extent than annual period prevalence.²⁸ In our study, to assess the prevalence of asthma in different age groups, the study subjects were divided into 3 groups (age 15-30 in group A, age 31-45 in group B and age 46-60 in group C). The result indicated that relatively more aged group showed more prevalence of asthmatic respiratory complications than lower aged group (Table 3). Sex may have effect on prevalence of asthmatic symptoms. The results of the study indicated that females are more susceptible to developed asthmatic respiratory complications than in male (Table 2). Among several strengths one notable strength of our survey is that, the study was conducted with a pre standardized questionnaires called IUATLD bronchial symptoms. Several research groups validated these questionnaires and the sensitivity and specificity of the questionnaires found to be justified.

In spite of several strengths, there were some limitations of this study that warranted further discussion. Asthma is a multi-factorial disease. Genetic variations, socioeconomic status, age, sex, occupation, smoking, eating behavior, racial variations etc. are key contributory for

asthma. Another limitation is that, the numbers of study subjects were very limited. However new study has been designed to address these limitations. Our study was a symptoms based prevalence study. Clinical study may also be designed to confirm the results.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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