Original Article

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TANAFFOS

Prevalence of Asthma in East Azerbaijan Adult Population and Its Determinants Factors: A Cross-Sectional Study from the Northwest of Iran

Shahryar Razzaghi [1], Ali Farshbaf Khalili [1], Leila Nikniaz [2], Zeinab Nikniaz [1], Ali Hossein Zeinalzadeh [3]

[1] Liver and Gastrointestinal Diseases Research Center. Tabriz University of Medical Sciences, Tabriz, Iran, [2] Tabriz Health Services Management Research Center, Health Management and Safety Promotion Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran, [3] Social Determinants of Health Research Center, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

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Correspondence to: Zeinalzadeh AH
Address: Social Determinants of Health Research Center, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
Email address: zenalali@gmail.com

Background: Asthma is one of the most common chronic respiratory diseases. It is estimated that more than 400 million people will suffer from it by 2025. This study aims to determine the prevalence of asthma in East Azerbaijan and investigate the association between asthma and some environmental and demographic factors.

Materials and Methods: This is a cross-sectional study based on a major Lifestyle Promotion Project (LPP) conducted in the districts of East Azerbaijan, including 2641 participants aged 15 to 65 years of the general population selected through probability proportional to size (PPS) multistage stratified cluster sampling. We used the World Health Survey questionnaire about doctor-diagnosed asthma to determine the prevalence of asthma. Age, smoking status, physical activity level, socioeconomic variables such as job and education level, and body mass index (BMI) were used as covariates in regression models. A questionnaire was used to obtain socio-demographic information and smoking status. The short form of the International Physical Activity Questionnaire was used to estimate the level of physical activity (IPAQ).

Results: The mean age of participants was 40.9 ± 12.05 years including 1242 (47 %) males and 1399 (53 %) females. The prevalence of asthma was 3.3 %. The frequency of smokers was significantly higher in the asthmatic group compared with the non-asthmatic group (OR=2.33 [1.76-3.31]; p=0.03). There was no significant association between asthma and other demographic and lifestyle characteristics. Obesity has also played a significant role in the development of asthma.

Conclusion: According to the results of this study, obesity and smoking have played a significant role in the development of asthma but there is no statistically significant relationship between socioeconomic and demographic factors.

Keywords: Asthma; Prevalence; Risk factor; Iran

INTRODUCTION

Asthma is a chronic respiratory disease defined by the three characteristics of reversible airway obstruction, chronic airway inflammation, and airway hyperresponsiveness which cough, wheezing, dyspnea, and chest tightness are its common symptoms (1). Over 350 million people worldwide were affected by asthma in 2021, and this number is expected to rise to 400 million by 2025 (2, 3). Asthma causes more than 400000 deaths per year globally (4). The prevalence of asthma in different countries varies from 4.7% to 10% which imposes a heavy socio-economic burden on healthcare systems (5-7). In Iran, the prevalence of asthma was reported to be 8.5% in

Khuzestan (8), and 5.2% in Kurdistan (9). In another study in 2015, the rate of asthma in Iran was 4.7% (10).

Asthma is a complex multifactorial disorder in which genetics and environmental exposures are the most important factors in the development of asthma (11). Recent studies indicated that the increasing prevalence of asthma is related to environmental changes (e.g., urbanization) (12), education level, employment status, income (13-17), and unhealthy lifestyle behaviors (e.g., smoking, sedentary lifestyle, and obesity) (18-20). However, not all associated factors of asthma were identified in all populations.

As the prevalence of asthma and its determining factors vary widely across different regions, and there are limited studies conducted in this regard in Iran, especially in East Azerbaijan province, our study aims to determine the prevalence of asthma in East Azerbaijan and investigate the cross-sectional association between asthma and some demographic and environmental factors.

MATERIALS AND METHODS

This study was performed by probability proportional to size (PPS) multistage stratified cluster sampling through which 150 clusters were selected. 20 individuals (15-65 years old) were enrolled in each cluster. After excluding the incomplete questionnaires, a total of 2641 people were left in the final sample which was statistically analyzed.

Inclusion criteria were age 15 to 65 years, at least 6 months of residence in that region, and Iranian nationality. People who had altered mental status and a confirmed mental disease, or people with cognitive disorders, blindness, deafness, and speech disorders were not included in the study.

All methods in this study were conducted by the ethical values of the Tabriz University of Medical Sciences Ethics Committee (Ethics code: 1394.383), and informed consent was obtained from all participants included in the study.

The prevalence of asthma was determined using the question of the World Health Survey Questionnaire about doctor-diagnosed asthma (22). World Health Survey (WHS) questions were similar to those used by the International Study of Asthma and Allergies in Childhood (ISAAC) and the European Community Respiratory Health Survey (ECRHS) surveys (5, 23, 24). This questionnaire has been previously translated and validated in the Persian language (25).

Age, smoking status, physical activity level, socioeconomic variables such as employment and education level, and body mass index (BMI) were included as covariates in regression models. A questionnaire was used to obtain socio-demographic information and smoking status. The short form of the International Physical Activity Questionnaire (IPAQ) was used to determine the level of physical activity (26, 27). The body weight of each individual was measured with a Seca scale (Dubai, United Arab Emirates) barefoot and in light clothes to the closest 0.1 kg for BMI calculation. Height was measured barefoot using a measuring tape with the subject's arm hanging freely at the sides and recorded to the nearest 0.5 cm. Weight (kg) divided by height^2 (m^2) yielded BMI.

Statistical analysis

SPSS software version 18 was used to perform statistical analysis. The Kolmogorov-Smirnov test was used for the determination of data normal distribution. The continuous variables were reported as mean ± standard deviation (SD), and the categorical and nominal variables were reported as frequency and percent. The independent t-test was used for continuous variables between-groups comparisons and the Chi-square statistical test was used for assessing the categorical and nominal variables between-groups comparisons. The risk of asthma was assessed using logistic regression models based on different demographic factors. Variables that had a significant association in the univariable model were analyzed in the multivariable model. A significance level of 0.05 was used and confidence intervals (CIs) were calculated at a 95% level.

RESULTS

In the present study, 2641 participants met the inclusion criteria of which 1242 (47 %) were male and 1399 (53 %) were female. The mean age of participants was 40.9 ± 12.05 years. The prevalence of asthma in our population was 3.3 % which was higher in females (3.64%) than males (2.97%) but it was not statistically significant (P=0.62).

Table 1 presents the prevalence of symptoms in the past year. Among participants, 6.8% have experienced chest tightness at least once in the past year. 1.2% of participants have experienced an asthma attack at least once in the past year, and 4.6% have experienced shortness of breath attacks in the past year other than during exercise and physical activity. Also, 1.2% of participants have received medication for asthma in the past two weeks.

Table 2 presents participants' demographic and lifestyle characteristics according to their asthma status. The population mean BMI was 27.08 ±4.75kg/m². About 16.2% of participants were current smokers and the frequency of smokers was significantly higher in the asthmatic group compared with the non-asthmatic group (p=0.03). Obesity has also played a significant role in the development of asthma. However, there were no significant differences between groups regarding other sociodemographic and lifestyle characteristics.

Table 1. Prevalence of symptoms in the study population

Symptoms*	Prevalence
Wheezing	4.1%
Wheezing after physical activity	5.1%
Chest tightness	6.8%
Nocturnal dyspnea	2.9%
Nocturnal cough	2.6%
Asthma attack	1.2%
Shortness of breath attacks in absence of physical activity	4.6%

*in the past year

Table 3 presents the result of logistic regression analysis. The results showed that the odds ratio of asthma was 2.3 times higher in smokers compared with nonsmokers (OR=2.33 [1.76-3.31]; p=0.03).

Table 2. General characteristics of the population according to asthma status

Variables	Total N=2641		Asthma+ N=88		Asthma- N=2553		p-value
	Mean ± SD		Mean ± SD		Mean ± SD		
Age (years)	40.97 ± 12.05		41.51 ± 12.03		39.85 ± 10.95		0.67 *
BMI	27.08 ± 4.75		27.73 ± 5.01		27.05 ± 4.72		0.18 *
	Categorical variables						
	n	%	n	%	n	%	
Sex							
Male	1242	47.02	37	42	1205	47.2	0.62**
Female	1399	52.9	51	58	1348	52.8	
Residency							
Tabriz	1292	48.9	51	58	1241	48.6	0.08**
Counties	1349	51.07	37	42	1312	51.4	
Smoking status							
Current smoker	429	16.2	27	30.6	378	14.8	**0.03****
Marriage							
Single	249	9.4	13	13.6	236	9.2	0.16**
Married	2392	90.5	75	85.2	2317	90.7	
	Socioeconomic factors						
Education							
Not educated	355	13.4	12	13.6	343	13.4	0.6**
Diploma and lower diploma	1797	68.04	55	62.5	1742	68.2	
University	489	18.5	21	23.9	468	18.3	
Employment status							
Employed	1233	46.6	33	37.9	1200	47	0.09**
Not employed	1408	53.3	55	62.1	1353	53	
Physical activity							
Low	780	29.5	27	30.7	753	29.5	0.58**
Medium	851	32.2	24	27.3	827	32.4	
High	1010	38.2	37	42	973	38.1	

*p-value of independent t-test; **p-value of chi-square

Table 3. Association between different factors and asthma

Variables	Univariate			Multivariate*		
	OR	95% CI	P-value	OR	95% CI	P-value
Age (years)						
<40		Reference			Reference	
>40	**3.36**	**1.90-5.95**	**<0.001**	**3.19**	**1.75-5.80**	**<0.001**
BMI (kg/m²)						
Normal weight (18.5-24.9)		Reference			Reference	
Underweight (<18.5)	1.01	0.98-1.02	0.99	1.01	0.97-1.01	0.99
Overweight (25-29.9)	1.48	0.77-2.82	0.23	1.51	0.79-2.89	0.21
Obese (≥30)	**2.23**	**1.15-4.34**	**0.01**	**2.24**	**1.14-4.41**	**0.01**
Sex						
Male		Reference				
Female	1.23	0.80-1.89	0.34			
Residency						
Tabriz		Reference			Reference	
countries	0.68	0.44-1.05	0.08			
Current smoker	**2.33**	**1.76-3.31**	**0.03**	**2.36**	**1.79-3.94**	**0.02**
Marriage						
single		Reference				
Married	0.65	0.34-1.20	0.16			
Socioeconomic factors						
Education						
Not educated		Reference				
diploma	0.90	0.47-1.70	0.75			
University	1.28	0.62-2.64	0.49			
Employment status						
Not employed		Reference				
Employed	1.44	0.93-2.25	0.09			
Physical activity						
Low		Reference				
Medium	0.80	0.46-1.41	0.45			
High	1.05	0.63-1.75	0.82			

*Adjusted for variables that have significant association in univariate model

DISCUSSION

Due to the increasing prevalence of asthma in developing countries, there is a need to determine the prevalence of asthma and the modifiable risk factors to prevent it (28). This cross-sectional study used the database from the Lifestyle Promotion Project (LPP) conducted in the districts of East Azerbaijan in 2015.

The present study investigated the prevalence of asthma and its associated factors in Tabriz, Iran. The prevalence of asthma was 3.3%. This value was lower than the previously reported prevalence of 5-20% in adults in Tabriz (10). However, this value was higher than a reported value of 2.5% in a meta-analysis study in the Iranian adult population (29). The prevalence of asthma in our study was lower than the prevalence of asthma in Brazil (30) and Japan (31) and it was higher than the reported prevalence of asthma in Korea (32). Studies that use spirometry to diagnose asthma have reported a lower prevalence of asthma compared to studies that use questionnaires to diagnose asthma. It seems that the

diagnostic criteria for asthma is the most important determining factor in the prevalence. It also seems that the age range of the study population is influential in the reported prevalence.

In terms of factors associated with asthma, the results of the present study revealed that there was a statistically significant relationship between current cigarette smoking and asthma. Previous studies on the association between asthma and smoking have reported controversial results. Our results confirmed the results of the studies of Piipari et al. (33) and Kim et al. (34). A case-control study by Piipari et al. (33) in Finland showed that there was a significant association between current smoking with asthma and a history of smoking with asthma. Kim et al. (34) also concluded that current smoking increases the risk of asthma significantly in a cross-sectional study in South Korea. In contrast, Rahimi-Rad et al. (35) in a cross-sectional study in Iran showed no significant relationship between smoking and asthma, but asthma symptoms were more common among smokers. Also in a cohort study in Italy, Verlato et al. (36), found that only a previous history of smoking increases the risk of asthma, but no such association was found for current smoking and asthma. The reason for these different results can be traced to differences in the type of studies, differences in the diagnostic criteria for asthma, and differences in the definition of current smoking. To study the relationship between smoking and asthma, we need to consider the frequency of smoking in smokers and ex-smokers, but our study, like the previous studies, did not consider the exact amount of smoking.

In the present study, a significant relationship was found between BMI above 30 and asthma. Our result was in line with the results of previous studies in this regard. The study of Souza et al. (30) also reported a significant association between asthma and BMI> 30. In two separate epidemiological studies conducted in Finland (37) and Japan (31), a significant association was found between BMI> 27.5 and asthma. The cross-sectional study of Masoompour et al. (38) reported a significant relationship between BMI and asthma among the Iranian adults. The positive association between BMI and asthma may partly be related to the low volume of the lungs relative to the body surface and also the greater bronchial hyperreactivity in obese people. Moreover, it has been shown that diagnosis of asthma is easier in obese people due to the earlier onset of symptoms in them (37).

Previous studies on the relationship between asthma and physical activity have yielded conflicting results. The results of our study showed that there is no significant relationship between any level of physical activity and asthma which confirms the results of some previous studies. Through a prospective cohort study in Norway using data from objective measurements of participants' physical activity, Brumpton et al. (39) concluded that there was no significant relationship between physical activity and asthma. Also, in a cross-sectional study in Finland in which physical activity was measured subjectively, Kilpeläinen et al. (37) found there was no association between asthma and physical activity. However, some other studies have reported a positive association between asthma and physical activity levels. Kang et al. (32) have shown a significant association between physical activity and asthma. Physical activity is a variable that is difficult to quantify and data are usually obtained through interviews. It seems that the most important reason for the difference in study results is the difference in how this variable is measured and categorized.

There have been limited studies on the relationship between asthma and education level and conflicting results have been reported. The results of our study were in line with the result of a previous study in Iran (38). A significant relationship between asthma and education was reported in a cohort study in Sweden and a cross-sectional study in Iran (10). It seems that the most important reason for the discrepancy in the results is related to the differences in the place of studies because there is a significant disparity in the frequency of various education levels across different communities.

The results of our study could be generalized to the entire population of the province due to the high sample size and the use of the cluster sampling method, but on the other hand, the cross-sectional design of the study does not determine the causal relationship. In this study, a questionnaire was used to diagnose asthma, while clinical tests such as spirometry were needed to diagnose asthma more accurately. Also in this study, we were not able to determine the severity of asthma and its relationship with the studied factors.

CONCLUSION

To our knowledge, our study is one of the few studies that has examined the relationship between different demographic factors and asthma in Iran. According to the results of this study, obesity and smoking have played a significant role in the development of asthma but there is no statistically significant relationship between socioeconomic and demographic factors such as age, gender, marital status, employment status, level of education, and place of residence (urban or rural) with asthma. In addition, no significant relationship was found between different levels of physical activity and asthma.

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