

Prevalence of Ever Self-Reported Asthma and Associated Factors among University Students in Iran: A Population-Based Study

Abstract

Background: Asthma is a chronic inflammatory airway disease with regressive episodic symptoms. This study aimed to assess the prevalence of asthma ever (lifetime prevalence of asthma) and the associated factors among newly entered students in public universities in Iran. **Methods:** This population-based cross-sectional study was part of the “Mental and Physical Health Assessment of University Students in Iran.” The target population included all newly admitted students ($N = 151,671$) in 74 public universities in 28 provinces (out of the 31 provinces) in Iran. STATA version 12 was used for calculating the descriptive statistics. Univariate and multivariate logistic regression models were employed to identify relationships between asthma and socioeconomic variables. The level of significance was set at 95% confidence interval. **Results:** Of a total of 79,277 participants, 55.23% ($n = 43,785$) and 44.77% ($n = 35,492$) were female and male, respectively. The prevalence of ever asthma among studied student was 1.89%. Of all the participants with asthma, 88.43% (85.49%–90.84%) were nonsmokers. More than 20% of the subjects were physically inactive. The respondents who revealed smoking >10 cigarettes/week were about 1.22 (1.036–1.437) times more likely to suffer from asthma disease (0.017), as compared with those who were not smoking. **Conclusions:** Our study provides valuable information about the prevalence of asthma ever symptoms among university students in Iran. In fact, the results of this study can fill information gaps concerning the affected groups in Iran, and even worldwide.

Keywords: Asthma, Iran, prevalence, students

Introduction

Asthma is a chronic inflammatory airway disease^[1] with regressive episodic symptoms (e.g., cough, wheezing, chest tightness, and shortness of breath).^[2] It has affected about 5% of the total world’s population.^[3] An international comparison of self-reported asthma prevalence among children in high-income countries indicated a rising trend in asthma prevalence since 1955 to 2010.^[4] Furthermore, other studies has demonstrated the increasing prevalence of asthma in developed and developing countries in recent years.^[5] Although the causes of asthma are not fully known yet,^[6] the raising prevalence is seemingly related to changes in environmental factors, lifestyle, and/or socioeconomic status.^[7] The studies concluded that smoking, obesity, and having comorbidity are risk factors for asthma.^[8,9] Moreover, it is indicated that sex, age, and race can be potential predictors for prevalence of asthma.^[10,11]

In the literature, asthma is defined in several ways including current asthma, physician-diagnosed asthma, and exercise-induced asthma. Another common definition is asthma ever which means a state characterized by a history of wheezing and dyspnea attack ever in the lifetime.^[12,13]

Several studies had tried to calculate asthma prevalence in Iran.^[13,14] However, the prevalence of asthma among the youth (20 to 30 years old) remains unclear. On the other hand, a large proportion of the young adults are university students in Iran (>30% of Iranian population in the mentioned age-group).^[15] Although the number of student population is enormous, so far there has been no comprehensive study on health (particularly asthma prevalence) and mental status of this population group. Therefore, this study aimed to assess the prevalence of asthma ever (lifetime prevalence of asthma) and the associated factors among newly entered students in public universities in Iran.

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How to cite this article: Mansouri M, Sharifi F, Tabatabaee SS, Heidari E, Yaghubi H, Keshtkar A, et al. Prevalence of ever self-reported asthma and associated factors among university students in Iran: A population-based study. *Int J Prev Med* 2020;11:54.

Access this article online

Website:
www.ijpvmjournal.net/www.ijpvm.ir

DOI:
10.4103/ijpvm.IJPVM_453_18

Quick Response Code:



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Methods

This population-based cross-sectional study was part of the “Mental and Physical Health Assessment of University Students in Iran (MEPHASOUS-Iran).” The profile of the study including the methodological details is published elsewhere. In brief, to evaluate universities’ health initiatives, the Counseling and Health Organization of the Ministry of Science and Technology (CHOMST) has designed “Mental and Physical Health Assessment of University Students in Iran” in 2012–2013 academic year. The assessment aimed to understand the present health issues and behaviors among university students. The detail of the program assessment was announced to the health centers of the public universities. All public universities from various geographical regions that had a health center participated in the program. During the registration phase, the students received detailed information regarding the health program by the health centers’ medical staff. Dates and times of screening sessions were announced on the website. The students were also informed by E-mail and SMS.^[16]

Study population

In this study, the target population included all newly admitted students ($N = 151,671$) in 74 public universities with a health center in 28 provinces (out of the 31 provinces) in Iran. In order to maintain consistency in data gathering in terms of sex- and age-group, we carried out a population-based stratification of homogeneous subgroups including four age-groups and two sexes. Eligibility criteria included all newly students who were entered in university and they were 18- to 29-year olds. Overall, of all eligible students included in the study, we collected data on 84,298 (55% of total) participants aged 18–29 year. In addition, 79,277 individuals completed information on demographic characteristic and included in the analysis. The details on sampling frame, sampling method, etc., are presented elsewhere.^[16]

Data collection

We employed a questionnaire as a tool to collect demographic characteristic including age and gender, body mass index (BMI) status, mental and physical health, and dietary habits data. Physical health was categorized into physical activity, sleep pattern, and sleep duration, whereas dietary habits was categorized to fruit consumption, vegetable consumption, and carbonated beverages consumption. To evaluate physical activity, the question was “During the week, how many days do you have

physical activity for at least 30 minutes?” The categories of this question were as follows: not at all, 1–2 times/week, 3–4 times/week, and every day; more than 1–2 times/week as active and those who did not at all as inactive. The other question was “How much do you eat vegetables, fruits and drinks during the week?”⁹

Statistical analysis

Survey analysis was performed to apply the correction weight to analyses. Univariate logistic regression model was utilized to assess differences in continuous variables associated with asthma. Furthermore, multivariate logistic regression model was utilized to identify relationships between asthma and other variables. In this model, we made further adjustment for age, sex, BMI, smoking status, junk food consumption, physical activity, fruit consumption, vegetable consumption, carbonate beverage, sleep duration reverse, diabetes mellitus (DM), and smoking family. The level of significance was set at 95% confidence intervals (CIs) or at a P value equal to 5%. All analyses were carried out using STATA software version 14.0 (College Station, TX, USA).

Results

The prevalence of asthma among studied student was 1.89% (2.2% in male and 1.6% in female). Of the total 79,277 contributors, 55.23% ($n = 43,785$) and 44.77% ($n = 35,492$) were female and male, respectively. More than half of the student, i.e., 55.56% (53.76–57.33; $n = 44,046$) had an ideal body weight [Table 1].

Personal lifestyle

Of all the participants with asthma, 88.43% (85.49%–90.84%) were nonsmoker and 79.23% (77.76%–80.63%) had no exposure for passive smoking. Less than half of the participants were consuming 200–500 g fruits per day. More than 56% of the students declared that they slept for about 6–8 h a day. More than 20% of respondents were physically inactive.

Factors associated with asthma disease

According to the results of univariate logistic regression model, self-reported asthma was not associated with age [Table 2], but according to the results of multivariable logistic regression model, asthma associated with sex, BMI, sleep duration, current smoking status, DM, physical activity, fruit consumption, vegetable consumption, carbonated beverages, and exposure of secondhand smoking [Table 3].

Table 1: Characteristics of the participants in terms of asthma status

Variables		Subject with Asthma	Nonasthmatic
Smoking	>10 cigarette/week	5.90 (3.79-9.06)	4.98 (2.97-8.24)
	≤10 cigarette/week	1.11 (0.79-1.57)	0.94 (0.87-1.02)
	Occasionally/week	4.54 (3.84-5.38)	2.86 (2.66-3.07)
Gender	No at all	88.43 (85.49-90.84)	91.20 (88.40-93.38)
	Male	52.56 (50.28-54.83)	44.62 (43.26-45.99)
	Female	47.44 (45.17-49.72)	55.37 (54.01-56.74)
BMI	Lean	13.51 (12.33-14.79)	17.88 (17.43-18.34)
	Ideal weight	55.56 (53.76-57.33)	59.95 (59.57-60.33)
	Over weight	22.91 (21.44-24.45)	17.50 (17.14-17.86)
	Obese	8.01 (7.04-9.09)	4.66 (4.47-4.85)
Smoking family	None smoker	79.23 (77.76-80.63)	88.70 (88.45-88.94)
	Smoker	20.76 (19.37-22.24)	11.29 (11.06-11.54)
Physical activity	Not at all	20.44 (19.01-21.96)	16.01 (15.64-16.38)
	1-2 times/week	43.44 (41.54-45.36)	43.99 (43.49-44.49)
	3-4 times/week	24.26 (22.71-25.88)	27.98 (27.64-28.33)
	Everyday	11.86 (10.56-13.28)	12.02 (11.63-12.43)
Sleep duration	>10 h	3.30 (2.70-4.03)	1.98 (1.85-2.12)
	8-10 h	31.46 (29.61-33.38)	34.30 (33.69-34.91)
	6-8 h	56.81 (54.81-58.79)	58.17 (57.53-58.81)
	<6 h	8.42 (7.53-9.39)	5.55 (5.36-5.74)
Fruit consumption	Not at all	7.03 (6.14-8.03)	3.85 (3.60-4.11)
	<200 g	37.02 (34.93-39.17)	34.77 (33.68-35.89)
	200-500 g	47.11 (44.90-49.34)	51.32 (50.22-52.42)
	>500 g	8.82 (7.91-9.84)	10.06 (9.80-10.32)
Vegetable consumption	Not at all	20.25 (18.74-21.86)	15.01 (14.34-15.70)
	Once/week	37.57 (35.69-39.50)	35.76 (35.26-36.27)
	2-3 times/week	30.03 (28.31-31.80)	35.79 (35.15-36.45)
	Often times (most the days)	12.14 (10.93-13.47)	13.43 (12.99-13.88)
Cereals consumption	Everyday	1.95 (1.47-2.58)	1.70 (1.61-1.79)
	2-3 times/week	18.78 (17.35-20.28)	21.69 (21.13-22.27)
	Once/week	46.31 (44.47-48.16)	48.14 (47.77-48.51)
	Not at all	32.97 (31.30-34.67)	28.47 (27.83-29.11)
Carbonated beverages and juice consumption	Everyday	9.83 (8.54-11.29)	6.02 (5.71-6.35)
	2-3 times/week	37.96 (36.29-39.67)	35.81 (35.20-36.41)
	Once/week	52.20 (50.18-54.20)	58.17 (57.31-59.03)

BMI=Body mass index

The respondents who revealed smoking were about 1.130 times more likely to suffer from asthma disease, as compared with those who were not smoking (OR = 1.130; 95% CI = 1.006–1.270).

Of those who exposed to secondhand smoking, 2.057 times were likely to suffer from asthma, as compared with those who were not exposed to secondhand smoking (OR = 2.057; 95% CI = 1.885–2.245).

The participants who did not consume carbonated beverage were less likely (less than half) to suffer from asthma, as compared with those who regularly consumed carbonated beverage (OR = 1.588; 95% CI = 1.327–1.900).

Discussion

In this study, we evaluated the prevalence of asthma among university students in Iran, and we realized that

sex, BMI, sleep duration, smoking status, DM, physical activity, fruit consumption, vegetable consumption, carbonated beverages, and having a smoker family member had a relationship with the incidence of asthma. The survey results suggested that asthma symptoms among students aged 18–39 years exacerbated with aging. These results are consistent with the findings of a previous study.^[17] It seems that the prevalence of asthma was higher among female than male students, whereas other study showed that the mortality of asthma was lower among female than male.^[18] Thus, our findings are in line with some other studies.^[19]

The results of the present study showed that both smoker and nonsmoker students, who lived with a smoker family member, were significantly at higher risk of asthma than those without a smoker family member. Several studies indicated the significant relationship between asthma

Table 2: Factors associated with asthma in univariate logistic regression model

Variables	Odds ratio	CI 95% odds ratio	P
Age (each one year increased)	0.995	0.985-1.005	0.383
Sex (female/male)	0.727	0.675-0.782	<0.001
Body mass index (each one unit increase)	1.057	1.048-1.066	<0.001
Smoking (smoker/nonsmoker)	1.356	1.188-1.547	<0.001
Junk food consumption			
No use at all		Reference	
2-3 days	0.646	0.484-0.860	0.003
1 day or not at all	0.570	0.435-0.748	<0.001
Physical activity	0.741	0.674-0.814	<0.001
Fruit consumption			
No use at all		Reference	
<200 g/day	0.582	0.505-0.671	<0.001
≥200 g/day	0.498	0.432-0.575	<0.001
Vegetable consumption			
No use at all	0.695	0.432-0.764	<0.001
Carbonated beverage			
No use at all		Reference	
2-3 days/week	1.181	1.098-1.271	<0.001
All days	1.820	1.564-2.118	<0.001
Each hour decreased sleep duration reverse	1.564	1.380-1.772	<0.001
Diabetic/non diabetic	2.411	1.588-3.662	<0.001
Smoking in family/no smoker in family	2.057	1.885-2.245	<0.001

CI=Confidence interval

Table 3: Factors associated with asthma in multivariate logistic regression model

Variables	Odds ratio	CI 95% odds ratio	P
Age (each one year increased)	0.993	0.983-1.003	0.148
Sex (female/male)	0.847	0.782-0.918	<0.001
Body mass index (each one unit increase)	1.056	1.047-1.065	<0.001
Smoking (smoker/nonsmoker)	1.130	1.006-1.270	0.039
Junk food consumption			
No use at all		Reference	
2-3 days	0.851	0.627-1.157	0.298
1 day or not at all	0.848	0.631-1.140	0.271
Physical activity	0.787	0.711-0.871	<0.001
Fruit consumption			
No use at all		Reference	
<200 g/day	0.713	0.610-0.833	<0.001
≥200 g/day	0.671	0.571-0.788	<0.001
Vegetable consumption			
No use at all	0.826	0.745-0.916	<0.001
Carbonated beverage			
No use at all		Reference	
2-3 days/week	1.151	1.061-1.248	0.001
All days	1.588	1.327-1.900	<0.001
Each hour decreased sleep duration reverse	1.275	1.115-1.459	0.001
Diabetic/nondiabetic	2.098	1.338-3.289	0.002
Smoking in family/no smoker in family	1.846	1.688-2.018	<0.001

CI=Confidence interval

prevalence and smoking status.^[20,21] The respondents who smoked every day were more significantly at risk of asthma.

Furthermore, the participants who consumed junk foods more than three times a week were more at risk of asthma. Other studies suggest that high intake of deep-fried foods

tends to be positively associated with increased risk of asthma among teenagers.^[22]

The relationship between asthma and overweight/obesity has been controversial so far^[23]; however, the higher prevalence of asthma among obese subjects might suggest that overweight and obesity could be among the asthma risk factors. This finding is not in line with the results of other studies. They observed no significant relationship between asthma and overweight among school-aged children.^[24] However, consistent with our study, Gilliland *et al.* have shown a significant relationship between the incidence of physician-diagnosed asthma and obesity, as asthma prevalence is significantly higher among overweight and obese people, as compared with those with an ideal weight.^[25] Similarly, Ziaei Kajbaf *et al.* have found a strong relationships between asthma symptoms and both overweight and obesity among school-aged children in both sexes.^[26]

The other factors investigated as potential covariates were fruit and vegetable consumption. The results of this study demonstrated that vegetable and fruit consumption was negatively associated with the prevalence of asthma. According to many scholars, fruit and vegetable consumption are among protective factors against asthma symptoms.^[27] It could be due to the fact that fruit and vegetable have several types of vitamin and minerals, which are useful for lung function.^[28] However, some other studies did not find any relationship between fruit and vegetable consumption and asthma prevalence.^[29]

Another factor that was associated with asthma was carbonated beverage usage. This result showed that asthma among every day carbonated beverage consumer was more prevalent than those has not consumed. Park *et al.* found that students, who drank steadily soda three or more times per day, 64% more likely to develop asthma compared with who never consumed soda.^[30] This relationship could be due to high absorbance of sodium benzoate.^[31] Wickens *et al.* conducted a study to examine the hypothesis that asthma prevalence is influenced by fast food. They showed that there is no relationship between asthma prevalence and fast food.^[32]

To the best of our knowledge, this is the first comprehensive assessment that investigated the relationship between asthma prevalence and its associated factors among university students (a young population group) at subnational, national, and even international level. So, the results of this study can address and fill a gap in the literature through presenting some data and findings on asthma prevalence and epidemiology of the disease among the large group of students in Iran. Furthermore, the results can help authorities, policy makers, and all stockholders to screen, plan, and assess essential medical services for students to reduce the prevalence of asthma among the people who are entering universities.

In this study, a number of limitations need to be acknowledged. The asthma in this study was self-reported and this may lead to some inaccuracies in classification. Furthermore, there is concern that the data of this study were collected about 6 years ago and the prevalence of asthma might have changed so far.

Conclusions

We found that multiple factors had a significant relationship with the prevalence of asthma among students, such as sex, high BMI, and some health condition including DM. Moreover, some life-style factors including physical activity, smoking status, and vegetable and fruit consumption were predictors to asthma. Our study provides valuable information about the prevalence of asthma symptoms among university students in Iran. In fact, the results of this study can fill information gaps concerning this age group in Iran.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Received: 09 Oct 18 **Accepted:** 02 Apr 19

Published: 30 Apr 20

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