



# Prevalence of asthma and the related-symptoms in children and adolescences; a cross-sectional study

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## Abstract

**Introduction:** Asthma is the most important chronic disease in children. The prevalence of this disease was increased in Iran and right across the world. Asthma was considered as a complicated interaction between the environmental stimulants and immunity responses. Numerous factors were recognized as the asthma related-factors.

**Objectives:** The aim of the current study was to evaluate asthma related-factors in Tehran province students.

**Materials and Methods:** The current research was designed as a descriptive-analytic study. The sampling was carried out among the students whose ages ranged from 6 to 7 years old and 13 to 14 years old using the randomly systematic method in Tehran province. The necessary information was collected using the standard ISAAC questionnaire to register the clinical symptoms of asthma. The study data were analyzed using Stata 12 software.

**Results:** A total of 2122 students met inclusion criteria were enrolled in the current study. The mean age and asthma history frequency were estimated as  $12.7 \pm 3.4$  years and 5.8%, respectively. The prevalence of asthma was calculated as 11.9%. The logistic regression analysis findings indicated a statistically significant correlation between wheezing in relaxation position and post-physical activity and nocturnal hacking in students with age, educational level, place of living and exposing to smoke ( $P < 0.05$ ).

**Conclusion:** The findings showed that place of living and exposing to smoke are the most important factors affecting asthma emerge especially in students older than 12 years of age. Paying attention to the aforementioned factors could be proposed as an appropriate approach to prevent asthma.

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## Introduction

Asthma, eczema or atopic dermatitis as well as allergic rhinitis are the commonest chronic diseases in childhood period (1). Asthma is a chronic and heterogeneous disease emerging with wheezing, nocturnal hacking, respiratory obstruction, airway obstruction, and bronchitis (BHR). The acute and chronic inflammations are recognized by eosinophil activity and allergic inflammation (2-4). The prevalence of allergic disorders including asthma was increased in urban districts during the recent decades (5,6). Nowadays, around 300 million people are diagnosed with asthma

## Key point

In a study on 2122 students, we found, asthma prevalence was more indicated in the age group older than 12 years old. Several factors are proposed in this field that the exposure to it causes asthma symptoms such as wheezing and night-time dry cough.

in the world (7). The studies indicated an increasing trend of asthma prevalence in different regions of the world. The annual incidence of asthma was estimated from zero to 3.9%, the childhood asthma was twice during the recent 20 years (8). The increasing



global prevalence of asthma, mortality complications, and even the economical load of asthma were more obvious in children than adults (9). About 20 million are diagnosed with asthma in the Middle-East. While the prevalence of asthma was increased in the developed countries, its prevalence was more apparent in undeveloped countries (7). The prevalence of asthma in children whose ages ranged from 6 to 7, and 13 to 14 years of was estimated as 11.9% and 21.2%, respectively (10). The studies performed in Iran showed different prevalence in Isfahan, Sanandaj, Rasht, Qazvin, and Kashan cities as being 3.9%, 11.9%, 15.4%, 26% and 28.7%, respectively (11-15). Although the accurate etiology of the aforementioned disease was not recognized, the genetic and environmental factors play a role in outbreak of the disease. The environmental factors such as allergens, viral infections, pollutants, low-weight during geniture, life style, the socio-economical position, the geographic region, nutritional regime, and smoking play the most pivotal roles (7,16,17).

The commonest clinical symptoms are included hack, wheezing, the obstruction resulted from bronchitis, airway obstruction, intramuscular secretion, hypertrophy and/or hyperplasia of epithelial cells and muscles (18-20). About 47% of children with asthma usually reported the activity and practice limitations, the nocturnal wake due to asthma and school absence were reported in 34% and 51% of them, respectively (21,22). The aforementioned disorders were more reported in metropolitans because of an increasing trend of asthma prevalence and other allergic diseases as well as people accordance with industrial life in developing countries (23,24).

### Objectives

Thereupon, the objective of the current study was to evaluate the asthma prevalence and the related factors in children younger than 14 years old.

### Patients and Methods

#### Inclusion criteria

The children whose ages ranged from 6 to 7 and 13 to 14 years old were enrolled in the study regardless of their gender.

#### Exclusion criteria

Lack of consent of the parents to enroll the children in the current study.

#### Study population

Areas under the supervision of Shahid Beheshti University of Medical Sciences, the desired number of the participants was estimated, and then the desired subjects were considered to be allowed to the current study then we collected the data.

Some schools were considered to collect the data based on sampling instruction after informing the schools list to the project manager. Around 40 and 10 children of urban and

rural categories were enrolled in the study.

Collecting the data was carried out through filling out the standard ISAAC questionnaire with the help of the researcher and direct referring of him/her to statistical sampling units and also through interview. Filling out the questionnaires was performed after the oral informed consent obtained of the children whose ages ranged from 13 to 14 years old, and of the parents for the children whose ages ranged from 6 to 7 years old.

#### Ethical issues

The research followed the tenets of the Declaration of Helsinki and its later amendments. Informed consent was obtained from parents or their children. The current study was supported by Iranian Ministry of Health and Medical Education (MOHME) to evaluate the asthma disease symptoms in children.

#### Data analysis

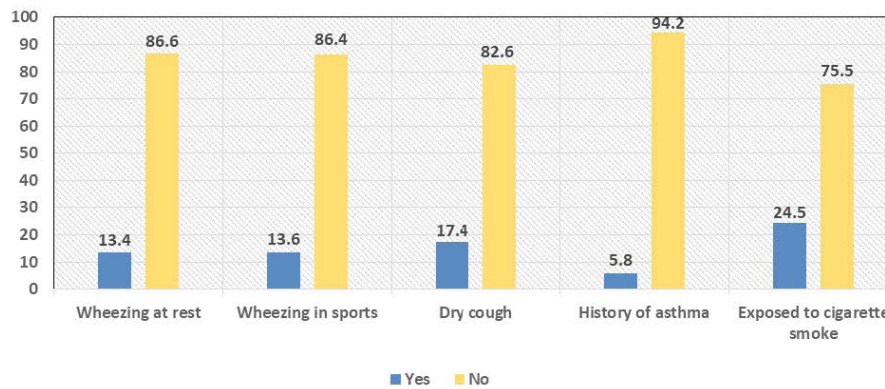
Recorded data were entered into Stata-12 software after completion and were analyzed statistically. Descriptive statistics were used to determine the demographic characteristics of the patients. A logistic regression model was used for the relationship between outcome variable and demographic variables.

### Results

A total of 2122 students were evaluated. The findings showed that around 50% of the students were female and the remainders were male. The age mean was calculated as  $12.7 \pm 3.4$  years. The educational status of the parents was more academic being 35%. About 90% of the participants' place of living was located in urban regions and the remainders were in rural ones. The grades of about 52% of the students were reported as primary school (Table 1). The wheezing prevalence as the main index of asthma in 6

**Table 1.** The demographic data of the participants

| Variable           |              | No.  | %     |
|--------------------|--------------|------|-------|
| Gender             | Boy          | 1057 | 49.8  |
|                    | Girl         | 1065 | 50.2  |
| Age (y)            | 6-7          | 1105 | 52.25 |
|                    | 13-14        | 1010 | 47.75 |
| Education          | Elementary   | 1121 | 52.8  |
|                    | Intermediate | 1001 | 47.2  |
| Location           | Urban        | 1942 | 91.5  |
|                    | Rural        | 180  | 8.5   |
| Father's education | Illiterate   | 96   | 4.5   |
|                    | Elementary   | 554  | 26.1  |
|                    | Intermediate | 132  | 6.2   |
|                    | Diploma      | 586  | 27.6  |
| Mother's education | Academic     | 743  | 35.6  |
|                    | Illiterate   | 105  | 4.9   |
|                    | Elementary   | 493  | 23.2  |
|                    | Intermediate | 119  | 5.6   |
|                    | Diploma      | 731  | 34.4  |
|                    | Academic     | 663  | 31.9  |



**Figure 1.** The frequency of wheezing, the nocturnal hacking, asthma history, and exposing to smoke.

to 7 and 13 to 14 years old children was reported as 9.6% and 14.38%, respectively during the 12 recent months. The findings showed a 24.5% and 5.8% prevalence of asthma history in children exposed to smoke. Additionally 13.4%, 13.6%, and 17.4% of the students complained of wheezing during the rest, during and after practicing, and nocturnal hacking, respectively (Figure 1).

The logistic regression analysis findings indicated a statistical significant correlation between wheezing in rest position with age [OR=1.5; CI 95 % (1.2–2.04)], grade [OR=1.7; 95% CI (1.3–2.1)], place of living [OR=0.6; 95% CI (0.3–0.8)], and exposing to smoke [OR=1.8; 95% CI (1.4–2.4)]. In addition, a statistical significant correlation was indicated between wheezing during and after practicing with age [OR=3.3; 95% CI (2.4–4.3)], grade [OR= 2.8; 95% CI (1.2–4.6)], and exposing to smoke [OR=1.9; 95% CI (1.5–2.6)]. There was a statistical significant correlation between nocturnal wheezing with age [OR=1.7; 95% CI (1.3–2.2)], grade [OR=2.8; 95% CI (1.4–2.2)], place of living [OR=0.6; 95% CI (0.4–0.9)], and exposing to smoke [OR=2.04; 95% CI (1.5–2.6)]. Moreover, there was a statistical significant correlation between asthma history with age [OR=2.4; 95% CI (1.6–3.6)], and grade [OR=2.2; 95% CI (1.5–3.3)] (Table 2).

## Discussion

Asthma disease is the most important chronic disease in childhood and one of the reasons for school absence and growth problems (25). Asthma is an airway inflammatory response due to airway obstruction to the lungs (25,26). The prevalence of asthma is being increased all around the world. Various studies conducted in Iran showed an increased trend of asthma prevalence (27). The wheezing prevalence as the main index of asthma in 6 to 7 and 13 to 14 years old children was reported as 9.6% and 14.38%, respectively during the 12 recent months. The logistic regression analysis findings indicated a statistical significant correlation between wheezing in rest position with age [OR=1.5; 95% CI (1.2–2.04)], grade [OR=1.7; 95% CI (1.3–2.1)], place of living [OR=0.6; 95% CI (0.3–0.8)], and exposing to smoke [OR=1.8; 95% CI (1.4–2.4)].

Accordingly, a statistical significant correlation was indicated between wheezing during and after practicing with age [OR=3.3; 95% CI (2.4–4.3)], grade [OR= 2.8; 95% CI (1.2–4.6)], and exposing to smoke [OR=1.9; 95% CI (1.5–2.6)]. There was a statistical significant correlation between nocturnal wheezing with age [OR=1.7; 95% CI (1.3–2.2)], grade [OR=2.8; 95% CI (1.4–2.2)], place of living [OR=0.6; 95% CI (0.4–0.9)], and exposing to smoke [OR=2.04; 95% CI (1.5–2.6)]. Moreover, there was a statistically significant correlation between asthma history with age [OR=2.4; 95% CI (1.6–3.6)], and grade [OR=2.2; 95% CI (1.5–3.3)].

Several studies performed in Iran showed an increased prevalence of asthma ranged from 2.7% to 8.4% (28). The wheezing prevalence as the main index of asthma in 6 to 7 and 13 to 14 years old children was reported as 9.6% and 14.38%, respectively during the 12 recent months. The prevalence of asthma in the studies of Rajaeifard et al (29), Hassanzadeh et al (26) and Assadi et al (30) was estimated as 10.3%, 3.8%, and 5.3%, respectively.

Wheezing during physical activity or practice is a non-specific sign of asthma. In the current study, there was no correlation between wheezing in rest position and post-physical activity in both genders which is in agreement with the studies of Assadi et al (30) and Kuti and Omole (31). These current findings were not compatible with the studies of Hassanzadeh et al (26), Hatami et al (32) and Yan et al (33).

Some studies reported that exposing to smoke outbreaks the severe symptoms of asthma, air-way inflammation, and unfavorable effects on children's health which is in agreement with the current findings (34).

The first study reporting the unfavorable effects of smoke was performed in 1967, to our knowledge. Afterwards, several studies evaluated the unfavorable effects of smoke on children's respiratory diseases. The inactive smoke effects were reported on newborns' and children's respiratory system (35,36). Some studies reported the significant correlation between smoking and asthma. Therefore, it is sounded that there is causality in this case despite its unknown mechanism (36). Smoking subjects

**Table 2.** Evaluation of index (OR) with asthma outcome based on demographic data using the logistic regression analysis

| Variable                   | Wheezing in rest |           |            |      | Dry cough |           |            |      | Wheezing during and after exercise |           |            |     | History of asthma |          |             |     |        |
|----------------------------|------------------|-----------|------------|------|-----------|-----------|------------|------|------------------------------------|-----------|------------|-----|-------------------|----------|-------------|-----|--------|
|                            | Yes              | NO        | OR         | P    | Yes       | NO        | OR         | P    | Yes                                | NO        | OR         | P   | Yes               | NO       | OR          | P   |        |
| Sex                        | Boy              | 127(12.1) | 923(87.9)  | 1    |           | 170(16.3) | 868(83.6)  | 1    |                                    | 144(13.7) | 900(86.2)  | 1   |                   | 59(5.6)  | 992(94.3)   | 1   |        |
|                            | Girl             | 155(14.6) | 901(85.3)  | 1.2  | 0.1       | 190(18.4) | 824(81.5)  | 1.1  | 0.3                                | 141(13.4) | 907(86.5)  | 0.9 | 0.4               | 63(5.9)  | 991(94.02)  | 0.9 | 0.9    |
| Age (y)                    | 6-7              | 117(10.6) | 982(89.3)  | 1    |           | 141(13.1) | 930(86.8)  | 1    |                                    | 80(7.3)   | 1013(92.6) | 1   |                   | 40(3.6)  | 1062(96.4)  | 1   |        |
|                            | 13-14            | 164(16.6) | 837(83.6)  | 1.5  | 0.001     | 218(21.9) | 776(78)    | 1.7  | 0.0001                             | 205(20.6) | 788(79.3)  | .3  | 0.0001            | 82(8.2)  | 915(91.8)   | 2.4 | 0.0001 |
| Education                  | Elementary       | 116(10.5) | 984(89.4)  | 1    |           | 143(13.3) | 927(86.6)  | 1    |                                    | 77(7.04)  | 1017(92.9) | 1   |                   | 41(3.7)  | 1062(96.3)  | 1   |        |
|                            | Intermediate     | 164(16.6) | 824(83.4)  | 1.7  | 0.01      | 212(21.5) | 770(78.4)  | 1.7  | 0.001                              | 203(20.7) | 777(79.2)  | 2.8 | 0.01              | 80(8.1)  | 904(91.9)   | 2.2 | 0.0001 |
| Location                   | Urban            | 263(13.6) | 1663(83.3) | 1    |           | 335(17.7) | 1556(82.2) | 1    |                                    | 262(91.9) | 1650(86.3) | 1   |                   | 114(5.9) | 1811(94)    | 1   |        |
|                            | Rural            | 19(10.5)  | 161(89.4)  | 0.6  | 0.01      | 25(13.9)  | 154(86.03) | 0.6  | 0.03                               | 23(12.7)  | 157(87.2)  | 0.8 | 0.4               | 8(4.4)   | 172(95.5)   | 0.6 | 0.2    |
| Father's education         | Illiterate       | 18(18.7)  | 78(81.2)   | 1    |           | 20(21.05) | 75(78.9)   | 1    |                                    | 15(15.7)  | 80(84.2)   | 1   |                   | 7(7.3)   | 88(95.5)    | 1   |        |
|                            | Elementary       | 65(11.8)  | 482(88.1)  | 0.7  | 0.4       | 91(16.9)  | 447(83)    | 0.8  | 0.5                                | 67(12.3)  | 476(87.6)  | 0.6 | 0.5               | 27(4.9)  | 518(95)     | 1.2 | 0.7    |
|                            | Intermediate     | 21(16)    | 110(83.9)  | 0.01 | 0.9       | 24(18.7)  | 104(81.2)  | 0.9  | 0.8                                | 24(18.3)  | 107(81.6)  | 1.1 | 0.7               | 8(6.1)   | 123(93.8)   | 1.4 | 0.5    |
|                            | Diploma          | 74(12.7)  | 507(87.2)  | 0.7  | 0.3       | 89(15.4)  | 486(84.5)  | 0.7  | 0.3                                | 77(13.3)  | 499(86.6)  | 0.8 | 0.7               | 35(6)    | 545(93.9)   | 1.3 | 0.4    |
| Mother's education         | Academic         | 101(13.9) | 623(86)    | 0.8  | 0.3       | 129(18.2) | 579(81.7)  | 0.8  | 0.6                                | 97(13.4)  | 624(86.5)  | 0.8 | 0.6               | 43(5.9)  | 684(94)     | 1.2 | 0.3    |
|                            | Illiterate       | 23(22.1)  | 81(77.8)   | 1    |           | 23(22.3)  | 80(77.6)   | 1    |                                    | 18(17.4)  | 85(82.5)   | 1   |                   | 12(11.6) | 91(88.3)    | 1   |        |
|                            | Elementary       | 51(10.4)  | 437(89.5)  | 0.4  | 0.1       | 81(16.7)  | 403(83.2)  | 0.7  | 0.4                                | 56(11.5)  | 430(88.4)  | 0.6 | 0.2               | 18(3.6)  | 470(96.3)   | 0.2 | 0.0003 |
|                            | Intermediate     | 18(15.1)  | 101(84.8)  | 0.6  | 0.3       | 19(16.1)  | 99(83.9)   | 0.7  | 0.4                                | 24(20.1)  | 95(79.8)   | 1.3 | 0.5               | 7(5.8)   | 112(94.1)   | 0.3 | 0.1    |
| Exposed to cigarette smoke | Diploma          | 94(13)    | 627(86.9)  | 0.5  | 0.1       | 109(15.4) | 597(84.5)  | 0.7  | 0.3                                | 90(12.6)  | 623(87.3)  | 0.8 | 0.6               | 44(6.1)  | 675(93.8)   | 0.4 | 0.08   |
|                            | Academic         | 92(14.2)  | 554(85.7)  | 0.5  | 0.1       | 120(19)   | 511(80.9)  | 0.8  | 0.6                                | 91(14.1)  | 553(85.8)  | 0.9 | 0.8               | 38(5.8)  | 610(94.1)   | 0.3 | 0.07   |
| Exposed to cigarette smoke |                  | 100(19.4) | 414(80.5)  | 1    |           | 224(14.4) | 1330(85.5) | 1    |                                    | 176(11.1) | 1404(88.8) | 1   |                   | 82(5.1)  | 1505(94.08) | 1   |        |
|                            |                  | 180(11.3) | 1404(88.6) | 1.8  | 0.001     | 136(26.4) | 378(73.5)  | 2.04 | 0.0001                             | 108(21.2) | 400(87.7)  | 1.9 | 0.001             | 40(7.7)  | 474(92.2)   | 1.3 | 0.1    |

in the family outbreak the Asthma onset increase and referring episodes increase as well to the emergency department (37).

The current results showed that exposing to smoke could be considered as a risk factor for childhood asthma which is in accordance with the study of Rajaeifard et al (29). Moreover, there is a significant correlation between exposing to pollution and traffic with asthma symptoms severity in children as well as the lungs function growth decrease. The current findings indicated the lower frequency of subjects with wheezing and dry night coughing living in rural regions as compared to the highest frequency of subjects living in urban regions [OR=0.6; 95% CI (0.3–0.8)] which is compatible with the study of Fedortsiv et al (40). There was no statistically significant between asthma symptoms and educational status of the parents which is in disagreement with the study of Kim et al (38-41).

### Conclusion

In the current study, asthma prevalence was more indicated in the age group older than 12 years old. Several factors are proposed in this field that the exposure to it causes asthma symptoms such as wheezing and night-time dry cough. Our study showed that living in urban regions outbreaks the asthma symptoms severity in the students owing to exposure to weather pollution and contact with smoke, paying attention to the aforementioned factors is necessary.

### Limitations of the study

This study was limited to a province. We suggest larger studies in this regard.

### Authors' contribution

All authors contributed to the design of the research. ZKH, EG, FF and ID collected the data. ZKH, EG and SLD, MF conducted analysis and interpretation of data. All authors drafted the first version. EG, FF, ID and SLD, MF edited the first draft. All authors reviewed, Commented and approved the final draft.

### Conflicts of interest

There was no conflict of interest for the authors.

### Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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