

Asthma among Adolescent Secondary-School Girls in Riyadh City, Saudi Arabia

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ABSTRACT

Background: Asthma is one of the most common chronic diseases in children and adults. The prevalence of asthma has increased in developed and developing countries over the last three decades. Our objective was to estimate the prevalence of physician-diagnosed asthma and to describe some related characteristics and associated symptoms of cases in a sample of adolescent secondary-school girls of Riyadh city, Saudi Arabia.

Methods: A descriptive cross-sectional study was conducted in secondary schools in Riyadh city, during the academic year 2016-2017. A predesigned questionnaire was disseminated to the targeted population to complete it. **Results:** Out of 154 female students, the prevalence of physician-diagnosed asthma was 4.5%.

The prevalence of rhinitis symptoms, exercise-induced wheezing and night coughing in the past 12 months in physician-diagnosed asthma and exercise-induced wheeze was 42.9%, 28.6% and 28.6%, respectively.

Conclusion and recommendations: The prevalence of physician-diagnosed asthma in female adolescents in Riyadh, Saudi Arabia was 4.5%, there was with a high rate (42.9%) of rhinitis symptoms among the asthmatic girls. The prevalence of asthma in Riyadh, Saudi Arabia was within the reported prevalence ranges from many other parts of the world. Health education sittings is recommended to increase the public awareness about the causes and importance of seeking medical care during and between the attacks of asthma, especially in adolescent period.

Keywords: Prevalence; Physician-diagnosed asthma; Adolescents; Secondary school girls; Riyadh city, Saudi Arabia.

INTRODUCTION

Asthma is one of the most common chronic diseases in adolescents around the world. The prevalence of asthma has increased in developed and developing countries over the last few decades. The burden of asthma is of public health concern because asthma is a major cause of infirmity, and reduces the quality of life of affected individuals. Asthma has become a focus of clinical research and public health programs as a common chronic disease responsible for considerable morbidity and mortality^[1]. It is a chronic respiratory inflammatory disorder of the airways that is characterized by episodes or attacks of impaired breathing, affecting up to 10% of adults and 30% of children and adolescents^[2]. During the childhood and adolescence period, bronchial asthma is often underdiagnosed and undertreated, which may lead to severe psychosocial disturbances in the family^[3]. Diagnosis is often missed or delayed due to the dynamic nature of the disease, unreliable past history or poor documentation of past episodes and lack of specific and sensitive diagnostic investigations^[4]. The clinical picture of asthma includes bronchial hyperresponsiveness, recurrent attacks of wheezing, shortness of breath, chest tightness and coughing, particularly at night

or early morning. The variable airflow obstruction is often reversible, either spontaneously or by treatment with bronchodilators or corticosteroids^[5]. The global prevalence of asthma is difficult to estimate because of the lack of a definitive diagnostic test and different methods of diagnosis and assessing asthma in epidemiological studies^[1]. The prevalence of asthma in Saudi Arabia has been investigated in several previous studies. Al Frayh et al. conducted epidemiological studies in Saudi Arabia in 1986 and 1995 and showed that the prevalence of asthma in comparable populations increased from 8% to 23%, respectively^[6]. Another study was done by Hijazi et al. in which he investigated the prevalence of asthma in 1,020 urban and 424 rural children and found that the prevalence of asthma was 13.9% and 8%, respectively^[7]. Also Al-Dawood et al. reported that the prevalence of physician-diagnosed asthma in school-age boys was 8%^[8]. Similarly, Alshehri et al. found that the prevalence of asthma in school-age boys was 9%^[9]. Our study was done as an estimation of magnitude of the problem in Riyadh city nowadays. In this study we surveyed a total of 154 adolescent girls in Riyadh city, KSA. The role of several risk factors was also evaluated in order to assess the association with asthma.

Objective: This work was conducted to estimate the prevalence of physician-diagnosed asthma and to describe some related characteristics and associated symptoms of cases in a sample of adolescent secondary school girls of Riyadh city, KSA.

SUBJECTS AND METHODS

A descriptive cross-sectional study was conducted among a sample of adolescent primary and secondary school girls of Riyadh city, KSA during the academic year 2016-2017. The sample size was calculated using the sample size equation $n = z^2 * p(1-p) / e^2$ considering the prevalence of bronchial asthma in Riyadh is 50%, target population less than 1000 and study power 95%. A predesigned questionnaire was disseminated to the targeted population to complete it. The parameters in the questionnaire included presence of physician-diagnosed asthma, nationality, age, gender, smoking, rhinitis symptoms, exercise-induced wheezing and night coughing in the past 12 months, contraceptives use, history of other chronic diseases and other important socio-demographic data as educational level of the mother and mean family income/month (in SR),

Ethical considerations

Permission to conduct the study was obtained from the Research and Ethics Committee in the College of Medicine, King Saud University, Riyadh, Saudi Arabia. Data collector gave a brief written introduction to the participants by explaining the aims and benefits of the study. Anonymity and confidentiality of data was maintained throughout the study. There was no conflict of interest.

Statistical Analysis

We utilized the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 16 to analyze the study data. Results are displayed as counts and percentages as it was a descriptive cross sectional study.

RESULTS

Table (1) shows that; the total number of participants was 154 adolescent girls. The overall prevalence of Asthma among the studied adolescent girls was 3.4%. 24.7% of the girls were under 15 years old and 75.3 were between 15 and 19 years old. The mean age was 16.89 (\pm 1.62) with minimum and maximum age 13-19. Almost 95% of the total participants were Saudi. More than 95% of participants were not using hormonal contraception. 97.5% were nonsmokers, 1 girl (0.7%) was ex-smoker and 1.9% were smokers. Regarding the presence of any other chronic

diseases, 1.2% of the total participants had renal diseases, 3.9% had hypertension, 0.6% had hypothyroidism, 2.4% had bronchial asthma and 0.6% had depression. Table (2) and Figure (1) show that; total number of asthmatic girls was seven, 4 of them were 15 years old, 1 was 16 and 2 were 19 years old. The mean age was 16.28(\pm 1.88). All asthmatic girls were Saudi. The father's educational level was primary in 14.3%, secondary in 28.6%, university or more in 14.3%. The father work in a private sector in 14.3%, Governmental sector in 42.9% and in army forces in 42.9%. All the asthmatic girls had a house wife mother. None of the cases was using a hormonal contraception. No smoking history or other chronic diseases was detected. The prevalence of rhinitis symptoms, exercise-induced wheezing and night coughing in the past 12 months in physician-diagnosed asthma and exercise-induced wheeze was 42.9%, 28.6% and 28.6%, respectively.

Table (1): Prevalence of bronchial asthma, age group, nationality, average family income, using of hormonal contraception, smoking history and other chronic diseases in all of the studied school girls, Riyadh, KSA, 2017

| Variables | Frequency (n=154) | Percent |
|--|--------------------|---------|
| Presence of physician-diagnosed asthma | | |
| Yes | 7 | 4.5 |
| No | 147 | 95.5 |
| Age group (in years) | | |
| \leq 15 | 38 | 24.7 |
| 15 – 19 | 116 | 75.3 |
| Mean age (\pm SD) | 16.89(\pm 1.62) | |
| Nationality | | |
| Saudi | 146 | 94.8 |
| Non-Saudi | 8 | 5.2 |
| Average family income/month (SR) | | |
| < 5000 | 26 | 16.9 |
| 5000 – 10000 | 50 | 32.5 |
| 10000-15000 | 36 | 23.4 |
| 15000-20000 | 22 | 14.3 |
| > 20000 | 20 | 13.0 |
| Using of hormonal contraception | | |
| No | 149 | 96.8 |
| Yes | 5 | 3.2 |
| Smoking history | | |
| No | 150 | 97.4 |
| Ex-smoker | 1 | 0.7 |
| Smoker | 3 | 1.9 |
| Other chronic diseases | | |
| Renal disease | 2 | 1.3 |
| Hypertension | 6 | 3.9 |
| hypothyroidism | 1 | 0.6 |
| Diabetes | 8 | 5.2 |
| depression | 1 | 0.7 |

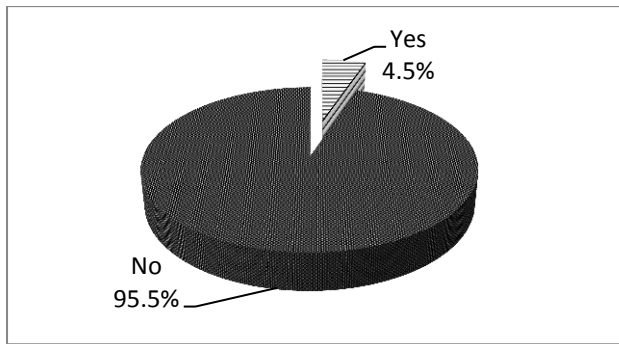


Figure (1): Prevalence of physician-diagnosed asthma among the studied school girls, Riyadh, 2017.

Table (2): Sociodemographic characteristics, smoking history and other asthma related parameters in the studied physician-diagnosed asthma cases, Riyadh, KSA, 2017

| Variable | Frequency (n=7) | Percent |
|---|---------------------|---------|
| Age (in years) | | |
| 15 | 4 | 57.1 |
| 16 | 1 | 14.3 |
| 19 | 2 | 28.6 |
| Mean age (\pm SD) | 16.28 (\pm 1.88) | |
| Nationality | | |
| Saudi | 7 | 100.0 |
| Non Saudi | 0 | 0.0 |
| Educational level of the mother | | |
| Read and write | 1 | 14.3 |
| Primary | 1 | 14.3 |
| Secondary | 1 | 14.3 |
| University | 4 | 57.1 |
| Educational level of the father | | |
| Primary | 1 | 14.3 |
| Preparatory | 3 | 42.9 |
| Secondary | 2 | 28.6 |
| University or more | 1 | 14.3 |
| Father's work | | |
| Private | 1 | 14.3 |
| Governmental | 3 | 42.9 |
| Army forces | 3 | 42.9 |
| Working status of the mothers | | |
| House wife | 7 | 100.0 |
| Average family income/month (SR) | | |
| < 5000 | 1 | 14.3 |
| 5000 – 10000 | 3 | 42.9 |
| 10000-15000 | 2 | 28.6 |
| 15000-20000 | 1 | 14.3 |
| Smoking | 0 | 0.0 |
| Using of hormonal contraception | 0 | 0.0 |
| Exercise-induced wheezing in the past 12 months | 2 | 28.6 |
| Night coughing in the past 12 months | 2 | 28.6 |
| Rhinitis symptoms | 3 | 42.9 |
| Smoking exposure | 4 | 57.1 |
| Other chronic diseases | 0 | 0.0 |

DISCUSSION

This study estimated the prevalence of physician-diagnosed asthma in adolescent girls in Riyadh city, Saudi Arabia. The study showed a low prevalence of asthma in the studied group. The prevalence estimated was 4.5% (7 girls out of 154). This result is much lower than another study done in 2004^[10] which reported that the prevalence of physician-diagnosed bronchial asthma in Saudi Arabia was 25%.

The overall prevalence of asthma in Saudi children and adolescents has been reported to range from 8% to 25% based on studies conducted over the past 3 decades^[11].

In other Gulf countries, the prevalence of childhood physician-diagnosed asthma was reported in 2000 to be 16.8% in Kuwait, 13% in the United Arab Emirates, while in 2006 it was 19.8% in Qatar and in 2008 it was 10.6% in Oman^[12]. Prevalence of asthma was found to be 13.0% in Urban Area Chidambaram, Tamilnadu by **Lakshmi et al.**^[13].

Similar prevalence was observed in other studies done among the same age group in urban areas by **Mistry et al.**^[14] in Chandigarh (12.5%) and **Singh et al.** (11.92%)^[15]. Another recent review analysis of 15 epidemiological studies showed that the mean prevalence of asthma among children and adolescents was 7.24%. Urban and male predominance was observed with wide interregional variation^[16]. Another study from Jaipur conducted among urban school children aged 5-15 years showed the prevalence of asthma as 7.59%^[17].

This high prevalence may be due to the rapid lifestyle changes related to the modernization of Saudi society, changes in dietary habits, and exposure to environmental factors, such as indoor allergens, dust, sand storms and tobacco.

Most of our participants (75.3%) were from 15 to 19 years old, unlike many of the previous asthma prevalence studies in Saudi Arabia and other Gulf countries, which were primarily conducted in children below the age of 15 years using either the ISAAC questionnaire or other research tools to screen for asthma^[18]. No relation was found in our study between age and prevalence of asthma, however; decreasing prevalence of asthma with age were shown by **Bayram et al.**^[19] and **Jain et al.**^[20].

Our findings revealed that the prevalence of rhinitis symptoms was 42.9%, however **Al Ghobain et al.**^[21] found a higher prevalence in his study. The association between asthma and rhinitis is related to the neural nasal-bronchial interaction, disturbances in the warming and humidification

functions of the nasal mucosa, drainage of irritants and inflammatory materials into the lungs and the presence of similar cellular infiltrates and pro-inflammatory mediators in the upper and lower airways. In another study, rhinitis occurred in 40 to 75% of all adults and children with asthma^[22].

In Britain, 61% of the studied girls had rhinitis symptoms with asthma,^[23] and in Greece, 69% of children with asthma had rhinitis symptoms^[24].

Exposure to passive tobacco smoke was shown to be an important risk factor in our study, similar to that in other studies^[25].

The prevalence of both exercise-induced wheezing and night coughing in our study in the past 12 months was 28.6%. **Al Ghobain et al.**^[21] reported a lower prevalence of exercise-induced wheezing (20.2%) in his total sample of both sexes, and 18% in the girls, while he reported a higher prevalence (25.7% and 31.3%) of night coughing in the past 12 months in the whole sample and in girls only respectively.

Conflict of Interest

There is no conflict of interest to be declared.

Authors' contributions: All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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CONCLUSION AND RECOMMENDATIONS

The prevalence of physician-diagnosed asthma in female adolescents in Riyadh, Saudi Arabia was 4.5%, there was with a high rate (42.9%) of rhinitis symptoms among the asthmatic girls.

The prevalence of asthma in Riyadh, Saudi Arabia was within the reported prevalence ranges from many other parts of the world. Health education sittings are recommended to increase the public awareness about the causes and importance of seeking medical care during and between the attacks of asthma, especially in adolescent period.

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