



## Prevalence of Asthma and Allergic Symptoms among General Population in Riyadh Region of Saudi Arabia

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### ABSTRACT

**Objective:** Asthma is a chronic respiratory disease affecting many adults and children across the world. Symptoms of atopic allergies are associated with early onset of asthma. The aim of this study is to explore the prevalence of asthma and allergic symptoms among the general population including adults and children in the Riyadh region of Saudi Arabia. **Methods:** This is a cross-sectional study and participants were of different age groups who lived in the Riyadh region of Saudi Arabia. The information for their general characteristic and self-reported symptoms for asthma and allergy were recorded through a questionnaire which was distributed electronically on social media through the Survey Monkey website. **Results:** Total of 1496 respondents participated in this study. The overall prevalence of asthma was 8.62% and prevalence of allergy was 28.88%. Cases for allergy and pollen allergy were found to be significantly more ( $p < 0.05$ ) among subjects of age older than 18 years as compared to 18 years of age or less than 18 years of age. Cases of asthma were found to be significantly more ( $p < 0.05$ ) among males as compared to females. Cases of dust allergy were found to be significantly more ( $p < 0.05$ ) among females as compared to males. Cases of allergy were found to be significantly more ( $p < 0.05$ ) among children group of 13-18 years of age as compared to children group of 5-12 years of age. **Conclusion:** In conclusion, this study reports the prevalence of asthma and allergic symptoms among the general population of Riyadh region of Saudi Arabia. This kind of more future research is recommended in this region with more sample size.

**Keywords:** Asthma, Allergy, General population, Riyadh

### INTRODUCTION

Asthma is known to be a heterogeneous disease, usually characterized by chronic airway inflammation. Asthma is a common, chronic respiratory disease affecting 1%-18% of the population in different countries. It approximately affects 235 million of the world population [1]. In Saudi Arabia, asthma is one of the most common chronic diseases which affect more than 2 million Saudi populations [2]. According to the Saudi Initiative for Asthma (SINA 2016) based on studies conducted over the past 3 decades, the overall prevalence of asthma in children ranges from 8%-25% [3].

Asthma is characterized by variable symptoms of chest tightness, wheeze, shortness of breath, and cough, and clinically diagnosed by variable expiratory airflow restriction. Both symptoms and airflow restriction vary over time and intensity. These variations are usually triggered by factors such as a change in weather, exercise, allergen or irritant exposure and viral respiratory infections [4].

The lining of the bronchial tubes swells during an asthma attack, causing the airways to narrow and reducing the flow of air into and out of the lungs. This attack may resolve spontaneously or in response to medication and may sometimes be absent for weeks or months at a time [4]. Recurrent asthma symptoms frequently cause reduced activity levels, sleeplessness, and daytime fatigue. As compared to other chronic diseases asthma has a relatively low fatality rate it but may be life-threatening and carry a significant burden to patients and the community.

There are many kinds of atopic allergies like allergic rhinitis, food allergy, pollen allergy and pollen allergy which may be associated with the pathogenesis of asthma. Reactions to allergens often also play an important role in asthma [5]. Allergic rhinitis occurs when the immune system overreacts to airborne allergens, such as those from dust mites,

cockroaches, pollens, animal danders and molds. These environmental allergies can cause symptoms like sneezing, a runny and stuffy nose, and itchy or watery eyes [6].

Many people with allergic rhinitis also have asthma, allergic conjunctivitis, or atopic dermatitis [6]. In Saudi Arabia, the limited available data on allergic disorders are largely confined to asthma for which the related studies suggest that the prevalence in Saudi Arabia varies anywhere between 8%-15% in children [7,8]. The aim of this study is to explore the prevalence of asthma and allergic symptoms among the general population including adults and children in the Riyadh region of Saudi Arabia.

## PATIENTS AND METHODS

### Study Setting and Design

This is a cross-sectional study, and participants were of different age groups who lived in the Riyadh region of Saudi Arabia. Most of the populations are students ranging from primary to graduation level. The information for their general characteristic and self-reported symptoms for asthma and allergy were recorded through a questionnaire which was distributed electronically on social media through the Survey Monkey website. The data was collected over a period of 2 years (December 2016 and April 2018).

### Questionnaire

The questionnaire was designed for the responses of allergy and asthma by the volunteers of different age groups. The questionnaire included questions about demographics, smoking and self-reported symptoms of asthma, allergy, and wheezing and also about the triggers of allergic condition from dust, pollen or animal.

### Statistical Analysis

Descriptive statistics have been generated to compare the parameters obtained from participants. Frequencies and percentages have been shown for all the categorical parameters. Chi-square test has been incorporated for comparison of the categorical outcomes (with symptoms and without symptoms). The criterion for significance was set at  $p < 0.05$ . All the statistical analysis has been performed using an online QuickCalcs version of the GraphPad software, 2018, California, USA.

## RESULTS

### General Characteristic and Frequency of Respiratory Disorders among Study Subjects

Table 1 represents the general characteristic and frequency of respiratory disorders among study subjects of Riyadh region. Total of 1496 respondents participated in this study among which 55.35% were males and 44.65% were females. There were 74.33% of subjects having more than 18 years of age and 25.67% had 18 years or less than 18 years of age. Smokers were 15.24% and nonsmokers were 84.83%. Allergic subjects were 28.88% and nonallergic subjects were 71.12%. Asthmatic subjects were 8.62% and nonasthmatic subjects were 91.38%.

**Table 1 General characteristic and frequency of respiratory disorders among study subjects**

Characteristics	Observations	Number	Percentage
Gender	Males	828	55.35
	Females	668	44.65
Age	≤ 18 Yrs	384	25.67
	>18	1112	74.33
Factors	Smokers	228	15.24
	Nonsmokers	1269	84.83
Allergy	Allergy	432	28.88
	Nonallergy	1064	71.12
Asthma	Asthmatic	129	8.62
	Nonasthmatic	1367	91.38

### Frequency Distribution and Comparison of Respiratory Disorders on the Basis of Age among Study Subjects

Table 2 shows the frequency distribution of respiratory disorders on the basis of age among study subjects. Cases for asthma, wheeze, allergic rhinitis, pets allergy, food allergy, and dust allergy were found to be more among subjects of age older than 18 years as compared to 18 years of age or less than 18 years of age, but not significant. However,

cases for allergy and pollen allergy were found to be significantly more ( $p < 0.05$ ) among subjects of age older than 18 years as compared to 18 years of age or less than 18 years of age.

**Table 2 Frequency distribution and comparison of respiratory disorders on the basis of age among study subjects**

Prevalence	Number of subjects (N=1496)				p-value
	≤ 18 years (n=384)		>18 years (n=1112)		
	n	%	n	%	
Asthma	42	2.81%	87	5.82%	NS
Allergy	134	8.96%	298	19.92%	Significant ( $p < 0.05$ )
Wheeze	11	0.74%	25	1.67%	NS
Allergic Rhinitis	70	4.67%	190	12.70%	NS
Pets Allergy	33	2.21%	81	5.41%	NS
Food Allergy	23	1.54%	74	4.95%	NS
Pollen Allergy	55	3.68%	89	5.95%	Significant ( $p < 0.05$ )
Dust Allergy	93	6.22%	287	19.18%	NS

\*NS: Not Significant

### Frequency Distribution and Comparison of Respiratory Disorders on the Basis of Gender among Study Subjects

Table 3 represents the frequency distribution and comparison of respiratory disorders on the basis of gender among study subjects. Cases for wheeze, allergic rhinitis, and pets allergy were found to be more among males as compared to females, but not significant; whereas cases of asthma were found to be significantly more ( $p < 0.05$ ) among males as compared to females. However cases of food allergy were found to be more in females as compared to males, but not significant; whereas cases of dust allergy were found to be significantly more ( $p < 0.05$ ) among females as compared to males.

**Table 3 Frequency distribution and comparison of respiratory disorders on the basis of gender among study subjects**

Prevalence	Number of subjects (N=1496)				p-value
	Males (n=828)		Females (n=668)		
	n	%	n	%	
Asthma	76	5.08%	54	3.60%	NS
Allergy	373	24.93%	232	15.50%	Significant ( $p < 0.05$ )
Wheeze	30	2.01%	21	1.40%	NS
Allergic Rhinitis	135	9.02%	124	8.28%	NS
Pets Allergy	70	4.68%	61	4.10%	NS
Food Allergy	45	3.01%	52	3.50%	NS
Pollen Allergy	61	4.08%	50	3.30%	NS
Dust Allergy	56	3.74%	207	13.80%	Significant ( $p < 0.05$ )

\*NS: Not Significant

### Frequency Distribution and Comparison of Respiratory Disorders among Children on the Basis of Age

Table 4 shows frequency distribution and comparison of respiratory disorders among children on the basis of age. Among children group of 13-18 years of age, more cases of asthma, allergic rhinitis, pets allergy, and dust allergy were found as compared to children group of 5-12 years of age, but not significant; whereas cases of allergy were found to be significantly more ( $p < 0.05$ ) among children group of 13-18 years of age as compared to children group of 5-12 years of age. However, cases of wheeze, food allergy, and pollen allergy were found to be more among children group of 5-12 years of age as compared to children group of 13-18 years of age, but not significant.

**Table 4 Frequency distribution and comparison of respiratory disorders among children on the basis of age**

Prevalence	Number of subjects (N=1496)				p-value
	Age 5-12 years (n=143)		Age 13-18 years (n=241)		
	n	%	n	%	
Asthma	12	0.80%	31	2.10%	NS
Allergy	60	4.01%	74	4.90%	Significant ( $p < 0.05$ )

Wheeze	7	0.47%	4	0.30%	NS
Allergic Rhinitis	17	1.13%	20	1.33%	NS
Pets Allergy	14	0.94%	19	1.30%	NS
Food Allergy	12	0.80%	11	0.70%	NS
Pollen Allergy	11	0.74%	11	0.70%	NS
Dust Allergy	31	2.07%	62	4.10%	NS

\*NS: Not Significant

## DISCUSSION

The present study shows the self-reported symptoms for asthma, wheeze, allergy, allergic rhinitis, pets allergy, food allergy, pollen allergy and dust allergy in the general population of Riyadh region of Saudi Arabia. In this study, the overall prevalence of asthma was 8.62% and prevalence of allergy was 28.88%. We have done a comparative analysis for the frequency of these symptoms on the basis of age groups and gender among the study subjects. Additionally, we have also made a comparative analysis for the frequency distribution of these symptoms for two age groups among children of this population. These asthmatic and allergic cases were found to be more among subjects of age older than 18 years. Cases of allergy, wheeze, allergic rhinitis, and pets' allergy were found to be more among males, whereas cases of dust allergy were found to be more among females. Among children group of 13-18 years of age, more cases of allergy, asthma, allergic rhinitis, pets allergy, and dust allergy were found, whereas cases of wheeze, food allergy, and pollen allergy were found to be more among children group of 5-12 years of age.

A study of national Saudi household survey in 2013 by Moradi-Lakeh et al [9], reported the burden of chronic medical conditions including asthma among the Saudi population aged 15 years or older, indicated a self-reported clinical diagnosis of asthma to be 4.05%, which is in agreement with our findings. The cases of asthma and allergy were found to be more among subjects aged older than 18 years in our study. Another study by Oladeji et al [10] reported high prevalence rates among a population with age range of 14-34 years, 35.1% of subjects had symptoms of allergic rhinitis, which shows similarity with our findings. The symptoms of allergic rhinitis may suggest that the proximity of the nasopharynx to the lungs may be a significant factor in asthma symptoms more than other types of allergies such as allergic conjunctivitis and dermatitis [11,12] Pathogenesis of asthma is also associated with genetic predisposition. A study by Tabbara et al in Bahrain [13] reported asthma to be attributed to the high incidence of consanguineous marriage, a practice which is also common in our studied population. In most of the middle countries including Saudi Arabia, consanguineous marriage is common among the general population.

Our study population belongs to the urban region of Riyadh and according to previous studies, urbanization has been reported as a major risk factor for the increase in the prevalence of allergy in developing countries [14,15]. This may also be linked with the "hygiene hypothesis" where lack of early childhood exposure to infectious agents and to symbiotic microorganisms and parasites which may cause an increase in susceptibility to allergic diseases due to suppression of development of the immune system naturally [16]. The children group of our study who reported wheezing and allergic symptoms may develop asthma in the future. Moonie et al [17] and Arabkhazaeli et al [18] observed that children who had early onset wheezing episodes are associated with atopic asthma.

The symptoms of asthma and wheeze in the current study can be attributed to high allergen exposure in dust storms in the Riyadh region. Major dust storms are common in Riyadh; the average monthly deposition of dust in Riyadh is estimated to be 42 tons/km<sup>2</sup> [19]. In a study by Nahhas et al [20] in Madinah region of Saudi Arabia among children population, overall cases of reported symptoms of allergic rhinitis were 24.2% and cases of asthma symptoms were 23.6%. They found that 41.7% of children had symptoms suggestive of at least one allergic disorder which shows some similarity with our study. We found that children below 12 years of age are more symptomatic for wheeze, pollen and food allergy which indicates that children are more susceptible to allergens and associated allergic reactions.

## CONCLUSION

In conclusion, this study reports the prevalence of asthma, wheeze, allergy, allergic rhinitis, pets allergy, food allergy and dust allergy among the general population of Riyadh region of Saudi Arabia. Subjects of age older than 18 years had more symptoms of asthma and allergy. Male subjects had more symptoms of allergy, wheeze, allergic rhinitis, and pets allergy; females had more symptoms of dust allergy. Children group of 13-18 years of age had more cases of allergy, asthma, allergic rhinitis, pets allergy, and dust allergy; children group of 5-12 years of age had more symptoms of wheeze, food allergy, and pollen allergy. The subjects with asthma symptoms may be associated with

the ambient dust exposure in the environment of the Riyadh region due to frequent sandstorms. Future research is recommended with more sample size and with some clinical investigations for asthma and allergy in this population.

#### DECLARATIONS

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##### Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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