

*Original Research Article*

# Risk Factors associated with asthma among Saudi adults in Najran, Saudi Arabia

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## Abstract

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**Asthma is a chronic illness that affects people of all ages. Its prevalence has risen over the last few decades in Saudi Arabia. The aim of this study was to explore the common risk factors that associated with asthma among Saudi adults in Najran during the period between December 2016 up to October 2017. One hundred eighty four patients who were over 18 years of age and who had a diagnosis of definite asthma (cases), beside another 184 healthy individuals as control group, that matched the cases in terms of age and sex constituted the study sample. A questionnaire as a tool of data collection was completed by cases as well as from controls. It was consisting of data that include personal, familial and indoor environmental factors that could be potential risk factors for asthma. The mean ages for cases and controls were 21.3(±16.5) and 21.7(±16.8) years respectively. Each group consisted of 108 (58.7%) males beside 76(43.3%) females. There were no significant association between asthma occurrence and level of education and indoor plants with *P*-value >0.05. On the other hand, multivariate logistic regression analysis showed that family history (OR= 5.01, and CI = 2.09 – 8.42), using sprays of insecticides or air fresheners (OR = 8.5, CI= 2.34 – 11.09), as well as rhinitis (OR = 4.76, CI= 2.19 – 6.45) were significantly associated with asthma occurrence. Additionally, active or passive smoking was significantly (*P*-value = 0.041 and 0.012) associated with asthma among adults in Najran. It was concluded that family history, smoking, allergic rhinitis and smoking among the most risk factors for developing asthma among Saudi adults. Further studies for investigating other factors were recommended. Moreover, health education programs for educating people about the risk factors, preventive measures, early diagnosis and proper management were highly recommended too.**

**Keywords:** *Asthma, Allergy, risk factors, Saudi adults.*

## INTRODUCTION

Asthma is a major health problem worldwide that occurs at any age, although it is more common among people under 40 years old (Online information, 2016). It has been estimated globally that 300 million persons suffer from asthma (Online information, 2016; World Health Organization, 2016). Asthma is a complex chronic inflammatory condition of the airways, which makes breathing difficult, and characterized by variable

reversible and recurring symptoms related to airflow obstruction, bronchial hyper-responsiveness and an underlying inflammation (Eder et al., 2006). Its development is seen as an intricate interaction between genetic and environmental factors (Kumar, 2008). It manifests in a variety of symptoms such as cough, wheezes, chest tightness and shortness of breathing (Fatma et al., 2014; Shirina et al., 2010).

Asthma is one of the most common chronic diseases in Saudi Arabia (KSA), it affects more than two million Saudis, and local reports suggest that the prevalence of asthma in Saudi Arabia is increasing (Eder et al., 2006).

Asthma continues to have a major impact on public health globally. Although, there is still an unacceptable level of morbidity, but fortunately, death from asthma is infrequent (Al-Moamary et al., 2009).

Its impact goes beyond the patients to their families as well as to the community as a whole in terms of lost work and school days, poor quality of life, frequent emergency department visits, hospitalizations and death cases may occur (Eder et al., 2006; Aggarwal et al., 2006).

An asthma attack can occur when someone with asthma is exposed to certain environmental triggers. Asthma triggers vary from person to person. However, some common asthma triggers include tobacco smoke, dust mites, cockroach allergens, pet, mold and wood smoke (Gilmour et al., 2006).

Despite the fact that the Saudi Thoracic Society (STS) is committed to a long-term enhancement plan for the best practice in the asthma field by creating asthma guidelines, periodic scientific meetings, frequent asthma courses and educational brochures, but local reports suggest that the prevalence of asthma is increasing in Saudi Arabia, this could be due to environmental changes, beside exposure to indoor and outdoor allergens as well as occupational and industrial exposure (Ministry of Health of the Kingdom of Saudi Arabia, 2017).

Additionally, KSA ministry of health had launched several programs to promote awareness about asthma. Asthma Insights and reality in the Kingdom of Saudi Arabia (AIRKSA) was launched in 2008 to determine the level of asthma control among asthmatic people (Maziar et al., 2015). Another asthma initiative was launched in 2009 to promote best practices in asthma management (Almoamary et al., 2012). Although it is too early to tell the impact of those programs, clearly there is a need for a comprehensive survey for assessing the outcomes of these programs.

Asthma comprises a range of heterogeneous phenotypes that differ in presentation, etiology and pathophysiology. Risk factors for each recognized phenotype of asthma include genetic, environmental and host factors. Although a family history of asthma is common, it is neither sufficient nor necessary for the development of asthma (Traore, 2010).

A plethora of risk factors have been shown to contribute to asthma. Risk factors may increase the chance of developing asthma, or may increase the chance that a person with asthma will develop additional health problems (Al-Moamary et al., 2009). These factors can be classified as indoor or outdoor allergens and air pollutants in terms of environmental and psychological factors (Desalu et al., 2013).

The most important indoor air pollutant is related to tobacco (smoking) exposure, over usage of detergents and other domestic insecticides, furred animals and cockroaches (Fatma et al., 2014; Nguyen et al., 2010).

Most of the interventions to reduce exposure to these triggers are helpful, but likely alone, will not help to achieve asthma control (Al-Moamary et al., 2009). On the other hand, outdoor allergens such as pollens and molds are impossible to avoid completely. Very interesting, food and food additives are uncommon triggers for asthma (Georgy et al., 2006).

## MATERIALS AND METHODS

This is a descriptive, cross-sectional and facility based study that was carried out among adult asthmatic Saudi patients who were attending outpatient thoracic clinic at King Khaled Hospital at Najran, KSA, during the period between December 2016, up to October, 2017.

One hundred and eighty four patients (cases) who were 18 years of age or above and who had a diagnosis of definite asthma, beside another 184 healthy persons (controls) that matched the patients in age and sex constituted the study sample. Informed verbal consent and confidentiality were assured for the participated individuals who agreed voluntary in this study after receiving enough information.

A questionnaire was completed from cases as well as from controls for collecting data, that including personal, familial, indoor and outdoor environmental factors that may be potential risk factors to asthma. The sample size was designated to ensure confidence level of 95%, with an error margin of 0.05.

### Data analysis

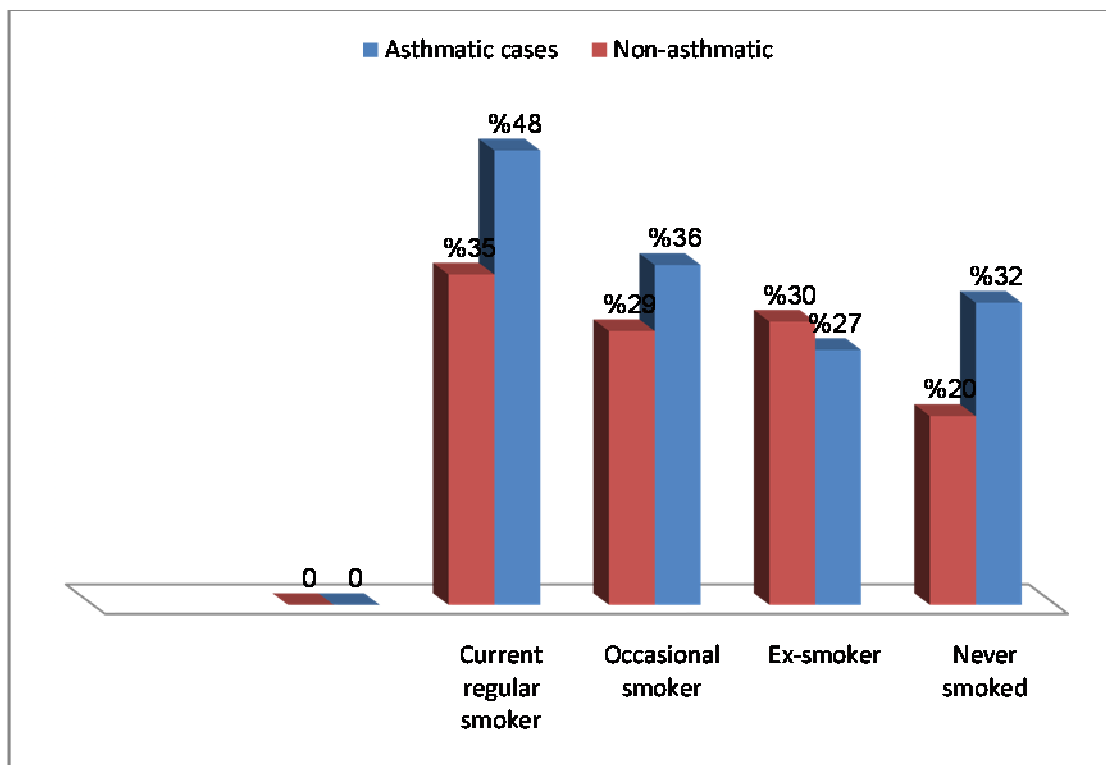
A semi-structured questionnaire was used for collecting data. Data include socio-demographic characteristics beside family history and smoking status. Data were collected and entered into SPSS software (Statistical Package for Social Science), version 18. Chi-square test was used to compare differences in proportions between groups (Odds ratios with 95% confidence intervals). Differences at 5% level ( $P$  value  $\leq 0.05$ ) were considered significant.

### Ethical approval

This study was approved by the Research Committee of Najran University, KSA. Informed verbal consent and confidentiality were assured to all participants.

**Table 1.** Demographic profile of the selected sample (n=368 [184 cases + 184 controls])

Variable	Characteristics	Frequency (50% + 50% controls)	%
Age	18 – 29	168	45.7%
	30 – 39	110	29.9%
	≥40	90	24.5%
Sex	Male	216	58.7%
	Female	152	41.3%
Marital status	Single	64	17.4%
	Married	234	63.6%
	Divorced /Widowed	70	19%
Employment status	Employee	228	62%
	HW/no job	140	38%
Educational status	Uneducated (illiterate)	32	8.7%
	Primary or intermediate school	144	39.1%
	Secondary school graduate	164	44.6%
	University or higher education	28	7.6%

**Figure 1.** Smoking status for the studied sample for cases and controls

## RESULTS

A total sample of 184 cases that were 18 years old or above and who had a diagnosis of definite asthma beside another 184 healthy persons as control group that matched the cases in age, sex and educational levels were recruited to participate in this study. Each group consists of 108 males (58.7%), beside 76 (41.3%) females. The mean age of cases and controls were 21.3 ( $\pm 16.5$ ) and 21.7 ( $\pm 16.8$ ) respectively. The majority of

cases and controls (45.7%) aged between 18 – 29 years old, beside that only 17.4% of them were singles as shown in Table (1).

As displayed in Figure (1), the majority of cases (48%) were currently active smokers, compared with controls that only 35% of them were active smokers, which indicates strong association between asthma and smoking.

The results of this study revealed that there were no significant association between asthma occurrence and

**Table 2.** Multivariate logistic regression analysis(n=368 [184 cases + 184 controls])

Factors	Cases no (%)	Controls no (%)	Odds Ratio (OR)	Confidence Interval (CI)	P-value
<b>Educational level</b>					
Uneducated (Illiterate)	20(10.9%)	12(6.5%)	1.01	-	
Primary or intermediate school	75(40.8%)	69(37.5%)	0.42	0.48-2.12	
Secondary school	77(41.8%)	87(47.3%)	1.06	0.36-2.09	0.13
University or higher education	12(6.5%)	16(8.7%)	1.03	0.39 -2.61	
<b>Family history</b>					
Yes	123(66.8%)	74(40.2%)	5.01	2.09-8.42	<0.05*
No	61(33.2%)	110(59.8%)			
<b>Indoor plants/flowers</b>					
Yes	118(64.1%)	86(46.7%)	2.41	1.23-4.91	0.07
No	66(35.9%)	98(53.3%)			
<b>Using insecticides/ air fresheners (spray)</b>					
Yes	74 (40.2%)	68(37%)	8.5	2.34 -11.09	<0.05*
No	110(59.8%)	116(63%)			
<b>History of allergic Rhinitis</b>					
Yes	99(53.8%)	102(55.5%)	4.76	2.19-6.45	<0.05*
No	85 (46.2%)	82(44.6%)			

\*Correlations considered significant when P-value <0.05

**Table 3.** Difference between smoking status and asthma among cases and controls

Variables	Asthma status		$\chi^2$	P - value
	Cases	Controls		
Active smoker	49 (26.6%)	42 (22.8%)	1.77	0.041*
Secondhand (passive) smoker	122 (66.3%)	103 (56%)	0.86	0.012*
Neither active, nor passive smoker	13 (7.1%)	39 (21.2%)	1.01	0.063

\*Correlations considered significant when P-value <0.05

level of education with  $P$ -value >0.05. Although about 64.1% of cases and 46.7% of controls (Confidence Interval {CI} 1.23 – 4.91) reported that they have plants and/or flowers in their homes, but no significant association was found between asthma and presence of indoor plant ( $P$ -value >0.05). On the other hand, multivariate logistic regression analysis showed that family history (Odds Ratio {OR}= 5.01, and Confidence Interval {CI} = 2.09 – 8.42), using of spray insecticide/air freshener (OR = 8.5, CI= 2.34 – 11.09), as well as rhinitis (OR = 4.76, CI= 2.19 – 6.45) were significantly associated with asthma occurrence as shown in Table (2). Additionally, active or passive smoking was significantly ( $P$ -value = 0.041 and 0.012) associated with asthma among adults in Najran as presented in Table (3).

## DISCUSSION

Asthma is a chronic inflammatory disease of the airways, which makes breathing difficult. Many cross-sectional studies have confirmed increases in the incidence and

prevalence of asthma over the past 2-3 decades, but much remains unknown as to the fundamental immunologic, genetic and environmental mechanisms underlying the development of this condition, especially in the developed world (Rosenberg et al., 2014).

The current study revealed that allergic rhinitis increases the risk for developing asthma, which is in consistent with what was concluded by Zhao et al who reported that asthma is significantly associated allergic rhinitis (Zhao et al., 2000). Several other studies have shown similar relationship findings (Akcakaya et al., 2000; Nayak, 2003; Talay et al., 2014). Additionally, this correlation was studied in large for 10 years-follow up study of patients with allergic rhinitis (Bousquet et al., 2005).

This study showed that females' cases were slightly higher than males among the total asthmatic cases within the studied sample, this obtained result is consistent with other studies that yielded similar results among adults (Almqvist et al., 2008; Vink et al., 2010; Melgert et al., 2007). In contrast, Bjerg et al concluded that asthma was observed to be more in males than females (Bjerg et al.,

2010). Very interestingly, a gender variation in asthma had been studied in Nigeria which reported a weak independent association between prevalence of asthma and gender (DesaluOO et al., 2013).

The influence of smoking and exposure to secondhand smoking had been acknowledged in many studies as one of the most important risk factor for developing asthma. Vozoris and Stanbrook believe that exposure to environmental tobacco smoke beside is an asthma trigger, it is also consistently worsens asthma symptoms (Vozoris and Stanbrook, 2011). Other number of studies have shown a significant association between smoking or exposure to smoke and increased risk of developing asthma (Chen et al., 2002; Piipari et al., 2004).

Similarly, our study shows a significant association between asthma and smoking. The same results had been reported by Cerveri et al. (2012). Moreover, Skoner stated that exposure to tobacco smoke was one of the strongest and most consistent risk factors in regard to development and exacerbation of asthma (Skoner, 2001). Furthermore, Larson et al evaluated the impact of exposure to environmental tobacco smoke during childhood on asthma prevalence in adulthood and they also reported that the prevalence of physician-diagnosed asthma was higher in exposed subjects than non-exposed subjects (7.6% and 5.9%, with p-value 0.036) (Larson et al., 2001).

These findings were coincided with what was reported by Asthma Burden Report (ABR) that shows no significant association between prevalence of asthma and smoking (Asthma Burden Report, 2012).

Genetic factors too have an important effect on the inception, severity and treatment of asthma. Over the past decade, Genome-Wide Association Studies (GWASs) have been utilized extensively to analyze the genetic influences on common complex diseases, including asthma (Weiss et al., 2009). Numerous studies have reported a strong correlation between family history of asthma and increased risk of the disease (Kuiper et al., 2006; Mingomataj et al., 2008). In agreement with these mentioned studies, the current study shows a significant association between asthma and family history. Similar findings have been reported by other studies that showed a significant association between hereditary factor and asthma occurrence (Altshuler et al., 2008; Howard et al., 2002).

## CONCLUSION AND RECOMMENDATION

Asthma continues to have a major impact on public health internationally. Based on the obtained results, it was concluded that there are different risk factors patterns for asthma, those factors appear to play a major role and likely contribute to the magnitude of this burden. Rhinitis, hereditary or genetic factors, tobacco use or

exposure to environmental tobacco smoke are among those risk factors or trigger factors that associated with the development of asthma. Health education programs were highly recommended to reduce exposure to triggers among Saudi people. Our observations may serve a template and thus emphasize the importance of future longitudinal studies on asthma. The current study has some limitations that include, first of all our data was cross-sectional and therefore, we couldn't assess causality. Furthermore, some behavioral data for instance smoking are self-reported that subjected to recall and social desirability biases. Moreover, we reported cases on self-reported diagnosed asthma.

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