

Evaluation of Prevalence of Allergic Rhinitis Symptoms in Kurdistan, a Western Province in Iran

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Abstract

Introduction

Allergic rhinitis, like other allergic diseases, is one of the most common disorders during childhood; this study was conducted to assess and compare the prevalence and severity of allergic rhinitis in children and adolescents living in Kurdistan province. The study was aimed to provide a ground for the identification of likely causes and risk factors of this disorder.

Materials and Methods

This study was a cross-sectional study. In order to collect data, 4,000 questionnaires were distributed to elementary schools and junior high schools and 3,890 questionnaires were completed; as a result, the survey response rate was 97%. The study was carried out based on International Study of Asthma and Allergies in Childhood (ISAAC): ISAAC questionnaire. After entering the data into SPSS version 13, they were analyzed using logistic regression and Chi-square test.

Results

Of a total 3,890 people, 29.7% of the subjects in this study reported a history of sneezing or runny nose in the past 12 months; it was reported more in boys in the age group 13-14 years and the difference between the sexes was significant [Odds ratio(OR)=1.35, Confidence interval (CI): 1.09-1.67, $P < 0.01$]. Based on physician diagnosis, 9.37% of the subjects were overtaken by allergic rhinitis and it was more prevalent in boys at both educational levels and the difference was statistically significant in subjects aged 13-14 years old (OR=1.44 CI: 1.07-1.94, $P < 0.05$).

Conclusion

The prevalence of the allergic rhinitis symptoms in children and adolescents living in Kurdistan province is relatively high and it is necessary to carry out extensive studies on its important risk factors.

Key Words: Allergic rhinitis, Iran, ISAAC questionnaire, Kurdistan.

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Received date: Aug 2, 2015 Accepted date: Aug 22, 2015

Introduction

Allergic rhinitis (AR) or hay fever is caused due to inflammation and swelling of internal part of the nose after smelling allergens. It is classified based on heterogeneous disorders of nose and one or more symptoms including sneezing, runny nose, itching, and nasal congestion(1). Like other allergic diseases, this disease is one of the most common disorders during childhood and it has had a significant increase in developing countries in recent decades (2, 3).

Although AR is not a severe disease, it has a considerable impact on the patient's quality of life and it is also able to affect patients' social life and school and work performance. It is also known as a risk factor for asthma. This disease is the most common allergic disease which has affected about 400 to 600 million people all across the world. Based on the results of the first phase of the International Study of Asthma and Allergies in Childhood (ISAAC) study, the prevalence of the symptoms of Rhino conjunctivitis varied in South America, from 10% in Chile to 35% in Paraguay(4). About 40 million people in America (10-20% of total population) are affected by allergic rhinitis and the mean age of onset of the first symptoms is between 8-11 years (5). The prevalence of the disease is reported to be more than 45% in Asia (6, 7), 37.9% in Thailand (8), 47.4% in Taiwan (9) and 25.3% in preschoolers in Singapore(10).

Changes in lifestyle and environmental factors, particularly changes in eating habits, play an important role in differences in the prevalence of the disease in the world (11-14). Western diet, that is poor in terms of the presence of antioxidants, increases individuals sensitivity to allergens (15). The Mediterranean diet has shown to have a protective role against rhinitis (16). Pollen allergy is common in all across the world,

but its nature and frequency varies based on geographical conditions, plant life, temperature, and climate (17-20).

Objective: With regard to climate and nature, Kurdistan province is a mountainous part of Iran with high plains and vast valleys across the region; moreover, its weather is under the influence of warm and humid Mediterranean air masses(21). Using the ISAAC questionnaire, this study was conducted to assess and compare the prevalence and severity of allergic rhinitis in children and adolescents living in Kurdistan province. The study was aimed to provide a ground for the identification of likely causes and risk factors of this disorder.

Materials and Methods

This cross-sectional study was conducted during September 2013 to June 2014. After obtaining permission from the General Office of Training and Education in Kurdistan University of Medical Science Sciences, 4,000 questionnaires were distributed to Elementary schools and Junior high schools, 3,890 questionnaires were completed, and the survey response rate was 97%. This study was the result of a research project which was approved by the Research deputy of Kurdistan University of Medical Sciences and Approved by the Ethics Committee no. MUK.REC.1393.121.

Subject: Given an approximate prevalence of 12%, a confidence interval of 95%, and an accuracy of 1%, the minimum sample size was determined to include 4,000 individuals. The study subjects included 1,768 people aged 6-7 years old and 2,122 people aged 13-14 years old which were respectively selected from students at Elementary schools and Junior high schools. The sample size was determined in proportion to the number of students in each city by sex and educational level; it was determined so that the sample would

be representative of the population of each age group in the province. The survey response rate was 97%. The method of sampling included a combination of cluster sampling (districts) and stratified sampling (sex and educational level). The samples were selected using the table of random numbers and based on the 8-digit codes of students, which had been registered in SANAD system. A trained interviewer who visited each school completed the questionnaires after obtain informed consent.

According to ISAAC protocol, in the age group 6-7 years parents completed old the questionnaires while in the age group 13-14 years old the students themselves completed them. Based on ISSAC protocol, after distributing the questionnaires, each question was explained by a trained interviewer.

Instrument: ISAAC consists of three phases. The first phase (which we used as the basis for conducting the present study) is based on simple methods for measuring the prevalence of symptoms of allergic rhinitis in children and adolescents in order to make proper international comparisons between different geographical areas with different languages.

Several studies have shown that after translating ISSAC questionnaire from English to other languages it has had an appropriate level of repeatability. According to the ISSAC questionnaire, eight questions are asked on the symptoms

of allergic rhinitis. The questions are about the development of sneezing or runny nose, having allergic rhinitis or hay fever, sneezing or runny nose concurrent with itching, and watery eyes. The positive predictive value of the questions is 80% for questions 1 and 2, 78% for question 3, and 71% for question 4(22).

Statistical analysis: The data that were collected based on ISSAC standards were entered into SPSS version 13 statistical software in two separate sheets by two persons. Descriptive analysis was performed. To investigate the relationship between symptoms of allergic rhinitis, sex, and educational level, the analysis was carried out using the Chi- square test, and its odds ratio (OR) and confidence interval (CI) of 95% were calculated. Based on ISSAC protocol, the analysis of the two age groups of 6-7 and 13-14 years were performed separately.

Results

According to the results 29.7% of the subjects in this study reported a history of sneezing or runny nose in the past 12 months; it was reported more in boys in the age group 13-14 years old and the difference between the sexes was significant (OR=1.35 CI: 1.09-1.67, P<0.01). Based on physician diagnosis, 9.37% of the subjects were infected by allergic rhinitis and it was more prevalent in boys in both educational levels and the difference was statistically significant in subjects aged 13-14 years old (OR=1.44 CI: 1.07-1.94, P <0.05) (Table.1).

Table 1: Prevalence of symptoms of allergic rhinitis, by sex and age groups

Variables	N (%)	OR	SE	CI	P value
Male	1809 (46.6)				
Female	2069 (53.4)				
Elementary school (6-7 years old)	1788 (45.5)				
Junior high school (13-14 years old)	2122 (54.6)				
Sneezing or runny nose in the past 12 months	29.7%				
(6-7 years old)	Male	1.07	.14	.84-1.38	.55
	Female				
(13-14 years old)	Male	1.35	.14	1.09-1.67	.006
	Female				

Sneezing or runny nose together with itching and watery eyes in the past 12 months		22.90%				
(6-7 years old)	Male	21%	.83	.12	.62-1.1	.2
	Female	24.20%				
(13-14 years old)	Male	23%	1.02	.13	.8-1.31	.81
	Female	22.60%				
Allergic rhinitis or hay fever		9.37%				
(6-7 years old)	Male	9.36%	1.28	.23	.89-1.83	.174
	Female	7.40%				
(13-14 years old)	Male	12%	1.44	.22	1.07-1.94	.016
	Female	8.60%				

Discussion

Of a total all, 29.7% of the subjects in this study reported sneezing or runny nose in the past 12 months, and it was more prevalent among the age group 13-14 years old among males; there was a significant difference between the two sexes. Moreover, 9.37% of the subjects were affected by allergic rhinitis diagnosed by physicians. The prevalence of allergic rhinitis in childhood is reported from 12% in Spain to 46% in Australia (23).

The prevalence of allergic rhinitis was 19.3% in children aged 4-9 years in southern part of Poland (24), 18.2% in children and adolescents aged 10-17 years old living in Palermo in southern Italy(25), 49.9% in children aged 6-7 years old in Fortaleza, Brazil(23), from 7.9% to 31% in Turkic-speaking schools (26-28), 23.3% in children aged 6-12 years old in Budapest (24), 11.7% in children aged 6-14 years old in San Juan Puerto Rico (25), and 30.8% in the age group 6-7 years and 36.6% in children aged 13-14 years old in Colombia (30).

In International ISAAC survey, the prevalence of Rhino conjunctivitis varied from 0.8%-14.9% in children aged 6-7 years old and 1.4%-39.7% in children aged 13-14 years old (3) 18% of 13-15 years old adolescents with allergic rhinitis were in Peru(26).

The prevalence of this disease may vary in different areas due to natural and

geographic conditions, lifestyle, diet, and even race and polymorphisms. This increases the need for regional studies and researches.

One of the other findings of the present study was the high prevalence of the disease among boys at both age groups. This finding was in line with the results of studies conducted in southern Poland (24), West Europe (31), and Palermo in southern Italy (25), Taiwan (32), Turkic-speaking schools (26-28), Korea(27), and Budapest (29). However, studies in Germany (33), Spain (34), Brazil (35), and Finland (36) showed that the prevalence was higher among girls at both age groups.

Nevertheless, no significant difference was observed between the two sexes in Colombian children aged 6 to 7 years old (30).

The difference in the results might be due to the differences in climate variables, nutritional factors, and genetic and hormonal differences caused by gene polymorphism in ethnically diverse populations. Because of the geographical differences and climate diversity in Iran, several studies have been carried out so far. In a study in Kerman (a city in East of Iran), the prevalence of AR in children aged 15-18 years was 19.3% (37).

In a study in Hamedan province, which is adjacent to Kurdistan province and has similar climate and geographical conditions, the prevalence allergic rhinitis

was reported to be 17.7% (38). In Bushehr, which is located in southern part of Iran and has humid climate, the prevalence of disease was reported to be 25.5% (39). In Kashan, which is located in the central part of Iran and has a desert climate, the prevalence of disease was 24.6% in girls and 34.6% in boys (40).

In Mirsaidi's study in Tehran, the capital of Iran, the prevalence of the symptoms of the disease was 23.5% in the students aged 7-18 years old (41). In Masjedi's study, 22% of students aged 6-7 years old and 13.5% of students in the age group 13-14 years old had symptoms of runny or sneezing in the last 12 months (31). With reference to the difference between the two sexes, our study was consistent with the results of a study by Mirsaidi in Tehran (41).

However, studies conducted in Bushehr (39), Tehran (42), Hamedan (38) showed conflicting results. In addition to the reasons mentioned in the previous sections, inconsistent results might be due to differences in the time of the study, sample size, method of sampling, differences in the climates, and climate conditions and vegetation in Iran.

Natural history of the disease has shown that during childhood the disease is more prevalent in boys than in girls, however at the time of adolescence it becomes more prevalent in girls. Comparing the results of the present study with previous studies shows that the prevalence of symptoms of allergic rhinitis in Kurdistan province in the western part of Iran is relatively higher than the other regions. The prevalence of rhinitis varies between different districts of the province (Figures 1 and 2).

With regard to climate and nature, Kurdistan province is a mountainous region with high plains and vast valleys across the region; the height difference

between the highest and lowest points of the province is about 2400 meters and such a height difference causes different climates. Kurdistan is far from the sea, but it is connected to the world's seas in South through deep intertwined valleys, and it is also linked with northern lakes like Caspian Sea and Uremia Lake.

Many major rivers originate in the mountains of Kurdistan. The highest amount of rainfall is observed in the West of the province in Marivan and Bane with 800 mm per year, and the lowest rainfall is observed in the East of the province in Ghorveh and Bijar with 400 mm per year and in the central part of the province i.e. in Sanandaj with 500 mm per year. Proper humidity and rainfall have caused dense oak forests and other forest species. Such climate and geographical factors have led to the increased growth of allergen factors such as trees, grasses, weeds, and molds, which in turn result in the pollination in different seasons.

As a result, the population of the province is exposed to a variety of allergenic factors; this result in ground for the emergence of symptoms of different allergies such as allergic rhinitis and asthma. Since the province's economy is based on agriculture, perhaps it can be one of the top causes of symptoms of rhinitis in the province.

Moreover, the higher levels of rainfall and humidity in the West of the province are consistent with the higher prevalence of rhinitis in western cities of the province. In addition, the western cities of the country are exposed to tiny dusts, which are transmitted from Iraq and can facilitate the emergence of rhinitis as well as other allergic diseases. The possibility of recall bias as well as the lack of definitive diagnostic methods for calculating the prevalence of the disease is among the limitations of this study.

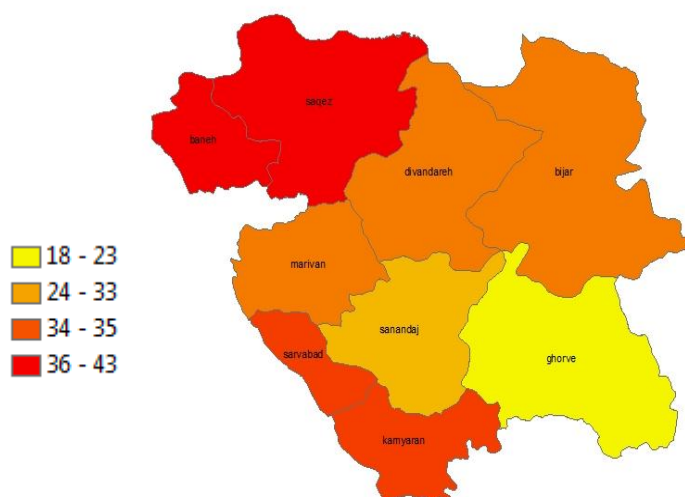


Fig 1: Sneezing or runny nose in the past 12 months in districts of Kurdistan province

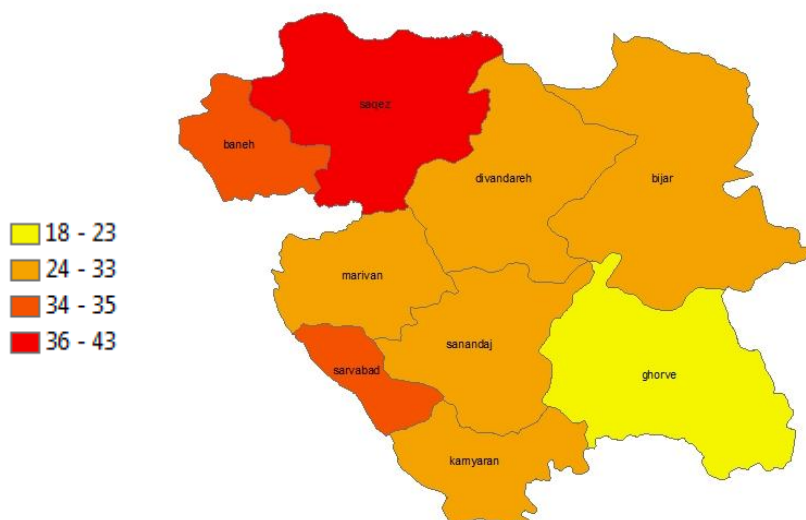


Fig 2: Diagnosed allergic rhinitis or hay fever in districts of Kurdistan province

Acknowledgments

This study was the result of a research project approved by the Research deputy of Kurdistan University of Medical Sciences and it was conducted under its financial support. We would like to appreciate those who paid special attention to this project.

Conflict of Interest: None.

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