

Original article

Study of the Association between Allergic Rhinitis and Asthma among Libyan Children

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ABSTRACT

Background and objectives: Allergic rhinitis is common association to asthma according to worldwide studies which showed that control of allergic rhinitis improves in turn asthma symptoms so we have conducted this study looking for the percent of allergic rhinitis in Libyan asthmatic children who were attending regular follow up in asthma clinic of Tripoli children hospital over period of one year (2008). **Methods:** This study was conducted by asking children's parents using questionnaire composed of directly answered questions (yes or no) if their children got attacks of rhinorrhea, nasal itching and sneezing around certain times of the year (spring and autumn). **Results:** Conclusively we found that the incidence of allergic rhinitis in asthmatic Libyan children was 36.6%. **Conclusion:** allergic rhinitis is common with asthma, and it needs to be put in consideration in any asthma patient and treated accordingly.

INTRODUCTION

Allergic rhinitis is a symptomatic disorder of the mucous membrane of the nose induced after allergen exposure due to an IgE-mediated inflammation of the membranes lining the nose. It was defined in 1929: "The three cardinal symptoms in nasal reactions occurring in allergy are sneezing, nasal obstruction and mucous discharge.

Allergen exposure likely causes both upper and lower airway inflammation. Many experts believe that a patient's airway needs to be evaluated as a total entity, not as individual parts. Studies have

shown that most patients with asthma also have allergic rhinitis. Allergic reactions of the upper airway can trigger lower airway symptoms and vice versa. One study showed that patients with untreated allergic rhinitis and asthma have an almost 2-fold greater risk of having an emergency room visit and almost a 3-fold greater risk of being hospitalized for an asthma exacerbation, respectively ^[1].

Allergic rhinitis is a global health problem that affects patients of all ages and ethnic groups. It causes major illness and disability worldwide. Allergic rhinitis affects social life, sleep, and performance at school and work, and its economic

impact is substantial. However, rhinitis is still underdiagnosed and undertreated [2].

Pathophysiology: understanding the function of the nose is important in order to understand allergic rhinitis. The purpose of the nose is to filter, humidify, and regulate the temperature of inspired air. This is accomplished on a large surface area spread over 3 turbinates in each nostril. A triad of physical elements (i.e. a thin layer of mucus, cilia, and vibrissae [hairs] that trap particles in the air) accomplishes temperature regulation. The amount of blood flow to each nostril regulates the size of the turbinates and affects airflow resistance. The nature of the filtered particles can affect the nose. Irritants (e.g. cigarette smoke, cold air) cause short-term rhinitis; however, allergens cause a cascade of events that can lead to more significant inflammatory reactions [1].

In short, rhinitis results from a local defense mechanism in the nasal airways that attempts to prevent irritants and allergens from entering the lungs [1].

Allergic reactions require exposure and then sensitization to allergens. To be sensitized, the atopic patient must be exposed to allergens for a period of time. Sensitization to highly allergenic indoor allergens can occur in children younger than 2 years. Sensitization to outdoor allergens usually occurs when a child is older than 3-5 years, and the average age at presentation is 9-10 years. The allergic reaction begins with the cross-linking of the allergen to 2 adjacent IgE molecules that are bound to high-affinity Fcε receptors on the surface of a mast cell. This cross-linking causes mast cells to degranulate, releasing various mediators. The best-known mediators are histamine, prostaglandin D2, tryptase, heparin, and platelet-activating factor, as well as leukotrienes and other cytokines [1].

These substances produce 2 types of reactions: immediate and late-phase. The immediate reactions in the nasal mucosa induce acute allergy symptoms (e.g. nasal itch, clear nasal discharge, sneezing, and congestion). The late-phase reaction occurs hours later, secondary to the recruitment of inflammatory cells into the tissue by the action of mediators released by the mast cell. Recruited cells are predominated by eosinophils and basophils, which, in turn, release their inflammatory mediators, leading to continuation of the cascade. In very sensitive individuals, this allergen-induced nasal inflammation causes priming of the nasal mucosa. Primed nasal mucosa becomes hyperresponsive, at which point even nonspecific triggers or small amounts of the antigen can cause significant symptoms [1].

Epidemiologic studies throughout the world have consistently shown that asthma and rhinitis often coexist in the same patient. The vast majority of patients with asthma have rhinitis, but the prevalence of asthma in rhinitis patients still needs to be assessed [2]. Asthma and allergic rhinitis (AR) comorbidity refers to the association between asthma and allergic rhinitis. This is due to their pathophysiological, epidemiological, and clinical similarities.

It is well known that patients with allergic rhinitis have changes in the Bronchial mucosa despite the absence of asthma symptoms. Studies done on patients with allergic rhinitis who had undergone bronchial biopsy; there was a reduction of lung and nasal function, as well as an increase in the number of eosinophils in nasal and bronchial mucosa, after bronchial provocation in non-asthmatic patients. Alternatively, patients with asthma have eosinophilic infiltrates in nasal mucosa despite the absence of AR symptoms. That asthma and AR are manifestations of the same inflammatory disease affecting the entire airway is further suggested by the clinical

improvement of asthma when AR is treated [3]. So we have conducted this study in an attempt to find out the percent of allergic rhinitis in Libyan asthmatic children which is underestimated and not treated properly in most of them.

METHODS

Study design and setting

This was cross sectional descriptive study conducted among patients attended the Tripoli children hospital over the period of one year (2008). Data analysis and handling by using computer software for data analysis called SPSS 14.

Sample population and collection

This study was done on known Libyan asthmatic children (after exclusion of other causes of recurrent wheeze like gastroesophageal reflux) attending regular follow up in asthma clinic at Tripoli children hospital. A questionnaire which is made from easy directed questions (answered by yes or no) as shown in the appendices.

During this time the investigator interviewed the parents personally (mostly the mother) in asthma clinic in Tripoli children hospital twice per week and during her duties and in the different wards of the hospital asking them by using previously prepared questionnaire which contains easy answered questions (yes or no) about if their children complaining of runny nose, sneezing and severe nasal itching in certain times of the year like spring and autumn so they have been considered to have allergic rhinitis.

RESULTS

From 152 patients (97 males and 45 females), 52 have allergic rhinitis (37 males and 15 females) so the

percent (prevalence) of allergic rhinitis in asthma Libyan children is 36.6% (Figure 1).

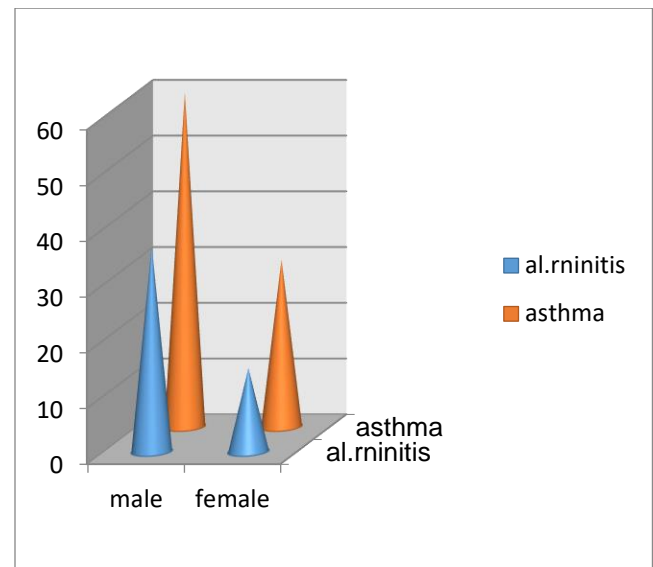


Figure 1: Asthma allergic rhinitis's sex ratio

All patients were Libyan except two, one was Tunisian and the other was Egyptian and all patients were living in Tripoli and the areas surrounding it. Age of the patients ranged between seven months and fourteen years, mean age was five years and standard deviation of 3.322. Sex ratio of patients who have allergic rhinitis was 2.5:1 male to female.

Among 142 patients, 65 have family history of asthma, 20 have family history of allergic rhinitis, 31 have family history of both asthma and allergic rhinitis, 10 have family history of other types of allergy (atopic dermatitis, food allergy, allergic conjunctivitis) and 16 of them have no family history of any type of allergy. Among 52 patients who have allergic rhinitis, 24 have family history of asthma, 9 have family history of allergic rhinitis, 13 have family history of both allergic rhinitis and asthma, 4 have no family history of any allergy type and 2 of them have family history of other allergy types. 26 of 52 patients who have allergic rhinitis were treated.

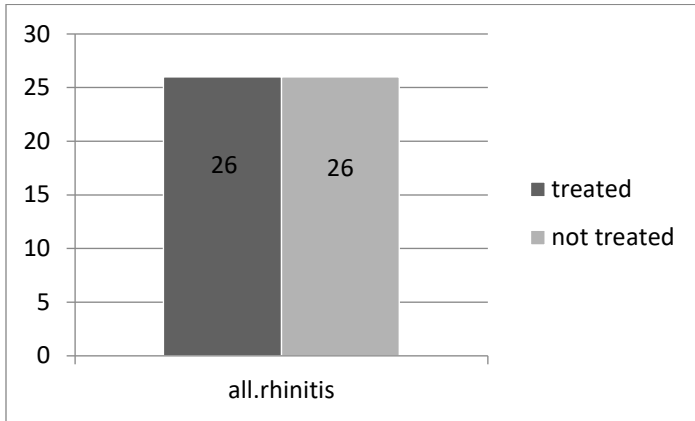


Figure 2: Allergic rhinitis treatment ratio

From 36 patients who have allergic rhinitis, 48 were diagnosed clinically, 2 were diagnosed laboratorial (e.g. level in the blood) and 2 diagnosed by two methods. P value for allergic rhinitis and diagnosis method cross tabulation was less than 0.05. P value for age and allergic rhinitis cross tabulation was less than 0.05.

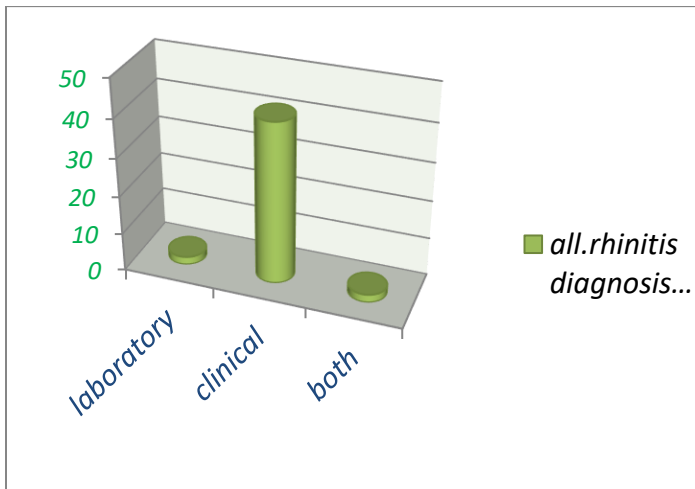
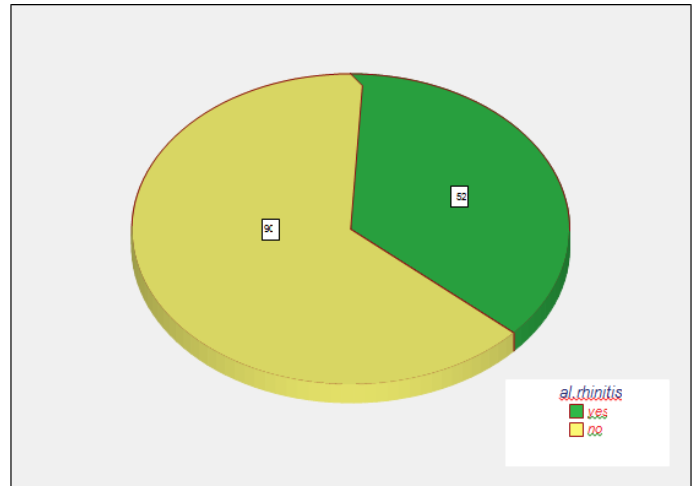
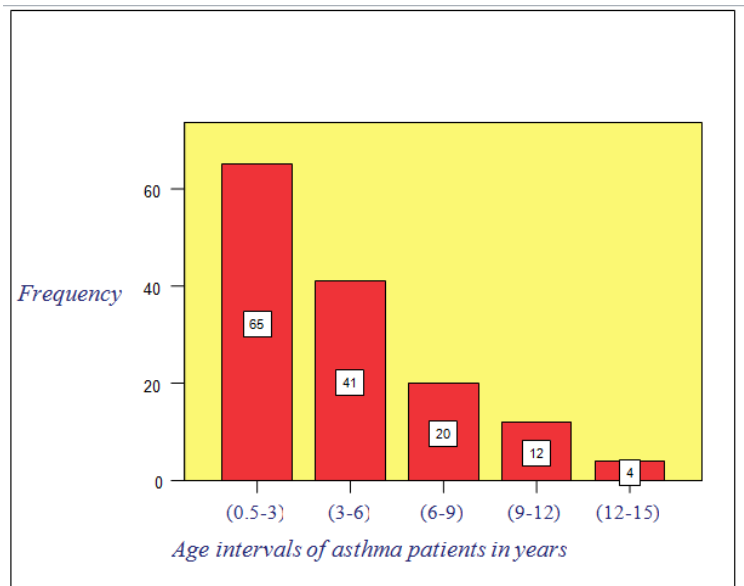


Figure 3: Allergic rhinitis diagnosis method



All. rhinitis asthma ratio (fig 4)

Figure 4: Asthma allergic rhinitis prevalence



Age intervals of asthma patients (fig 5)

Figure 5: Age intervals of asthmatic patients

DISCUSSION AND CONCLUSION

Although allergic rhinitis (AR) is a common disease, the impact on daily life cannot be underestimated. Allergic rhinitis is caused by an immunoglobulin E (IgE)-mediated reaction to various allergens in the nasal mucosa. The most common allergens include dust mites, pet dander, cockroaches, molds, and pollens. Allergen exposure likely causes both upper

and lower airway inflammation. Many experts believe that a patient's airway needs to be evaluated as a total entity, not as individual parts. Studies have shown that most patients with asthma also have allergic rhinitis. Allergic reactions of the upper airway can trigger lower airway symptoms and vice versa. One study showed that patients with untreated AR and asthma have an almost 2-fold greater risk of having an emergency room visit and almost a 3-fold greater risk of being hospitalized for an asthma exacerbation, respectively.

Comorbidity of other atopic diseases (asthma, atopic dermatitis) or upper airway inflammation (sinusitis, otitis media) is significant in AR. Individuals with AR have a higher frequency of these conditions than individuals without allergic rhinitis. Quality-of-life surveys revealed that patients with significant AR found symptoms to be just as debilitating as symptoms in patients with moderate-to-severe asthma.

Patients with AR felt they were equally impaired and unable to participate in the activities of normal living similar to those with the moderate-to-severe asthma. They felt that chronic congestion, sneezing, the need to wipe the nose, and a decrease in restful sleep compromised levels of their daily activity. AR usually presents in early childhood. AR caused by sensitization to outdoor allergens can occur in children older than 2 years; however, sensitization in children aged 4-6 years is more common. Clinically significant sensitization to indoor allergens may occur in children younger than 2 years. This is typically associated with significant exposures to indoor allergens (e.g. molds, furry animals, cockroaches, dust mites). Some children may be sensitized to outdoor allergens at this young age if they have significant exposure [1].

allergic rhinitis often associated to asthma. Up to 78% of asthma patients have AR, and 38% of patients with AR have asthma. Rhinitis patients without asthma

often manifest bronchial hyperresponsiveness. The aggravation of AR coincides with exacerbation of asthma; accordingly, treatment of nasal inflammation reduces bronchospasm, asthma-related emergency department visits, and hospitalizations [4].

There is a strong epidemiologic association between rhinitis and asthma. There are common cellular mechanisms mediating allergic inflammation in the upper and lower airway. Treatment of rhinitis improves asthma control. The mechanism by which upper airway responses to allergen may exacerbate lower airway symptoms has been postulated to be mediated by mechanisms including a nasobronchial reflex, altered breathing patterns associated with nasal obstruction, aspiration of nasal secretions, or most recently a systemic inflammatory response to a local allergen challenge in the nasal mucosa. Further studies are needed to determine whether any of these, or other, mechanisms mediate the propagation of the inflammatory response from the upper to the lower airway, or vice versa [5].

Fujisawa Takao found in his study that allergic rhinitis is combined high-frequent in the infantile bronchial asthma. The frequency is different by the report, and it was observed that 77.7% had year-round allergic rhinitis on us using objective diagnostic criteria in 130 asthmatic children [6].

Preliminary evidence suggests that inadequately controlled allergic rhinitis in asthmatic patients can contribute towards increased asthma exacerbations and poorer symptom control, which may increase medical resource use. Among 2961 asthmatic children under 15 years of age with at least one asthma-related hospital admission over a 2-year period, 795 (26.8%) had a recorded history of allergic rhinitis. Asthmatic children with allergic rhinitis had a 1.72-times greater hazard of asthma-related readmissions than asthmatic children without allergic rhinitis. Concomitant allergic rhinitis in asthmatic children was associated with increased

likelihood of asthma-related hospital readmissions and greater total hospital days [7].

The incidence of allergic rhinitis in pediatric bronchial asthma patients was about 80% according to a questionnaire survey. Watery nasal discharge and nose rubbing were common symptoms of pediatric allergic rhinitis, while nasal congestion and sneezing increased with age. Although there were slight differences depending on the age of patients, one-third to nearly half were believed to have nasal symptoms and asthma attacks [8].

Most studies on the association between rhinitis and asthma evaluate the prevalence of asthma in patients with allergic rhinitis, while few assess the prevalence of rhinitis in patients with asthma. The prevalence of allergic rhinitis among asthma patients varies widely in published studies, ranging from 80% to 95% in the most recent. The Estudio Ibérico, 49% of patients with allergic rhinitis had concomitant asthma (56% intermittent, 44% persistent, 33% mild, 10% moderate and 1% severe. In the 2005 Alergolical study, 37% of patients with allergic rhinitis had concomitant asthma and 65% conjunctivitis.

In the Oneair (allergologists) and Rinair (pneumologists) studies, the prevalence of allergic rhinitis among asthma patients was 71% and 89.5%, respectively. However, it is interesting to emphasize that, in the Rinair study, the prevalence was much higher among allergic (84%) than nonallergic (51%) asthmatics. In the Oneair study, the prevalence of asthma severity groups according to the GINA classification was 38.5% intermittent and 61.5% persistent (29.4% mild, 27.2% moderate, and 4.9% severe). In the Rinair study, the prevalence of asthma by severity was 24.5% intermittent and 75.5% persistent (35.4% mild, 32.7% moderate, and 7.4% severe) [2].

The Global Initiative for Asthma (GINA)30 recognizes that AR is frequently associated with asthma and that AR needs to be treated in order to achieve good asthma control – in accordance with Allergic Rhinitis and its Impact on Asthma recommendations [3].

In comparison to worldwide studies as mentioned above, our study was not far from their results concerned our research but less commoner than them and we found the incidence of allergic rhinitis in asthmatic Libyan children 36.6% therefore allergic rhinitis is common association to asthma so it should be looked for in any asthmatic child and treated accordingly if it were found because its treatment improves asthma symptoms control.

In conclusion, the percent of allergic rhinitis in Libyan asthmatic children was 36.6. And among them 92% have family history of allergy. So, it is considered high percent that the pediatricians should look for it in any asthmatic child and treat it accordingly to improve asthma control in among their patients.

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

REFERENCES

- [1] Jack M, Becker MD. (2007). Allergic rhinitis. <http://www.emedicine.com>.
- [2] Mullol J, Valero A, Alobid I, Bartra J, Navarro AM, Chivato T, Khaltaev N, Bousquet J. Allergic Rhinitis and its Impact on Asthma update (ARIA 2008). The perspective from Spain. *J Invest Allergol Clin Immunol*. 2008;18(5):327-34.

- [3] Sukhan VS. Allergic rhinitis and asthma co-morbidity. *Wiad Lek.* 2019;72(4):622-626.
- [4] Milgrom H, Leung D. Allergic rhinitis, *Nelson's text book of pediatrics*, 142;2008.
- [5] Bousquet J, Cauwenberge P, Khaltaev N. Allergic Rhinitis and Its Impact on Asthma. <https://doi.org/10.1067/mai.2001.118891>.
- [6] Fujisawa Takao: Association of bronchial asthma and allergic rhinitis in children. *Journal of Allergy in Practice.* 2005; 338:940-944.
- [7] Sazonov V, Thomas J, Jonsson L, Valovirta E, Kristensen F, Yin D, Bisgaard H. Association between allergic rhinitis and hospital resource use among asthmatic children in Norway. *Allergy.* 2005;60(3):338-42. <https://doi.org/10.1111/j.1398-9995.2005.00712.x>.
- [8] Shimojo N, Suzuki S, Tomiita M, Inoue Y, Nakano K, Kohno Y. Allergic rhinitis in children: association with asthma. *Clinical & Experimental Allergy Reviews.* 2004;4(1):21-25. <https://doi.org/10.1111/j.1472-9725.2004.00027.x>.