Research Article

Characteristics of childhood allergy in a pediatric population in Outpatient and Emergency settings

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Received on: 28-Jun-2022 Accepted for Publication: 20-Sept-2022

Background: Pediatric allergic diseases (AD) continue to rise and are a significant health concern worldwide. Pediatric Asthma, eczema, allergic rhinitis (AR), Allergic conjunctivitis (AC), and food allergies are increasing rapidly. Understanding AD's characteristics of ADs can help improve the treatment and outcome of ADs.

Method: A multicenter retrospective study was conducted in China from outpatient and emergency Department (ED) pediatric departments across 66 hospitals from 2016 to 2018. Data were analyzed based on demographics, patient encounters, the spectrum of diagnosis, and comorbidities.

Results: A total of 2,376,150 Outpatient and ED were included in the study. Allergic skin disease is most common (38.9%), followed by AR (22.9%), AC (3.3%), and male numbers dominate in all four diseases. Asthma and allergic skin disease are more common in 1 to less than four years of age. On the other hand, AR and AC are more common in 4 to <7 years. Asthma was the most common reason for ED visits. Also, seasonal variations in AD are an area of interest in clinical practice. The most associated comorbidity with Asthma was lower respiratory tract infection (LRTI), followed by AR and upper respiratory tract infection. On the other hand, AR was associated with morbidities like otitis media, adenoid hypertrophy, LRTI, Asthma, and chronic pharyngitis in the following order.

Conclusion: Understanding the characteristics of ADs is beneficial to understanding associated comorbidities and improving childhood ADs patient's daily life.

Keywords: Allergic rhinitis, Asthma, Atopy, allergic conjunctivitis, cough variant asthma

INTRODUCTION

Allergic diseases are becoming more prevalent globally and affecting all age groups [1]. In the last decade, allergy diseases are dominating the pediatric population. [2-3], increasing medical costs and morbidity. As per [4] study shows, Asthma prevalence was 10%, rhinitis at 54%, and eczema at 22% among Shanghai residents. A retrospective study [5] showed the prevalence of asthma and rhinitis in 20% of outpatient visits. All ADs are associated with co-morbidities but a lacking understanding of the profile and characteristics of ADs. This study determines the characteristics of ADs in a selected population to effectively improve clinical practice and treatment.

METHOD

As per [1], two Pediatric hospitals and sixty-four other hospitals that take care of pediatric patients in Shanghai, China, performed a multicenter retrospective analysis of Children less than 18 years with A.D., seen as OPD and ED encounters between 1st January 2016, and 31st December 2018. Data were classified based on age, birth date, male or female, a record of the encounter, and reported diagnosis. Patient ages were classified as < 1, 1 to < 4, 4 to < 7, 7 to < 12, and 12 to ≤18 years. The Research ethics committee approved the study protocol of Shanghai children's hospital.

DEFINITIONS

Allergic diseases prevalent in pediatrics, Asthma, Allergic rhinitis, skin allergies, and Allergic conjunctivitis were included in the study. Standard definitions according to I.C.D. 10 were used [6].

Cough variant asthma (C.V.A.) was defined as a cough lasting more than four weeks but with no associated wheezing or difficulty breathing in contrast to classic asthma.

Severe asthma attack, according to [7] "Asthma guideline in China, 2016, is defined as the use of additional respiratory muscles associated with fast breathing, increased heart rate, unable to speak in entire sentences, reduced arousal, Spo2 less than 90%, and less than 50% of expected of Peak flow while expiration, and similar symptoms children < 6 years of age but the addition of loss of consciousness.

Status asthmaticus is an extreme form of asthma exacerbation that is not responding to first-line treatment for asthma exacerbation.

Eczema is long-term skin inflammation associated with a high IgE level and elevated eosinophils in blood and tissues. Therefore, the healthcare providers can perform serum eosinophils, total, and allergen specific IgE in serum, and allergy skin tests, according to clinical conditions.

STATISTICAL ANALYSIS

The statisticians utilized Python for data processing, and S.P.S.S. modern was used for data analysis. Numbers and percentages represented the qualitative factors. The proportion difference between the collections was analyzed with the chi-square. The p-value of 0.05 demonstrates the statistical significance.

There were 2,376,150 total OPD and ED encounters for A.D. across 66 hospitals in shanghai between 2016 and 2018. Results showed the number of patients with allergic conditions in shanghai increased by 13.2 % in 2018. According to the results, allergic skin diseases accounted for a more significant number of patients at 38%, followed by Asthma at 34%, A.R. at22%, and A.C. at 3%.

Table: Overview of visits with allergic diseases in Shanghai, China, 2016 to 2018:

Disease	2016	2017	2018	Total
Asthma	267091 (40.6)	260887 (32.6)	298939 (32.6)	826917 (34.8)
AR	120196 (18.3)	179142 (22.3)	243873 (26.5)	543211 (22.9)
Allergic Skin disease	249596 (38)	333284 (41.6)	341857 (37.3)	924737 (38.9)
AC	20334 (3.1)	28055 (3.5)	32896 (3.6)	81285 (3.4)
Total	657217	801368	917565	2376150

Patients with Allergic Diseases' Demographic Profile

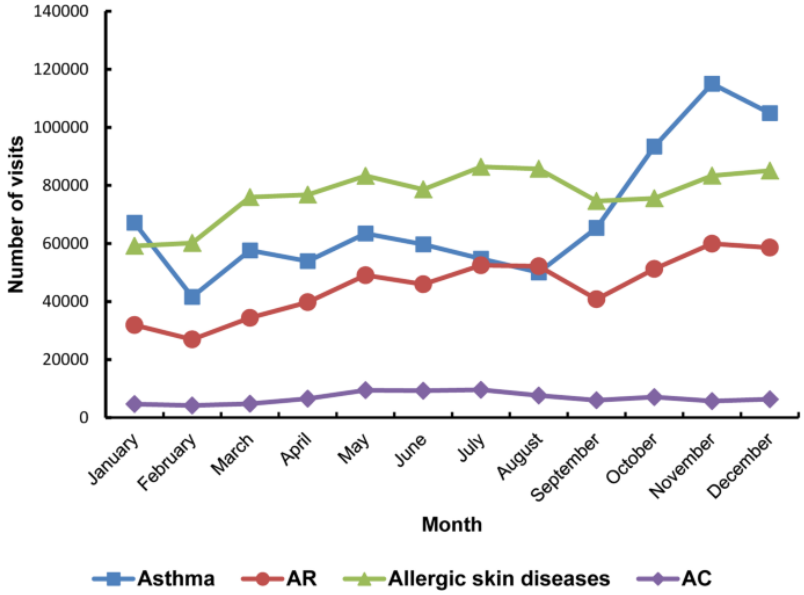
Data were compared across age ratio, payment methods, and sex of the child. Males have been significantly affected by most of the allergic manifestations. In contrast to A.R., A.C., and Asthma, allergic skin disorders were found to have a lower male to female ratio. Compared to other conditions, allergic skin diseases had a smaller Payer type percentage of children with government insurance. Regarding age distribution, age group 1 to less than 4 has the highest allocation of Asthma (37.9%) followed by 4 to <7 (32.4%), 7 to <12 (16.2%), < 1(9.6%), and 12 to 18 < (3.9%) and allergic skin disease highest among 1 to < 4 year (33.4%) followed by <1

(26.2%), 4 to < 7 (18.4%) and 7 to <12 (14.8%). AR and AC are most common among 4 to <7 years, followed by 7 to <12, 1 to <4, and <1 year.

The pattern of the visit of the patient with A.D.

The percentage of emergency visits was highest for Asthma at 19%, followed by allergic skin conditions at 8%, AR at 4%, and A.C. at 2%. Most asthma emergency visits were in children aged 7 to 12 and the lowest in children under a year. Those with medical insurance coverage visit the emergency department more than outpatient visits for the four diseases. The figure below demonstrates the seasonal holidays of children with allergic conditions to various hospitals in shanghai.

Seasonal Variations in the number of visits for ADs:



According to the graph, the total encounter linked to Asthma was lower in February and more in November. Visits for A.R. were at an all-time high in November, while meetings for skin diseases were noted to be highest between July-August and decreased in January. A.C. visitors see a consistent trend throughout the year with a little uptick from May to July.

Comorbidity and presentation of A.D.s

According to the asthma visits, the proportion of C.V.A. (Cough variant Asthma) was 9.5%, increasing from 2016 to 2018. Out of the total visits, 3.7% were Asthma complicating respiratory infections, which turned out to be a decrease from the year 2016 to 2018. 0.3% (2636) of the visits were severe asthma exacerbation, with 62 patients undergoing a status asthmaticus.

After observing the patient's characteristics, a comparison was made between those with classic Asthma and C.V.A. The patients with C.V.A. (9.7%) recorded a lower number of E.D. visits as compared to those with classic Asthma (21.3%), with most of the C.V.A. patients being 4 to <7 years of age (46.9%) and the majority of classic Asthma being 1 to <4 years of age. In addition, patients with C.V.A. had a reverse male-to-female ratio compared to those with traditional Asthma. Eczema was the most reported allergic skin condition, with a prevalence of 70.8%, followed by acute urticaria (27%) and then followed by other allergic skin conditions such as chronic urticaria (0.895%), contact dermatitis (0.624%), and angioedema (0.506 percent). Atopic dermatitis was shown to be the cause of 0.038 percent of all medication eruptions, with patients under 1-year-old being the most affected (32.8 percent), followed by those between 1 and 4 (30.4 percent), 4 and 7 (16.7 percent), 7 to 12, and 12 to 18 (6.2 percent) years old.

The constituent ratio of comorbidities in Asthma

The study of Asthma and C.V.A. comorbidities was studied well in the article. According to the data, L.R.T.I., A.R., and upper respiratory tract infections (URTI) account for 43.9 percent, 20.5 percent, and 14.1 percent of all asthma comorbidities, respectively. Food allergies (2.98 percent), allergic skin conditions (1.51 percent), and A.C. were other allergic comorbidities (0.75 percent). Epilepsy and ADHD were present in some individuals (0.14 percent).

The constituent ratio of comorbidities in Cough variant Asthma:

The coexisting conditions of C.V.A. patients typically had a greater rate of coexistence than people with typical Asthma. Major allergic comorbidities such as L.R.T.I.s recorded the highest proportion, with 63.1% coexisting with URTIs at 4.5%, followed by AR at 23.9%. Other allergic comorbidities such as food allergy (0.84%), allergic pharyngolaryngitis (0.96%), OSA (obstructive sleep apnea) (0.62%), allergic skin conditions (0.46%), and AC (0.25 percent).

The Constituent ratio of comorbidities in AR:

78,266 (14.4 percent) out of 543,211 visits for AR over three years had any concurrent illnesses. The data shows that Middle ear infection (23.4%) and adenoid hypertrophy/O.S.A. (22.1%) were the most prevalent comorbidities, followed by L.R.T.I. (12.1%), followed by Asthma (9.4%), and chronic pharyngitis at (8.9 percent).

DISCUSSION

The etiology of Asthma and allergic disease remain poorly understood [8]. The study showed that the prevalence of A.D. had sharply increased over the years. Globally burden of asthma is changing, and there are potentially modifiable risk factors for asthma [9]. However, there were regional and racial differences in the A.D. prevalence spectrums. As per the current study, skin allergy manifestations were more prevalent than Asthma and A.R., While as per [10-11], A.D. are Asthma, A.R. and atopic dermatitis, and A.C. in order, possibly because of genetic differences and environmental factors.

In the present study, AR has increased from 2016 to 2018, possibly because of an increase in outdoor and indoor pollution and an increase in the training of physicians in diagnosing AR and Asthma. At the same time, AC reported lower in the study because of maybe mild presentations and limited expertise in diagnosis.

It's known that ADs changes with age. The study on the Swedish pediatric population reported more asthma in the age group of more than seven years [12].in the USA, a study also found that Asthma prevalence shows an increasing trend with age [13]. But in the present study, Asthma was significantly higher in the age group 1 to less than four years, possibly because of a higher incidence of Respiratory tract infection in this age group and a lack of diagnostic criteria that differentiate it from Viral associated wheezing and it overreported. Also, for Asthma, many factors play a role [14]. It found that Asthma is highest in Winter and spring, negatively affected by humidity [15]. In present study showed more asthma in Autumn and winter, possibly because of associated viral infection and cold temperature. Also, more visits for AR were reported in colder months, but some peak from ay to August, possibly because of pollen and other allergens [16]. That's why seasonal variations in AD require further research.

The present study is consistent with the high prevalence of ADs in boys than girls, similar to previous studies [17]. Also, the present study shows higher ED visits for boys compared to girls with asthma, found identical in other studies [18]. Also, ED visits are lower in less than one year and increase with age, likely because of more trigger exposure and easy access to visits.[19] also proved the same findings.

Also, Asthma and AR are associated with many co-morbidities, as mentioned in the study. LRTI was most noted associated with Asthma. GERD is frequently associated with Asthma, but the present study showed low association maybe because it's underestimated.

The study limitation was no data from private medical institutions and other hospitals. Also, the study did not include the patient who required a prescription for Asthma /AR and a level of control for asthma.

CONCLUSION

Pediatric allergy research is essential because it helps to understand the allergic process and the causes of allergies. More attention is required to understand the characteristics of ADs, so It also gives parents, doctors, and researchers a better understanding of managing children's allergies and associated co-morbidities. Pediatric allergy research is expected to increase in the coming years as more scientists join this field—skin allergies and Asthma are the most common diseases for outpatient and emergency visits in shanghai. Moreover, respiratory tract illness was the most common complication of Asthma.

ETHICAL APPROVAL

The study was approved by the Ethics committee, and waiver consent was obtained from the Research Ethics committee of the children's hospital, affiliated with Fudan university, for this retrospective study.

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