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Asthmatic Attacks against Specific Primary School Students in Baghdad, Iraq

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Annotation: Background: Certain stimuli can readily irritate the lungs and airways in children with asthma. Potential causes include, for instance, breathing in pollen or getting a cold or other respiratory illness. Play, sports, school, and sleep can all be disrupted by the irritating daily symptoms of childhood asthma [1]. For certain children, untreated asthma may result in potentially fatal episodes. Although it has distinct consequences, childhood asthma is not distinct from adult asthma. The illness is the main cause of hospital stays, emergency department (ED) visits, and absences from school. Asthma in children is unfortunately incurable, and symptoms may last into adulthood. Children can, however, control symptoms and safeguard their growing lungs with the right care [2].

Objective: This short study aims to identify certain risk factors that may increase the probability of developing asthma in some children under the age of 11 at Alrussafa-Baghdad.

Methods: This survey was conducted in Baghdad to determine the prevalence of asthma among primary school students aged 7 to 11, with an average age of 9 years. The study was conducted from October to December 2024 at Al-Ilwiyah Paediatric Teaching Hospital in Al-Rusafa, Baghdad. Sixty children were included,

30 with bronchial asthma and 30 without asthma, control groups were gathered using face-to-face questionnaires directed to the child's parents following the clinical examination of children by the consultant paediatrician at the hospital's outpatient clinic.

Results: There was no significant difference (p-value > 0.05) in gender distribution between asthmatic and non-asthmatic teams, as measured by frequency percentage: male = (16, 53%) and female = (14, 47%). Males (18, 60%) and females (12, 40%) were non-asthmatic, respectively. In this study, the prevalence of bronchial asthma was 2.1% (p-value = 0.04), which is statistically significant (p < 0.05).

Conclusions: This Questionnaire indicated that crowding index, non-breastfeeding, family social status, mother's education, family smoking history, family history of asthma, and food hypersensitivity reaction were all significant risk variables for illness severity (p-value = 0.001, p-value < 0.05).

Keywords: Asthma, Primary school children, Alrusafa-Baghdad/Iraq.

Introduction

Asthma is a complex, multifactorial condition characterised by the interaction of allergic and non-allergic triggers, leading to bronchial obstruction and inflammation. It is the predominant chronic disease among children in industrialized nations, although it is also prevalent in children in developing countries [2]. Despite several studies on asthma, the aetiology of childhood asthma remains inadequately defined. Lifestyle variables and environmental exposures in early life may significantly contribute to the incidence of asthma. Allergenic sensitisation plays a crucial role in the aetiology of asthma, and while the associations between inhalant allergens and asthma have been recognized for decades, they have lately been underscored once more [3]. Indoor allergens correlate with the prevalence, severity, and exacerbations of asthma, while outdoor allergens are linked just to exacerbations. The timing of environmental exposure throughout early development may be crucial for allergic sensitization and subsequent asthma development. Initial exposure to endotoxin in agricultural environments correlates with a diminished risk of infantile asthma; conversely, endotoxin exposure in later life may elevate asthma incidence, particularly in farming contexts [3].

Asthma exacerbation is the primary cause of morbidity and mortality in paediatric asthma patients. Evidence indicates that viral infections, as opposed to bacterial infections, significantly contribute to asthma aggravation. Nonetheless, the influence of respiratory infections diminishes with age in children; as they grow older, asthma episodes are more prone to be induced by variables such as physical exertion or allergic reactions. Tobacco smoke, wood smoke, airborne allergens, dust mites, mould, and other indoor pollutants have all been linked to wheezing or exacerbated asthma in children [4]. The extent of contact with these chemicals varies by region

in Iraq and developed countries, since youngsters spend more time outside as they grow older. Despite the increased exposure to asthma triggers, there is limited population-based data assessing whether exposure to environmental variables is connected with asthma in Iraqi children [4].

Worldwide, childhood asthma is a significant clinical concern that places a heavy strain on families and society. It causes many missed school days and may prevent kids from interacting with others and succeeding academically. Due to the expense of treatment and the need for hospital and doctor visits, childhood asthma also puts a burden on healthcare resources [5]. According to reports, the prevalence of paediatric asthma varies from 1% to 30% depending on the community. Different exposures to respiratory diseases, indoor or outdoor pollution, and food may cause these variances. These differences may also be influenced by environmental, behavioural, and genetic factors. Asthma appears to be more common in wealthy people than in less wealthy ones. Worldwide, the prevalence of childhood asthma is rising, and as a result, morbidity, mortality, and healthcare costs are all increasing [5]. Asthma's genetic foundation and indoor allergens, such as dust mites and air dust, have been linked to the disease's rising incidence. About 4.8 million children in the United States are among the 15 million people who suffer from asthma. The "hygienic hypothesis," which holds that childhood asthma develops as a result of reduced exposure to infectious agents during infancy and early childhood, is supported by numerous studies. This hypothesis states that the neonatal T helper lymphocyte 2 immunophenotype persists, predisposing the child to atopic diseases [6].

When an irritant, such as pet hair or cigarette smoke, comes into contact with the airway walls, it causes inflammation. The body's immune system sends unique cells called mast cells to the site of irritation, which in this case is the walls of the airways, after identifying the irritant as a dangerous invader. The inflammatory response is the process by which mast cells produce histamine, resulting in swelling and redness [7].

Aims of study

This study aims to identify risk variables that may increase the likelihood of getting asthma in some children under the age of 11 at Alrussafa-Baghdad.

Materials and Methods

This short study was carried out in Baghdad to determine the prevalence of asthma among primary school students aged 7 to 11, with an average age of 9 years. The study was conducted from October to December 2024 at Al-Ilwiyah Paediatric Teaching Hospital in Al-Rusafa, Baghdad. Sixty children were included, 30 with bronchial asthma and 30 without asthma, as control groups were gathered using face-to-face questionnaires directed to the child's parents following the clinical examination of children by the consultant pediatrician at the hospital's outpatient clinic (Fig. 1).

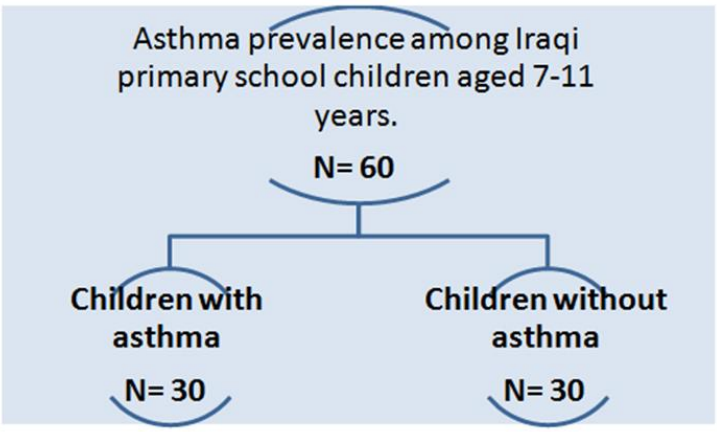

Figure (1): Distribution of asthma in primary school children.

Tools of the Study

The results were collected through face-to-face interviews with the child's parents using a specially constructed questionnaire for this study after it was approved at the Al-Kindi University/ Faculty of Medicine/ Department of Pediatrics. This questionnaire included socio-demographic information such as age, gender, number of children in the family, breastfeeding status, economic situation, family structure, type of household cooling, parents' educational levels, smoking history, history of asthma, and hypersensitivity to drugs and foods.

Limitation of the study

1. This brief study was conducted at one of the teaching children's hospitals on the Rusafa side of Baghdad, with a small number of study participants, to identify specific risk variables that raise the severity of the disease.
2. Cases similar to asthma, such as colds, influenza, and bronchitis caused by viruses or bacteria, were excluded.

Statistical Analysis

Statistical analysis was performed using SPSS version 23 and Excel 2010. The data was presented as frequency percentages. The studied parameters were compared between the two subject groups using unpaired t-tests and Pearson Chi-squared tests. Each outcome in this study had a p-value < 0.05, indicating statistical significance.

Results

In this study, 60 samples were divided into two groups: 30 samples with an asthma group and 30 with a non-asthma group as the control. The current study found that the prevalence of asthma among primary school children aged 7 to 11 years, with a median age of 9, was 2.1% (p-value = 0.04), which is statistically significant. There was no significant difference in gender distribution between the asthma and non-asthma groups (p-value > 0.05), with males (16, 53%) and females (14, 47%) in the asthma group. Meanwhile, males (18, 60%) and females (12, 40%) constituted the non-asthma group, table (1).

Table (1): Asthma frequency among primary school children aged 7 to 11 years, with gender distribution.

Variable	observation
Children with asthma	
Male [%]	16 [53.0]
Female [%]	14 [47.0]
Total [%]	30 [100]
P-Value	0.23
Children without asthma	
Male [%]	18 [60.0]
Female [%]	12 [40.0]
Total [%]	30 [100]
P-Value	0.25
Prevalence of asthma	2.1%
P-Value	*0.04

*Significant

The study revealed that all observational data were highly significant (p-value < 0.05), except for economic status, cooling type, and medication allergies, which were non-significant (p-value > 0.05). The crowding index of 2-3 children was 15 [50.0] and 19 [63.3], indicating most of the

asthmatic and non-asthmatic groups, respectively with a significant result. The non-breastfeeding rates in the asthma group were 17 [56.6] higher; in the non-asthmatic group, breastfeeding was 20 [66.6] higher, with an important percentage difference. In a low-income setting, it was 18 [60.0] for asthmatic and non-asthmatic groups, respectively, which was higher with non-significant results. The low social state was a significant result, with a frequency percentage of 24 [80.0] and 20 [66.6] in the asthma and non-asthmatic groups, respectively. The cooling type represented by a dry air cooler was 24 [80.0] and 25 [83.0], with a higher percentage frequency but non-significant result in the asthmatic and non-asthmatic groups, respectively. The maternal education in the asthmatic group was a primary education with a high percentage frequency, 13 [43.3], whereas, in the non-asthmatic group, the maternal education was a secondary education with a high percentage frequency, 14 [47]. The results were statistically significant. The majority percentage frequency of those with a family history of smoking in the asthmatic group was 20 [66.6]. In contrast, the most common percentage frequency of those with a family history of no smoking in the non-asthmatic group was 16 [53.0]. These findings were statistically significant. Regarding the family history of asthma, food allergy, and drug allergy, the higher percentage frequency with a family history of asthma was 20 [66.6.0] in the asthmatic group and with no family history of asthma was 23 [77.0] in the non-asthmatic group. The highest prevalence of food allergy was 15 [83.0] in the asthmatic groups, compared to the non-asthmatic groups, which had 30 [100.0] no food allergy. And without a medication allergy, it was 30 [100.0] for both groups. The findings were statistically significant except for medication allergy, which was non-significant, table (2).

Table (2): The frequency and proportion of several factors correlated in this observational study (N = 60).

characteristics	Number of Children's with asthma [%]	Number of Children's without asthma [%]	P-Value
Crowding Index			
1 child	5 [16.6]	4 [13.3]	*0.001
2-3 children	15 [50.0]	19 [63.3]	
>3 children	10 [33.3]	7 [23.3]	
Breast Feeding			
Yes	13 [43.3]	20 [66.6]	*0.001
No	17 [56.6]	10 [33.3]	
Economic Situation			
High	12 [40.0]	12 [40.0]	0.9
Low	18 [60.0]	18 [60.0]	
Social Status			
High	6 [20.0]	10 [33.3]	*0.001
Low	24[80.0]	20 [66.6]	
Cooling type			
Dry air cooler	24 [80.0]	25 [83.0]	0.12
None	6 [20.0]	5 [17.0]	
Maternal Education			
illiterate	5 [16.6]	6 [20.0]	*0.002
Primary	13[43.3]	9 [30.0]	
Secondary	8 [26.6]	14 [47]	
College or higher	4 [13.3]	1 [3.0]	
Family History of Smoking			
Yes			*0.002

No	20 [66.6] 10 [33.3]	14 [37.0] 16 [53.0]	
Family History of Asthma **Yes** **No**	20 [66.6] 10 [33.3]	7 [23.0] 23 [77.0]	*0.001
Food Allergy **Yes** **No**	15 [83.0] 5 [17.0]	0 [0.0] 30 [100.0]	*0.002
Drug Allergy **Yes** **No**	0 [0.0] 30[100.0]	0 [0.0] 30 [100.0]	0.2

*Highly Significant

Discussion

According to a recent study, 2.1% of primary school students between the ages of 7 and 11 whose median age was 9 had asthma, which was statistically significant (p-value = 0.04). These results are in line with earlier research showing that asthma is the leading cause of hospitalizations and school absences and that more children are admitted to American hospitals with an asthma diagnosis than with any other chronic illness. In the US, 6.5% of children, or over 6 million, have asthma, according to the Centres for Disease Control and Prevention (CDC) [8].

Males (16, 53%) outnumbered females (14, 47%) in the asthma group, whereas males (18, 60%) outnumbered females (12, 40%) in the non-asthma group. However, there was no discernible difference in the gender distribution between the asthma and non-asthma groups (p-value > 0.05). These results align with earlier research on the prevalence of severe asthma and its clinical manifestations at the Asthma Clinic, a cross-sectional hospital outpatient study conducted at one of Sudan's biggest tertiary pediatric hospitals. With a mean diagnosis age of 2.9 ± 2.8 years, the group was primarily male (62%), with 40.2% of the participants being 5 years or less [9].

This study found that all observational data regarding risk variables for asthma in children were highly significant (p-value < 0.05), except for three factors: economic position, the use of dry air coolers, and medication allergies, which were not significant (p-value > 0.05). These results align with previous studies indicating that several factors can increase a child's risk of developing asthma, including exposure to tobacco smoke, past allergic reactions, food allergies, and hay fever (also known as allergic rhinitis). Additionally, a family history of asthma or allergies, living in areas with high pollution levels, obesity, chronic nasal congestion, irritated sinuses, and pneumonia are all associated with respiratory diseases [10].

In this study, the crowding index for 2-3 children was determined to be 15 (50.0%) for asthmatic children and 19 (63.3%) for non-asthmatic children, showing a substantial outcome for both groups. These findings are consistent with previous data indicating a link between asthma and crowding [11]. Housing circumstances, such as overcrowding and poverty, have been associated with frequent hospitalization in asthmatic children [12]. On the one hand, infections can aggravate chronic problems such as asthma, [13] and studies show that asthma rates are higher among children growing up in highly populated cities [14]. Furthermore, the hygiene concept argues that crowding may guard against the spread of hazardous and non-infectious respiratory disorders [14].

In the current study, the non-breastfeeding rates were higher in the asthma group, with 17 (56.6%) of participants not breastfeeding. In contrast, the non-asthmatic group had a higher breastfeeding rate of 20 (66.6%), resulting in a significant percentage difference between the two groups. These findings are consistent with previous research, which has shown that prolonged,

exclusive breastfeeding can protect against the onset of asthma [15]. A recent meta-analysis conducted by Dogaru et al. in 2014 also indicated a positive correlation between breastfeeding and a reduced risk of asthma or wheezing. Furthermore, Dogaru et al. noted that their results were not influenced by the study's circumstances or methodology [16]. Human breast milk is highly beneficial for immune system development due to its content of antigens, immunoglobulin A (IgA), polyamines, polyunsaturated fatty acids, chemokines, and cytokines [17, 18]. The parents' economic situation and social status in this study were low, with a significant correlation observed between the asthma and non-asthma groups. Specifically, both groups exhibited a notably deficient social status, which aligns with findings from previous studies. The complex relationship between individuals or groups within the social hierarchy is called socioeconomic status (SES). Although SES is not a singular, fixed concept, it can be assessed by considering various factors such as household income, the employment or educational status of caregivers, living conditions, and residency in areas where the majority of the population lives in poverty [19]. Several factors are linked to the management of pediatric asthma. Ecological data indicate that wheezing is more prevalent among children in high-income countries worldwide. In contrast, severe wheezing symptoms are more common in less affluent nations [20]. Other studies suggest that children living in socially disadvantaged areas may be more vulnerable to developing asthma due to adverse environmental exposures that both directly and indirectly worsen the condition [21].

In this observational study, the dry air cooler represented 24 instances (80.0%) in the asthmatic group and 25 instances (83.0%) in the non-asthmatic group. These results showed a higher frequency percentage, although the difference was not statistically significant. These findings are consistent with a previous study indicating that the cold air challenge (CACh) elicits a greater reaction compared to the dry air challenge (DACh). Unlike DACh, CACh seems to promote refractoriness, likely due to the additional stimulus from airway cooling. This suggests that CACh is the preferred challenge method [22]. Maternal education levels differed significantly between the asthmatic and non-asthmatic groups. In the asthmatic group, a majority of mothers had only primary education, accounting for 13 individuals (43.3%). In contrast, the non-asthmatic group had a higher proportion of mothers with secondary education, totalling 14 individuals (47%). These findings were statistically significant. Previous studies have indicated that the level of education among caregivers is a significant risk factor for asthma flare-ups. A particular study highlighted that individuals residing in areas with the lowest adult educational attainment rates are more likely to visit the emergency department or be admitted to the hospital for asthma-related issues. This study categorized populations by zip code in impoverished areas, reinforcing the link between education and health outcomes related to asthma [23]. Adult education may be a significant risk factor for inadequate management of childhood asthma. This might be due to difficulties navigating the medical system or a lack of understanding regarding the condition and its treatments. It's challenging to isolate this effect from other potential factors such as access to healthcare, financial instability, and lower employment levels, all of which can independently contribute to the increased morbidity associated with childhood asthma [23]. The medical literature has expanded this concept to include socioeconomic status (SES) and other social inequalities linked to health disparities [24].

A recent study found that 66.6% of the asthmatic group had a family history of smoking, totalling 20 individuals. Conversely, among the non-asthmatic group, 53.0% (16 individuals) had a family history of no smoking. These findings were statistically significant. These findings support a previous study that also indicated that 15.4% of parents smoked, while only 2.4% of children lived with an indoor smoker. In comparison, 12.9% of children lived with someone who only smoked outdoors [25]. One of the primary risk factors for poor lung health in children is environmental tobacco smoke (ETS). While children are most often exposed to ETS through parental smoking, they can also encounter it in restaurants, public spaces, schools, and public transportation. ETS contains thousands of harmful compounds, and its particles are significantly

smaller than those found in mainstream smoke, allowing them to penetrate the children's airways more easily [43]. Exposure to ETS is associated with a higher incidence of wheezing, asthma, lower respiratory tract infections, and upper respiratory tract infections. Additionally, if a pregnant mother is exposed to tobacco smoke, the nicotine can reach the developing fetus through the umbilical cord blood, as there is no barrier in the placenta to block ETS from entering. Consequently, infants exposed to ETS are more likely to develop asthma later in life due to their immune systems being more prone to allergic and asthmatic inflammatory responses. It is crucial to raise awareness about the harmful effects of ETS on children's health [26].

This short study examined the family history of asthma and found a significant difference between the two groups. In the asthma group, 20 out of 30 participants (66.6%) had a family history of asthma, while in the non-asthma group, only 7 out of 30 participants (23.0%) reported a family history. These findings align with previous research indicating that a child's risk of developing asthma is significantly influenced by a family history of allergies and asthma. However, it is important to note that this relationship may vary depending on whether the asthma is late-onset, early-onset chronic, or early-onset transitory [27]. A child's risk of having asthma is increased if they have a family history of allergies and asthma, according to numerous studies [28]. Martinez et al. postulated that a parental history of asthma and allergies is most strongly associated with persistent early-onset asthma that persists throughout later childhood, as opposed to early-onset transitory asthma or late-onset asthma. Data from prospective birth cohort research served as the basis for their conclusions [29, 30]. One chronic inflammatory disease of the airways that is linked to the immune system is asthma [31]. Asthma in young infants is linked to persistent pregnancy-related T-helper cell-2 (Th-2) immune responses [32]. Increasing evidence suggests that the in-utero environment affects fetal immune system development [32]. Twin studies indicate that asthma has a genetic inheritance of 35% to 70% [33]. In this cross-sectional study, the highest prevalence of food allergies was found in the asthmatic group, with 15 individuals (83.0%) affected, compared to the non-asthmatic group, where 30 individuals (100.0%) reported no food allergies. This indicates a significant difference between the two groups. These findings are consistent with previous studies on food allergies. There is a close relationship between food allergies and asthma, as both share common risk factors such as atopic eczema, allergen sensitization, and parental allergies [34]. According to population studies, asthma and atopic diseases like atopic dermatitis, allergic rhinitis, and allergic conjunctivitis—referred to collectively as the "atopic march"—as well as allergies to other foods (known as the "food allergen march") during school age, are often preceded by early food sensitization or food allergy in the first year of life [34. 35]. For infants, sensitivity to certain foods, particularly eggs, can predict the development of asthma. Children with asthma and food allergies are at higher risk for severe asthma and asthma-related complications, especially during anaphylaxis episodes [36].

Both research groups did not have any drug allergies. In this brief trial, the non-allergy drug score was 30, indicating a 100% success rate, though the results were not statistically significant. These findings do not relate to previous studies. It’s important to note that only 15% of all medication reactions are classified as drug hypersensitivity reactions, which are immunologically mediated responses that lead to the production of drug-specific antibodies and/or T-cells [37]. Drug hypersensitivity reactions (DHR) can trigger various immunological reactions listed by Gell and Coombs [38]. The most common reactions are mediated by T cells and IgE. Immediate reactions occur due to Type I hypersensitivity, while non-immediate reactions are associated with Type II, III, and IV hypersensitivity mechanisms [39]. A previous study found that 53.5% of patients experienced immediate-type reactions, while 46.5% experienced non-immediate-type reactions. Allergic problems manifested on a median of the first day (minimum: 1 day, maximum: 8 days) following drug ingestion [37]. Due to the limited number of cases collected for this investigation and the lack of a family history of drug allergies, neither group in this study experienced any suspected drug hypersensitivity reactions.

Conclusion and Recommendation

Asthma is one of the main public health problems that Iraqi children face. It is as common in Baghdad as in industrialised. Primarily crowding, non-breastfeeding, low socioeconomic status, parents' lack of education, family history of smoking, family history of asthma, and food sensitivity were among the risk factors that led to the development of childhood asthma. In conclusion, environmental exposure and lifestyle factors are important. They may play a significant role in the causes of childhood asthma. Therefore, environmental measures and children's health care must be given priority to address this health concern.

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