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RISK FACTORS FOR BRONCHIAL ASTHMA AMONG PRESCHOOL CHILDREN IN MOSUL CITY

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ABSTRACT

Background: Childhood bronchial asthma is a common, complicated, long-term inflammatory disease of the lower respiratory tract. Often characterized by intermittent blockage of expiratory airflow and respiratory symptoms such as coughing, chest tightness, wheezing, and dyspnea. Asthma and related bronchopathies in children can be caused by a variety of factors, including genetics, pulmonary immaturity, viral infections, environmental pollution, and insults (both pre- and post-birth), during a critical developmental period. **Objectives:** Is to assess the risk factors for having bronchial asthma in preschool children aged less than 6 years in Mosul City. **Methods:** The study is a hospital based, observational, descriptive, case control study. It was conducted between the 20th of September 2021 to the end of February 2025 at Al Khansa'a and Ibin Sina Teaching hospitals in Mosul. The study included 400 children which were divided in to 200 asthmatic patients (the cases) and 200 non asthmatic patients (controls). The questionnaire includes three parts, part one for demographic information, part two for family and personal risk factors and part three for natal and post-natal risk factors for preschool bronchial asthma. **Results:** The mean age of the study participants was 4.53 ± 0.83 years with Male: Female ratio was 1.469. significant association and difference between cases and controls regarding the presence of one or both parents suffering from asthma (OR= 2.515, CI=1.234-4.217) or atopy (OR= 2.020, CI= 1.387-3.002), the presence of personal history of atopy (OR=2.681, CI=1.738-3.289), the presence of pets in the house (OR= 2.334, CI= 1.895-4.131), exposure to smoking (OR=1.853, CI=1.090-3.204) and patients' history of more than three respiratory tract infection per year (OR=5.037, CI= 3.357-8.542), P value < 0.05 for all. **Conclusion:** In addition to clinical signs and symptoms, preschool bronchial asthma can be predicted by history of having one or both parents suffering from asthma or atopy, personal history of atopy, the present of house pet, smoking exposure and more than three respiratory tract infections per year. To fully examine how many factors, contribute to the development of childhood asthma, more researches are mandatory.

KEYWORDS: Preschool, Bronchial asthma, Risk factors, Mosul, Iraq.

1. INTRODUCTION

Childhood bronchial asthma is a common, complicated, long-term inflammatory disease of the lower respiratory tract.[1] Often characterized by intermittent blockage of expiratory airflow and respiratory symptoms such as coughing, chest tightness, wheezing, and dyspnea.[2-3] Asthma often starts in early childhood, and 50% of children with asthma experience at least one wheezing episode during the first six years of their lives.[4] Although the frequency of asthma has increased over the past few decades in all sexes, ages, and racial groups, especially in children, it is still lower in school-aged children than in preschool-aged children.[5-6] The most prevalent chronic illness among children is asthma. If the illness is not managed, symptoms may appear multiple times throughout the day.[7]

Preschoolers' asthma can be difficult to diagnose and treat since it can coexist with other conditions including bronchitis and bronchiolitis.[8] Patients' and their families' quality of life is greatly impacted by uncontrolled symptoms, which can lead to decreased activity, exhaustion, sleep deprivation and missing of work or school.[9] Children with asthma are more likely to visit the emergency room, be hospitalized, or die as a result of their condition.[10] Poor asthma control adds greatly to the asthma burden. Children with poorly treated asthma have lower overall health-related quality of life.[11]

Asthma and related bronchopathies in children can be caused by a variety of factors, including genetics, pulmonary immaturity, viral infections, environmental pollution, and insults (both prior to and during birth) at a vital developmental period.[12-14] Recent evidence suggests that genetic factors, maternal infections, birth characteristics, and environmental exposures can influence the pulmonary and immune system of newborns and infants, potentially leading to the development of asthma in children and adults.[15-17]

Finding risk factors for bronchial asthma in preschoolers under the age of six was the aim of the study. It also evaluated the association between demographic factors, personal and natal/postnatal variables as well as the risk of childhood asthma for each type of exposure.

2. PATIENTS AND METHODS

The study is a hospital based, observational, descriptive, case control study. It was conducted between the 20th of September 2021 to the end of February 2025 at Al Khansa'a and Ibin Sina Teaching hospitals in Mosul. The study included 400 children which were divided in to 200 asthmatic patients (the cases) and 200 non asthmatic patients (controls). The samples of both groups were selected randomly from the study settings. Ethical approval was taken from the Directorate of Health in Nineveh governorate, another consent was also taken from the parents to participate in the study.

The investigators conducted direct interviews with parents to complete self-administered questionnaires. The questionnaire was divided into three parts. The first section provides demographic information about the study participants, including their age, gender, residency, and parent educational level. The second part covers personal and environmental factors, such as a family history of asthma or atopy, the presence of pets, and exposure to passive smoking. The third part covers natal and postnatal factors, such as maternal medication intake, treatment for common colds, mode of delivery, low birth weight, preterm delivery, and early postnatal factors like exclusive breastfeeding.

The questionnaires were divided into case and control groups and analyzed using the SPSS (scientific package for social sciences) version 30.0 software. Descriptive statistics, such as frequencies and percentages, were used to present categorical variables in tables and figures. The chi-squared ($\chi 2$) test was used to determine the significance of differences between cases and controls groups. The statistical findings were expressed as odds ratios (OR) and 95% confidence intervals (CI) for each risk factor, P-values less than 0.05 were regarded as statistically significant.

3. RESULTS

The study includes 400 children, of them; 200 patients with asthma (cases) and 200 patients without asthma (the controls), the mean age ± standard deviation of the study participants is 4.53 ± 0.83 years. Male: Female ratio was 1.469. Its evident that no significant association or difference between the study cases and controls with regard to patients' ages, patients' gender, patients' residency; patients' maternal and paternal educational levels. More the other hand; there is statistically significant difference regarding patients' ages (P value < 0.05). As shown in table 3.1.

Table 3.1: Demographic risk factors.

Risk factor	Cases		Controls		Odds ratio	Confidence interval	P-value
	No.	%	No.	%			
Age:							
-Less than three years	106	53	125	62.5	0.676	0.213-1.234	**0.047**
- three to six years	94	47	75	37.5	1.666	0.769-2.145	
Gender:							
-Male	121	60.5	123	61.5	0.958	0.658-1.521	0.397
-Female	79	39.5	77	38.5	1.042	0.785-1.242	
Residency:							
-Urban	172	86	168	84	1.170	0.789-1.242	0.245
-Rural	28	14	32	16	0.854	0.357-1.331	
Maternal education:							
-Illiterate	23	11.5	27	13.5	0.832	0.379-1.372	
-Primary	81	40.5	77	38.5	1.087	0.298-0.152	0.393
-Secondary	64	32	67	33.5	0.934	0.456-1.628	
-Higher	32	16	29	14.5	1.123	0.892-1.356	
Paternal education:							
-Illiterate	16	8	21	10.5	0.741	0.221-1.477	
-Primary	76	38	58	29	1.500	0.821-2.003	0.133
-Secondary	59	29.5	66	33	0.849	0.464-1.495	
-Higher	49	24.5	55	27.5	0.855	0.774-1.201	

Table 3.2 shows a significant association and difference between cases and controls regarding the presence of one or both parents suffering from asthma or atopy, the presence of personal history of atopy, the presence of pets in the house and exposure to smoking (P value < 0.05) for all.

Table 3.2: Family and personal risk factors.

Risk factor	Cases		Controls		Odds ratio	Confidence interval	P-value
	No.	%	No.	%			
The presence of one or both parents suffering from asthma: -Yes -No	 83 117	 41.5 58.5	 44 156	 22 78	 2.515 0.397	 1.234-4.217 0.172-0.567	<0.001
The presence of one or both parents suffering from atopy: -Yes -No	 139 61	 69.5 30.5	 106 94	 53 47	 2.020 0.494	 1.387-3.002 0.258-0.762	<0.001
The presence of personal history of atopy: -Yes -No	 59 141	 29.5 70.5	 27 173	 13.5 86.5	 2.681 0.372	 1.738-3.289 0.153-0.689	<0.001
The presence of pets in the house: -Yes -No	 43 157	 21.5 78.5	 21 179	 10.5 89.5	 2.334 0.428	 1.895-4.131 0.326-0.649	<0.001
Exposure to passive smoking: -Yes -No	 129 71	 64.5 30.5	 99 101	 49.5 50.5	 1.853 0.430	 1.090-3.204 0.245-0.979	<0.001

Table 3.3 illustrates that there is no significant association between cases and controls concerning maternal antibiotic use during patient's pregnancy, patients' mode of delivery, patients' preterm delivery, patients' birth weight, patients' types of feeding, but a significant association is found regarding patients' history of more than three respiratory tract infection per year. From the other hand; no statistically significant difference between cases and controls regarding maternal antibiotic use during patient's pregnancy, patients' mode of delivery, patients' preterm delivery and patients' types of feeding (P value >0.05) for all. In contrast to that, a statistically significant difference is found regard patients' birth weight (P value = 0.19) and patients' history of more than three respiratory tract infection per year (P value < 0.001).

Table 3.3: Natal and post-natal risk factors.

Risk factor	Cases		Controls		Odds ratio	Confidence interval	P-value
	No.	%	No.	%			
Maternal antibiotic use during patient's pregnant: -Yes -No	 137 63	 68.5 31.5	 133 67	 66.5 33.5	 1.095 0.912	 0.639-1.329 0.739-1.358	0.367
Mode of delivery: -Normal vaginal delivery -Cesarean section	 118 82	 59 41	 141 59	 60.5 39.5	 0.939 1.064	 0.885-1.214 0.059-1.890	0.921
Preterm delivery: -Yes -No	 21 179	 10.5 89.5	 10 190	 5 95	 2.229 0.448	 0.467-3.198 0.128-1.089	0.131
Low birth weight: -Yes -No	 34 166	 17 83	 16 184	 8 92	 2.355 0.424	 0.593-3.579 0.239-1.341	0.019
Type of feeding: -Exclusive breast feeding -Other	 154 56	 77 23	 149 51	 74.5 25.5	 1.145 0.286	 0.567-1.428 0.088-1.029	0.223
Recurrent respiratory tract infections: -More than 3 times/ year -less than 3 times/ year	 159 41	 79.5 20.5	 87 153	 43.5 56.5	 5.037 0.197	 3.357-8.542 0.132-0.265	<0.001

4. DISCUSSION

In the present case control study, out of sixteen factors which were studied, we found six of them were risky. Importantly; incorporation of these factors may help in predict the risk of having preschool asthma. The results of our study showed that the mean age of the study participants was about four and half years with male gender predominance, which is runs with Souheil Hallit et al that done in Lebanon at 2020 about the preschool asthma risk predication, which found the mean age was 4.4 years with male predominance.[18]

Regarding the demographic variables, the current study found no association of patients' ages, patients' gender, patients' residency and paternal educational level, with childhood asthma which is goes with Fariha M. Altaboli et al from Libya study findings about the risk factors of asthma among preschool children.[19]

Concerning parents' history of asthma and/ or atopy, the study found the presence of such problems among the one or both parents can increase the risk of their children affected by asthma, this finding is consistent with Jie Ren et al study about the risk factors of asthma in preschool children in Shanghai.[20]

In this study, Personal history of atopy founded to be in risky association with asthma, which comparable to Amani Elgadal et al study findings about the atopic and allergic association with asthma.[21] Moreover; house pet and smoking exposures illustrated in the present study to be in risky association, this goes with Xiaoyi Ji et al systemic review and meta-analysis about the relationship of domestic pet ownership with the risk of childhood asthma[22] and Rikke Bjersand Sunde et al study about the Prenatal tobacco exposure and risk of childhood asthma.[23]

Additionally; this study found recurrent upper respiratory tract infections for more than three times in risky association with childhood bronchial asthma, this finding may rise a question about the relationship between pathogenicity of viral agents such as rhinoviruses and respiratory syncytial virus and asthma development. Comparable result was obtained by Maarten van Wijhe et al in his retrospective cohort study about respiratory syncytial virus and asthma development.[24] However, maternal perinatal antibiotic use founded to have no significant association, anyhow; poor documentation of maternal perinatal events may affect the results. This is in disagreement with Kedir N Turi et al study who found that Increased cumulative dose, early pregnancy first course, and broad-spectrum antibiotic exposure were associated with childhood asthma risk.[25] Furthermore; the study founded that low birth weight, mode and history of preterm delivery have no significant association which is not parallel to Julie Nyholm Kyvsgaard et al study findings about the risk factors of early childhood asthma.[26] However; further studies are need to confirm the exact association. Lastly; this study found no significant association between child type of feeding and asthma development which is goes with Fariha M. Altaboli et al study results.[19]

Although this study examines preschool risk factors for a sample of Mosul city residents, certain constraints minimize its impact. Since the small sample size limits its generalizability, more research with bigger, more diverse groups is necessary. Lastly, this research may contribute to the development of a predicting score for encountering preschool bronchial asthma when paired with other studies, which could significantly improve preventive strategies.

5. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this study revealed, in addition to clinical signs and symptoms, preschool bronchial asthma can be predicted by history of having one or both parents suffering from asthma or atopy, personal history of atopy, the present of house pet, smoking exposure and more than three respiratory tract infections per year. To fully examine how many factors contribute to the development of childhood asthma, more researches are necessary.

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CONFLICT OF INTERTEST

About this study, the authors disclose no conflicts of interest.

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