

**Risk Factors of Wheezing in Children under the Age of Six in Al-Zahraa Hospital****Dr. Amel Abdulameer Khadum Aldahan\***

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**Abstract:** Wheezing happens when the airways are tightened, blocked or inflamed making a person's breathing sounds like whistling or squeaking. A study was conducted to identify the most probable risk factors for pediatric bronchospasm. Hence, a total of 205 patients, aged below 6 years, from inpatient admissions at Al-Zahraa Teaching Hospital, were enrolled. All children who presented with attacks of bronchospasm were clinically evaluated. It was found that 34.14% of the study group had a history of wheeze. Male patients and those of urban origin were more affected, (67.14%) and (74.29%), respectively. Wheeze was associated with prematurity, low birth weight and family history of asthma. There was an association of wheeze in first degree relatives (87.1% versus 32.2%) including children of those with asthma (64.3% versus 30.6%). Environmental factors and parental smoking showed clear difference from 50% to 12.8% respectively. Furthermore, overcrowding, atopy, persistent nasal snuffle, were all associated with wheeze. History of recurrent chest infection was found to be higher in those who had parental history of asthma (85.7% versus 39.8%). In conclusion, Family history and siblings asthma, parental smoking, atopy, overcrowding was risk factors of wheeze further studies are highly suggested for further assessment.

**Keywords:** Wheezing, Bronchospasm, Asthma, Pathophysiology, phenotypes.

**INTRODUCTION**

Wheezing is a common problem amongst children that creates anxiety with parents frequently and this is reflected in frequent visits to medical and pediatric casualty departments. Until recently, the earliest stages of asthma in young children have not been investigated in detail and there has been controversy over the nature of recurrent wheezing following viral respiratory infection. These attacks have been labeled as wheezy baby syndrome or episodic wheeze syndrome [1]. Identifying risk factors can therefore contribute to better understanding, prevention and management of such cases among this age group.

Wheeze is defined as a musical and continuous sound that originates from oscillations in narrowed airways. Wheezing is heard mostly on expiration as a result of critical airway obstruction. Wheezing is polyphonic when there is widespread narrowing of the airways causing various pitches or levels of obstruction to airflow [2,3].

Regarding the Pathophysiology, asthma is a complex syndrome with many clinical phenotypes in both adults and children. Its major characteristics include a variable degree of airflow obstruction, bronchial hyper-responsiveness and airway inflammation. They concluded that for many people the

disease begins in infancy and that a genetic propensity to be allergic, combined with environmental exposure, contributes to disease development [3].

As defined by the 1991 National Heart, Lung and Blood Institute expert panel on asthma; mast cells, eosinophils, T lymphocytes, macrophages, neutrophils, and epithelial cells all play a role in this condition [3]. Production of immunoglobulin (IgE) is central to the pathophysiology of pediatric allergic diseases such as allergic rhinitis, atopic dermatitis, and atopic asthma [4]. After IgE binds to high affinity mast cell surface receptors and is cross-linked by antigen, mast cell activation occurs and sets in motion a cascade of events resulting in the clinical manifestations of allergic disease. The interaction of IgE and antigen results in an immediate hypersensitivity reaction that can be responsible for the classic asthma symptoms exhibited during acute exacerbation [5], for example, mucosal edema, mucus production and smooth-muscle constriction. Eventually, these and other reaction cascade can induce the production of cells responsible for the airway inflammation that underlies asthma and is observed even in the absence of symptoms [1].

Most infants who wheeze in the first 3 years of life have transient syndromes associated with diminished air way function and do not have an

increased risk of asthma or allergies later in life. These early episodes are probably related to predisposition to asthma in only a minority of infants such children already had elevated serum IGE levels during the first months of life and at age 6 years, and were more likely to have a family history of a disease [3, 4]. Three wheezing phenotypes have been identifying in children:

Transient wheezing (generally occurring under 1 year of age and resolving by age 3 years). Non atopic wheezing (perhaps related to lower respiratory tract infection with onset before age 3 years and often resolving by age 13 years). Atopy associated asthma (progressive) disease with usual outset before 6 years of age. Recently observed a number of different patterns of wheezing syndromes with early and transient wheezers uncovering potentially different risk factor patterns than persistent and later –onset wheezers [1,5].

Many studies have demonstrated that pediatric asthma is strongly associated with atopy. Many pediatric asthma patients will have some evidence of atopy. Whether clinical or serological however, not all persons with atopy will develop asthma. Currently asthma[6] at age 6 years is defined by physicians as a wheeze or cough without cold in the previous 12 months and use of asthma medications[1].

## MATERIALS AND METHODS

This was a cross sectional study with analytic utility included 205 patients below 6 years of age who were recruited from the inpatient of Al-Zahraa Hospital, Najaf province during a period of one year who were presented with attacks of bronchospasm.

Data were collected using a data collection and full history was taken included previous attacks, family history of asthma especially parents, siblings, history of atopy, age, sex, residence overcrowding, and parental smoking.

History of recurrent chest infection / history of first attack and persistent nasal snuffle, prematurity and low birth weight. These who were presented with suspicion of pneumonia were excluded from the study. 65.85 % of children who were not complaining of

wheeze were considered as our control group. The statistical analysis was performed using the statistical package for social sciences, version 15, appropriate statistical tests were applied accordingly, odds ratio (OR) was calculated and used as measure of association.

## RESULTS AND DISCUSSION

Out of the 205 children, 70 were reported to suffer recurrent wheezing episodes. This is a descriptive study and the accuracy may be dependent on a parental history so it might be subjected to recall bias. However the validity of the method used is well proved and is of high repeatability [4,5]. The frequency of wheezing in our survey was 34.4%, which was higher than reported in the UK (15.6%) [4] And study of south of Iraq in Basrah (15.8%) (7). This may have been affected by relatively smaller sized patient sample and higher frequency of upper respiratory tract infections during months on which study was done.

Complete data were available for 205 subjects, of whom 70 were wheezing. No significant differences were observed in the baseline characteristics of age groups, sex and residence (Table 1). The present study did not specifically investigate different age groups as a risk factor, however the current literature suggests that wheezing is reported to be more common among child below 6y old, perhaps due to proportional increase in airway diameter with age [1,6,8]. A higher percentage of boys were more affected than girls 67.14%, 32.86% respectively [4, 5] (Table 1). Difference observed between boys and girls which goes with the results of Luyt and Horwood who found wheeze to be common among boys (9, 10) and that males have a lower airflow than female (transient condition) due to reduced airway caliber in infancy which improve with time the Detroit childhood allergy study indicated that the pattern development of total IGE differed between boys and girls. With boys showing a more rapid increase between birth and 2 years of age [1]. The percentage of wheezy children was higher in urban (74.29%) than in rural areas (25.71%). The observed geographical difference in the UK was 11.1% - 24.7% in children (10) and in Saudi Arabia it was 9%.

**Table-1: Baseline Characteristics in a studied Sample of 205 Subjects, According to Wheezing and non –wheezing Status**

Variable		Wheezing (n = 70)		Non-wheezing (n = 135)		P value
		No.	%	No.	%	
Age (month)	< 12	27	38.6	45	33.3	0.96
	12 - 36	30	42.9	56	41.5	0.59
	> 36	13	18.6	34	25.2	0.08
Sex	Male	47	67.1	76	56.3	0.32
	Female	23	32.9	59	43.7	0.87
Residence	Urban	52	74.3	112	83.0	0.93
	Rural	18	25.7	23	17.0	0.09

The observed difference in prevalence of wheeze is a confirmation of geographical variation of prevalence of asthma and its possible underlying environmental factors [11]. Wheezing was more frequent in states of overcrowding, but the (OR) was

not significantly (Table 2). Childs with wheezing were significantly more likely than control subjects to be of low birth weight, the OR (95% CI) was 1.68 (0.82 – 2.19).

**Table-2: Percentage of Wheezing and Non-Wheezing according to risk factors**

Variables	Wheezing (%)	Non-Wheezing (%)	OR	95% CI of OR	P value
Parental Smoking	50.0	12.8	6.69	3.32 – 13.51	< 0.001*
Siblings Asthma	64.3	30.6	1.96	1.46 – 2.65	0.006*
History of recurrent Infection	85.7	39.8	3.61	2.22 – 5.87	< 0.001*
Family History	87.1	32.2	4.56	2.74 – 7.58	< 0.001*
Prematurity/low birth weight	47.0	21.8	1.68	1.26 – 2.19	0.013
Persistent Nasal Snuffle	81.4	78.9	1.10	0.76 – 1.58	0.72
Overcrowding	68.6	56.7	1.68	0.94 – 3.0	0.11
Atopy	21.4	19.8	1.06	0.54 – 2.11	0.165

Wheezing was more frequent in children of overcrowded family, however, the difference did not reach the statistical significance, ( $P>0.05$ ) [4]. Atopy show slight difference which was not statistically significant (21.4 versus 19.8) but can indicate this plays a role in persistent wheezing with the positive family history [1]. Prematurity & low birth weight result (47% versus 21.8) considered as significant which goes with results of cohort study in Dunedins one maternity hospital (22.4%) in new Zealand [12]. Family history and siblings asthma the most important risk factors in our study the frequency of family history (87.1 versus 32.2) this was also reported by Horwood [13] and Luty DK [14], Martinez *et al.* [15]. Showed an association between preschool wheeze and family history in patient with persistent wheeze but not in those who wheeze transiently during the first 3 years of life [15] the latter group. Show no association between wheeze and skin allergy or elevated IGE level and they had underlying diminished airway function during infancy but not later [15,16] our study found that wheezy children were most likely to be asthmatic rather than having transient wheezing. Off spring of asthma frequency (64.3% versus 30.6) with wheezing were significantly more likely than control subjects [17]. Parental smokers (50% versus 12.8%) which appeared to be a significant risk factor supported the known association of tobacco smoke with wheezing illness in children [15] smoking may not necessarily induce wheeze but may perpetuate wheezing episodes [13,18] due to increased lower respiratory infections the allergy effects of smoke acting increased bronchial hyper-responsiveness, or a combination of these [18,7]. Persistent nasal snuffle (81.4% versus 78.9%) was slightly more frequent but for 2 groups not significant [13]. History of recurrent chest infection found in 58.7% versus 39.8. This study also shows an increase in rate of all respiratory infections in infants older than 7 months who had parental history of asthma or atopy. 68.8% of those with

a parental history of atopy, and for 75.9% of those with a parental history of asthma [19].

## CONCLUSION

Recurrent episodes of wheezing occur in a high proportion of children in this age group who present to hospital. Both environmental and familial factors contribute to this. Whether these patients are truly asthmatic or suffer transient wheezing illnesses needs further follow-up studies and pulmonary function tests.

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