

## Study of Clinical Categorization of Under Five Wheezers at SKMCH, Muzaffarpur, Bihar

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### Abstract

**Background:** Children are more likely than adults to wheeze; by the time they are 3 years old, 40% of children will have experienced a wheeze episode, and by the time they are 6 years old, 50% of children will have experienced at least one wheeze episode. The study objective was to classify several wheeze kinds among children aged 6 months to 5 years based on their history, clinical profile, aetiology, and risk factors.

**Methods:** All children between the ages of 6 months and 5 years who were admitted to the pediatrics unit at the SKMCH, Muzaffarpur, Bihar, had a known history of wheezing and respiratory distress along with the usual clinical signs.

**Results:** In the age range of 6 months to 5 years, 105 children with recurrent wheeze were examined. In the age range of 0 to 5 years, several children are hospitalised with recurrent wheezing. This research may aid in determining the causes of wheezing, how to classify wheezers, and the risk factors that make these children more likely to wheeze than other children.

**Conclusion:** According to clinical phenotypes, there are several groups for recurrent wheezing in our study, including episodic wheezing (40%) and multitrigger wheezing (42.8%), asthma (12.3%), and gastroesophageal reflux syndrome (4.7%).

**Keywords:** Asthma, Child, Wheeze.

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### Introduction

Children are more likely than adults to wheeze; by the time they are 3 years old, 40% of children will have experienced a wheeze episode, and by the time they are 6 years old, 50% of children will have experienced at least one wheeze episode. [1]

The prevalence of wheeze in children is significant in India. According to research, one in three infants experience their first wheezing episode, and by the age of six,

wheezing affects about half of all children. By the age of six months and three years, 75% of children who have persistent asthma began to wheeze. [2] A recurrent wheeze is thought to affect one-third of preschool-aged children and can lead to considerable morbidity, lower quality of life, more frequent use of medical services, and higher expenses. [3] The outcomes differ for such phenotypes because data have shown that

wheezing is clinically variable in early childhood in terms of its temporal pattern (i.e., age of beginning and duration until symptoms diminish) and its risk factors, which include atopy and genetic or environmental factors. [4,5]

The Tucson childhood respiratory study by Martinez *et al.* [6] was the first to describe different wheezing phenotypes. Children were divided into four main subtypes, including never wheezing, early transient wheezing, persistent wheezing, and late-onset wheezing. Subsequent reports further divided patients with persistent wheeze into nonatopic persistent wheezing or atopic/IgE-associated wheezing. [7,8].

Because the manifestation of symptoms and risk variables might fluctuate over time, it is challenging to distinguish between these phenotypes clinically whether five or six different types are included in an experiment. In addition, a child's condition can be impacted by a variety of factors, such as genetic, environmental, and host factors (as well as interactions among these factors), which can also affect wheezing development and the progression of a patient's symptoms. [9]

Our suggested operational criteria are intended to streamline the subtypes of persistent wheezing that are used to classify preschool-aged children and to identify risk factors for these conditions, which should be treated with the appropriate medical interventions. These conditions can affect lung function or result in the development of asthma.[11-15]

### Materials and Methods

From May 2022 to October 2022, this descriptive study was carried out at Department of Pediatrics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. The study included 105 patients with wheeze (recurrent wheezing or persistent

wheeze) between the ages of 6 months and 5 years. Exclusion criteria for the study were children older than 5 years old and less than 6 months, known or suspected immunodeficiency, other chronic disorders (TB, bronchiectasis, cystic fibrosis, and CHD), and foreign body aspiration. Every kid presented to the department between the ages of 6 months and 5 years old had a clear history of wheezing and respiratory distress along with usual clinical characteristics.

All children admitted to the department between the ages of 6 months and 5 years who had a known history of wheezing and respiratory distress with typical clinical characteristics underwent routine and targeted diagnostic procedures. A thorough history, clinical examinations, and necessary baseline tests such the Mantoux test, chest radiography, absolute eosinophil count, and hemogram will be performed.

Microsoft Excel (Windows 10; Version 2019) was used to enter the data, and the Statistical Package for the Social Sciences (SPSS) for Windows programme was used to conduct the analyses (version 22.0; SPSS Inc, Chicago). For continuous variables, descriptive statistics like mean and standard deviation were calculated. For categorical variables, frequencies and percentages were calculated.

### Results

In the age range of 6 months to 5 years, 150 children with recurrent wheeze were examined. When looking at the study population as a whole, we find that it is split equally between men and women, with 55% being men and 50% being women [Table 1]. Seven of the eleven infants, or 63.6% of the total, were male, indicating a male predominance among those in infancy.

11 (10.4%) of the 105 children were under one year old, 18 (17.1%) were between the ages of one and two, 23 (21.9%) were

between the ages of two and three, 27 (25.7%) were between the ages of three and

four, and 26 (24.7%) were between the ages of four and five.

**Table 1: Age and Sex distribution in the study population**

Age (years)	Male n (%)	Female n (%)	Total n (%)
6 months-1 year	7(63.6%)	4(36.3%)	11(10.4%)
1-2 years	8(44.4%)	10(55.5%)	18(17.1%)
2-3 years	13(56.5%)	10(43.4%)	23(21.9%)
3-4 years	14(51.8%)	13(48.1%)	27(25.7%)
4-5 years	13(50.0%)	13(50.0%)	26(24.7%)
Total	55(52.3%)	50(47.6%)	105(100.0%)

**Table 2: Age of onset of symptoms in the study population**

Age of onset	Cases (n=105)	Percentage
<1 year	41	39.04%
> 1 year	64	60.95%

In the study population, 41 (39.04 %) had onset of symptoms <1 year of age and 64 (60.95 %) had symptoms onset after 1 year of age [Table 2].

**Table 3: Personal and family history of atopy in the study population**

History of	6 month-1 year n=11 (%)	1-2 yrs. n=18 (%)	2-3 yrs. n=23 (%)	3-4 yrs. n=27 (%)	4-5 yrs. n=26 (%)	Total n=105(%)
Eczema	0	0	4(17.3%)	5(18.5%)	1(3.8%)	10(9.5%)
Rhinitis	0	1(5.5%)	6(26.0%)	7(25.9%)	4(15.3%)	18(17.1%)
Family H/O atopy	2 (18.1%)	6(33.3%)	11(47.8%)	14(51.8%)	10(38.4%)	43(40.9%)

Table 3 shows that 10 (9.5%) of the study population had eczema, 18 (17.1%) had rhinitis, and 43 (40.9%) had a family history of atopy.

One hundred (95.2%) children with recurrent wheeze had a good response to short-acting beta analog (SABA) and 5 (4.7%) had poor response to SABA [Table 4].

**Table 4: Response to short-acting beta analog in the study population**

History of	6 month-1 year n=11 (%)	1-2 yrs. n=18 (%)	2-3 yrs. n=23 (%)	3-4 yrs. n=27 (%)	4-5 yrs. n=26 (%)	Total n=105(%)
Good	8(72.7%)	16(88.8%)	23(100%)	27(100%)	26(100%)	100(95.2%)
Poor	3(27.2%)	2(11.1%)	0	0	0	0

While multitrigger wheezers have a 100% association with additional triggers like exposure to cold, sweet, chocolate, and cool drinks, episodic wheezers have a 100% association with virally-induced wheeze and fever. The asthma group also has personal atopy in the form of eczema 8 (61.5%), rhinitis 11 (84.6%), and 100% family history

of atopy. Clinical features in various etiology of recurrent wheeze.

There was no sex preference among the 42 children who had episodic wheezing, with 23 (54.7%) boys and 19 (45.2%) girls. 25 (59.5%) had an onset after one year, while 17 (40.4%) had an onset earlier. Every one of the 42 kids had a fever and a cough, and 10

(23.8%) of them had noisy breathing. No kids had atopy, and 8 (19.04%) had family H/O atopy. They all experienced viral wheezing, and Short-Acting Beta-Agonist worked well for all of them (SABA).

There was no sex difference in the 45 children who had multi-trigger wheeze, with 23 (51.1%) boys and 22 (48.8% girls). 31 (68.8%) people had symptoms start after age 1 year, while 14 (31.1%) had symptoms start before age 1. 42 (93.3%) of the patients had a cough, 10 (22.2%) had a fever, 5 (11.1%) had noisy breathing, 2 (4.4%) had eczema, 7 (15.5%) had rhinitis, 22 (48.8%) had family H/O atopy, and 7 (15.5%) had wheezing brought on by a viral infection. All of these patients had triggers other than viral infections, and they all responded favourably to SABA.

There was no sex difference in the 13 asthmatic children, 7 (53.8%) of whom were male and 6 (46.1%) female. Seven (53.8%) people reported symptoms that started after the age of one year, whereas six (46.2%) did so before. All of them had a cough, no one had a fever, noisy breathing, familial H/O atopy, triggers other than viral infections, 8 had eczema, 11 had rhinitis, and all of them responded favourably to SABA.

Two (40%) of the five children with gastroesophageal reflux disease (GERD) were boys, and three (60%) were girls. One (20%) patient had symptoms that started after the age of one year, one (80%) had symptoms that started before that age, four (80%) had coughing fits, none had fevers, one (20%) had noisy breathing, and five (100%) had either a poor or insufficient response to SABA.

46 (43.8%) and 59 (56.1%) of the 105 cases included in our analysis were located in metropolitan areas.

In our study, 90 babies (85.7%) were delivered at term, while 15 babies (14.2%) arrived early.

The majority of the participants in our study were of normal birth weight, whereas 18 (17.1%) were underweight.

In our study, 41 (39.0%) of the children were given formula, while 17 (16.1%) were partially (mixed) breastfed and 47 (44.7%) were entirely breastfed.

89 (84.7%) of the 105 cases in our research group had healthy diets, while 16 (15.2%) were underweight [Tables 5–9].

**Table 5: Location-wise distribution of cases**

Location	Cases (n=105)	Percentage
Rural	59	56.1%
Urban	46	43.8%
Total	105	100%

**Table 6: Gestation age-wise distribution of cases**

Gestational age	Cases (n=105)	Percentage
Term	90	85.7%
Preterm	15	14.2%
Total	105	100%

**Table 7: Distribution with relation to birth weight**

Birth weight	Cases (n=105)	Percentage
<2500 g	18	17.1%
>2500 g	87	82.8%
Total	105	100%

**Table 8: Distribution with relation to different feeding practice**

Feeding practice	Cases (n=105)	Percentage
Exclusive breastfeeding	47	44.7%
Partially breastfed	17	16.1%
Artificial feeding	41	39.0%
Total	105	100%

**Table 9: Distribution with relation to nutritional status**

Nutritional status	Cases (n=105)	Percentage
Healthy	89	84.7%
Underweight	16	15.2%
Total	105	100%

## Discussion

In the age range of 0 to 5 years, several kids are hospitalised with recurrent wheezing. This research may aid in determining the causes of wheezing, how to classify wheezers, and the risk factors that make these children more likely to wheeze than other kids.

The precise prevalence of the different types of wheeze in the Indian population has not yet been disclosed. It is important to note that there may be a variety of causes for infants, toddlers, and preschoolers to wheeze repeatedly.

One hundred five children of age group between 6 months and 5 years admitted at our institution who met the inclusion and exclusion criteria were recruited. We had 42 (40%) episodic wheezers, 45 (42.8%) multitrigger wheezers, 13 (12.3%) asthma, and 5 (4.7%) GERD.

In our study, 55 were male and 50 were female, showing no difference sex-wise, but in age <1 year, there was male predominance. Out of 105 children, 11 (10.4%) were <1 year of age; 18 (17.1%) belonged to the age group 1–2 years; 23 (21.9%) to the age group 2–3 years; 27 (25.7%) to the age group 3 to 4 years; and 26 (24.7%) children to the age group 4 to 5 years.

In early-onset wheeze (<3 years), LY *et al.* discovered no gender difference that was statistically significant, which is consistent with our research. According to Patra *et al.*, there was a male majority in children under 2 years old.

In the study population, symptoms first appeared in 41 (39.04%) people under the age of one year and in 64 (60.95%) people beyond the age of one.

Along with wheeze and shortness of breath, 101 (96.1%) patients also reported cough, 52 (49.5%) had an accompanying fever, 16 (15.2%) experienced noisy breathing, and 58 (55.2%) had triggers including exposure to cold, eating ice cream, chilly drinks, or chocolate, among other things. 49 (46.6%) of the kids wheeze when they have a viral infection.

In his research on recurrent wheeze in children between the ages of 3 months and 5 years, Saglani *et al.*

Our study is primarily based on clinical aspects, whereas the prior study was based on studies that might not be feasible in a situation with limited resources like ours. There is less viral-associated wheezing than in our study. The previous study was carried out in London, where the infection rate is lower than that of our population, which may

help to explain this. The previous study found a very high incidence of asthma, although multitrigger wheezers were not attempted to be separated.

Children at risk of developing asthma who have recurrent wheeze have a high rate of atopy, according to Mathieu *et al.* According to our study, there is a strong link between atopy and wheezing. 19.04% of episodic wheezers, 48.8% of multitrigger wheezers, and 100% of asthmatics had a family history of atopy, of which 61.5% had personal eczema and 84.6% had allergic rhinitis.

According to Litonjua *et al.*, parents with a history of asthma are more likely to have an asthmatic children. This is in line with our data, which demonstrates a 100% familial H/O atopy connection among asthmatics.

Patra *et al.* found that GER is an important cause for recurrent wheezing among children <2 years of age. This is consistent with our study.

### Conclusion

According to clinical phenotypes, there are several groups for recurrent wheezing in our study, including episodic wheezing (40%) and multitrigger wheezing (42.8%), asthma (12.3%), and gastroesophageal reflux syndrome (4.7%).

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