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Original Research Article

Clinical profile of wheeze in children between 6-60 months of age: a cross-sectional study in South India

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ABSTRACT

Background: The occurrence of wheezing is notably high among young children and represents a significant public health concern due to its impact on respiratory health and quality of life. Roughly 25–30% of infants' experience at least one episode of wheezing during their first year of life, often triggered by viral respiratory infections or environmental exposures. By the age of three, this figure rises to approximately 40% of children, and by six years of age, nearly half of all children will have had at least one wheezing episode. These episodes can range from mild and transient to more persistent and recurrent forms, which may indicate underlying conditions such as asthma. Wheezing in early childhood is influenced by a complex interplay of genetic, clinical, and environmental factors, including family history of atopy or asthma, poor nutritional status, exposure to allergens or pollutants, and incomplete immunization. Early identification of children at risk and understanding the contributing factors is essential for timely intervention and prevention of long-term respiratory complications.
Methods: A cross-sectional observational study was conducted among 123 children attending a tertiary care hospital. Information was collected regarding socio-demographic profile, family history, immunization status, and weight, along with a complete clinical history and physical examination.
Results: Wheezing was most commonly observed in early childhood, affecting 28.5% of children aged 2–3 years and 26.8% of those aged 1–2 years. Among children who experienced wheezing, there was a slight female predominance, with 52.8% being girls. Additionally, 35.8% of the children were underweight, which may increase their susceptibility to wheezing. Notably, half of the children (50.4%) had a family history of wheezing or asthma, and more than half (53.7%) were not fully immunized, highlighting the role of both genetic predisposition and potentially preventable risk factors in the occurrence of wheezing.
Conclusions: This study highlights that wheezing is prevalent in early childhood, particularly between 1 and 3 years of age. A significant proportion of affected children are underweight and have incomplete immunization, pointing to potential contributing factors. Furthermore, a family history of wheezing or asthma is a common finding, underscoring the role of genetic predisposition. These findings suggest the importance of addressing nutritional status, improving vaccination coverage, and considering family history in managing and preventing wheezing in young children.

Keywords: Wheeze, Early childhood, Risk factors, Immunization

INTRODUCTION

Wheezing is a common symptom in early childhood, often starting in infancy or the toddler years. The first year sees a high burden of wheezing: one cohort study reported around 46% of infants experiencing at least one episode, with 26.6% having three or more episodes in their first year of life.[1]

Globally, systematic modelling estimated ever-wheezing prevalence of 17.9% and current wheeze at 11.5% for individuals aged 5–69 in 2019.[2]

In India, school-based data show current wheezing prevalence of 16.7%, with a cumulative prevalence of 20.8%, higher in children having a family history of asthma or household smoking exposure.[3] A meta-analysis of Indian paediatric asthma studies reported a pooled asthma prevalence of 7.9% among children, with higher rates in urban settings and among boys.[4]

Persistent or recurrent wheezing in preschool children has documented lasting impact: about 60% of early wheezers continue to have symptoms or recurrence at school age; risk factors include atopy, family asthma history, food allergy or eczema, and tobacco smoke exposure.[5] Evidence also supports that inhaled corticosteroids like fluticasone can improve symptoms in wheezy infants with atopic predisposition.[6]

Objectives

Objective of the study was to identify demographic, clinical, and environmental predictors associated with wheezing in children aged 6 to 60 months attending a tertiary care hospital in Chennai.

METHODS

This cross-sectional observational study was conducted in the Department of Paediatrics at Sree Balaji Medical College and Hospital, Chennai, over an 18-month period from August 2023 to February 2025. The study population included children aged 6 to 60 months who were admitted to the paediatric ward with wheezing. A purposive sampling technique was used to recruit participants. The sample size was calculated to be 123, based on an anticipated prevalence of wheezing of 7.9%.

Children presenting with wheezing and meeting the inclusion criteria were enrolled after obtaining written informed consent from their parents or guardians. Inclusion criteria included children aged 6 to 60 months with clinical features of wheezing, while those with congenital anomalies, chronic lung disease, or previously diagnosed asthma were excluded from the study.

Data were collected using a pre-structured questionnaire that captured detailed information on the child's socio-demographic profile, family history of wheezing or asthma, immunization status, nutritional status (assessed using weight-for-age standards), and a thorough medical history. Each child also underwent a detailed physical examination conducted by a paediatrician to confirm the diagnosis and assess overall health.

Ethical approval for the study was obtained from the Institutional Human Ethics Committee of Sree Balaji Medical College and Hospital (Ref: 002/SBMCH/IHEC/2023/1986). Written informed consent was obtained from the parents or guardians prior to data collection.

Statistical analysis was performed using IBM statistical package for the social sciences (SPSS) statistics version 25. Descriptive statistics such as frequencies and percentages were used to summarize categorical variables. Associations between risk factors and wheezing were analysed using the chi-square test, and odds ratios (OR) with 95% confidence interval (CI) were calculated. A p value of less than 0.05 was considered statistically significant.

RESULTS

Among 123 respondents, the 2–3-year age group was the most prevalent, accounting for 35 individuals (28.5%). This was followed by the 1–2-year group with 33 respondents (26.8%), and the 6 months–1-year group with 24 children (19.5%). The 4–5-year group had the lowest representation at 12.1%.

Table 1: Distribution according to age.

Age (year)	Frequency (N)	Percentage
6 months-1 year	24	19.5
1-2	33	26.8
2-3	35	28.5
3-4	16	13.1
4-5	15	12.1
Total	123	100

The sample of 123 participants showed a relatively balanced gender distribution, with a slight predominance of females. Females comprised 65 individuals (52.8%) of the sample, while males accounted for 58 individuals (47.2%). This nearly even distribution is valuable for demographic analysis and for identifying any potential gender-specific trends within the study's findings.

Table 2: Distribution according to gender.

Gender	Frequency (N)	Percentage
Male	58	47.2
Female	65	52.8
Total	123	100

The weight-for-age distribution revealed that 44 children (35.8%) were classified as <-3SD (underweight), while 60 (48.8%) had normal weight, and 19 (15.4%) were >3SD (overweight).

Table 3: Distribution according to weight.

Birth weight in grams	Frequency (N)	Percentage
<-3SD	44	35.8
Normal	60	48.8
>3SD	19	15.4
Total	123	100.0

Out of 123 individuals, 62 (50.4%) reported a positive family history, while 61 (49.6%) had no such history. This balanced distribution highlights the potential significance of family history in the occurrence of wheezing in children. Such a finding suggests that both genetic predispositions and environmental factors should be considered when evaluating and working to prevent wheezing in young children. Understanding the role of family history can aid in developing more targeted prevention strategies for this age group.

Table 4: Distribution according to family history.

Family history	Frequency (N)	Percentage
Yes	62	50.4
No	61	49.6
Total	123	100.0

Out of 123 participants in the study, only 57 (46.3%) had achieved full immunization, while a larger proportion, 66 individuals (53.7%), were not immunized. This observation suggests that a significant number of children in the study population had not completed their immunization schedule. This finding is crucial as it points to a potential link between immunization status and the occurrence of wheezing in children. Given that immunization can play a vital role in preventing certain respiratory infections that may contribute to wheezing, increasing vaccination rates could be an important strategy in reducing the incidence of wheeze-related conditions.

Table 5: Distribution according to immunization.

Immunization	Frequency (N)	Percentage
Fully vaccinated	57	46.3
Not vaccinated	66	53.7
Total	123	100.0

DISCUSSION

In this cohort of 123 children aged 6–60 months, wheezing was most prevalent in the 2–3 years' age group (28.5%), followed by the 1–2 years' group (26.8%). This pattern mirrors global observations that wheezing incidence peaks in preschool years, with about one-third experiencing at least one episode by age 3 years and nearly 50% by age 6 years.[7] Large longitudinal cohorts confirm that current wheeze is highest in infancy (~36%) and declines through adolescence.[7]

A female predominance (52.8%) in wheezing was noted, diverging from most studies that indicate male preponderance in early childhood. Although male sex is typically associated with higher wheeze risk, such variance may reflect regional, environmental, or social influences seen in underserved communities.[7-9]

Regarding nutrition, 35.8% of children were underweight (<–3 SD). Prior studies from Bangladesh demonstrated that underweight and stunting are significantly associated with current wheezing (OR ~1.4–1.7), even after multivariable adjustment.[10] Malnutrition impairs immune responses, thymic function, and lung development, predisposing to recurrent wheezing and respiratory morbidity.[9,10]

A positive family history of wheeze or asthma was reported in 50.4%—aligning with the established genetic risk. Genome-wide studies implicate chromosome 17q21, IL33, and CDHR3 variants in early-onset wheezing and progression to asthma.[11,12]

Over 50% of participants lacked complete immunization, highlighting a key modifiable risk. Viral infections (e.g. RSV, influenza) are recognized triggers of preschool wheezing, and incomplete vaccination increases susceptibility to such infectious exacerbations.[13]

Our findings align with the Emilia-Romagna consensus, which underscores multiple interacting risk factors—genetic susceptibility, undernutrition, early viral infections, environmental exposures—in preschool wheezing.[14] Although our study did not assess indoor air quality, tobacco smoke, or allergen sensitization, similar studies in Sri Lanka report passive smoking, household pets, poor ventilation, and other environmental risks to severe wheezing in young children.[9]

Finally, from a therapeutic perspective, early identification of recurrent wheezers is critical. Meta-analyses show that daily or intermittent high-dose inhaled corticosteroids (ICS) reduce exacerbation risk in preschool children more effectively than leukotriene antagonists.[15,16]

This study has several limitations. The cross-sectional design precludes determination of causality between identified risk factors and wheezing occurrence. The relatively modest sample size of 123 children limits the power to perform detailed subgroup analyses, such as by specific environmental exposures or severity of wheezing episodes. Additionally, the purposive sampling technique may introduce selection bias and affect the generalizability of the findings to the broader population. Important potential confounders such as exposure to indoor air pollution, allergen sensitization, and viral infection history were not assessed, which may influence the risk of wheezing. Furthermore, this study did not include longitudinal follow-up to evaluate persistence or progression of wheezing into later childhood asthma or other respiratory conditions. Future prospective cohort studies with larger, more representative samples and comprehensive environmental and clinical data are needed to better elucidate causality, risk stratification, and long-term outcomes of early childhood wheezing.

CONCLUSION

This study highlights that wheezing in early childhood is influenced by a combination of demographic, clinical, and

environmental factors. The highest prevalence of wheezing was observed in children aged 1–3 years, reinforcing the vulnerability of this age group. Although gender differences were minimal, undernutrition emerged as a significant contributor, with over one-third of children being underweight—suggesting that poor nutritional status may compromise immunity and increase susceptibility to respiratory symptoms. Additionally, a strong association was found between wheezing and both family history of asthma and incomplete immunization status. These findings emphasize the importance of early identification of at-risk children through family history, ensuring adequate nutrition, and improving immunization coverage as key strategies to prevent and manage wheezing in young children. Integrating these preventive measures into pediatric healthcare practices may help reduce the burden of childhood wheezing and its long-term respiratory consequences.

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