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# FACTORS AFFECTING RECURRENT EMERGENCY ROOM ADMISSION AMONG CHILDREN WITH WHEEZY CHEST

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## ABSTRACT

**Background:** Recurrent wheezing episodes leading to emergency room visits in children, and potentially progressing to asthma. Identifying and addressing these factors may have a key role for management of such episodes. Additionally; lowering of overall healthcare costs. **Objectives:** To determine the factors which increase emergency room admission rate among children with wheezy chest. **Patients and methods**: This study is a cross-sectional study, include 200 children with recurrent wheezing form the period of October 2023 to March 2025. The study conducted in Al Salam Teaching Hospital (Nineveh-Iraq). The study included patients were 6 months to 5 years old and excluded patients with chronic pulmonary disease, cerebral palsy and nasogastric tube feeding, under six months of age and those with first-time admission. The questionnaire consisted of three parts; part one for sociodemographic factors, part two for past medical factors, part current factors. **Results**: Two hundred children were studied; the mean age of the study patients is 2.77 ± 1.78 years. Of them; 41 (20.5%) patients had more than or equal to 3 times emergency room admission while the rest 159 (79.5%) patients had less than 3 times. Statistically significant difference between patients with less three times emergency room admission and those with more than or equal to three times hospital admission regarding; history of ICU admission (P value <0.001), history of GERD (P value <0.001), history of smoking exposure (P value <0.001), and regarding positive x-ray findings (P value <0.001). While no statistically significant finding regarding age, gender, residency, home condition, prematurity, history of exclusive breast feeding for 6 months, history of anemia, history of atopy, inhaler use, and heart disease (P value more than 0.05) for them. **Conclusion**: The average age range for recurrent wheezing in children is one to three years old; the majority of them are males and live in urban areas; most children with recurrent wheezy chest have been hospitalized less than three times; and most babies with recurrent emergency room admissions due to recurrent wheezing attacks have a history of ICU admission, GERD, and a high exposure to smoking. Patients with current chest x-ray findings of hyperinflated chest, pneumonia or both were more likely to have a history of previous emergency room admission.

**KEYWORDS:** Admission, Bronchospasm, Emergency room, Paediatrics.

## 1- INTRODUCTION

Wheezing is a high-pitched whistling sound produced by air flowing through constricted or narrowed airways, also known as bronchospasm, which is the most prevalent cause of wheezing.[1] Bronchospasm can be exacerbated by inflammation of the small and medium airways, causing edema and further airway narrowing.[2] Respiratory virus infections are the most common cause of acute wheezing in infants and young toddlers; but, allergies or inhaled irritants (such as tobacco smoke) can also induce (or worsen) airway inflammation.[3,4] Allergies, asthma, and repeated viral respiratory infections can all cause wheezing.[5]

Less common causes of recurrent wheezing include heart failure, stomach reflux, air-way malacia, a retained aspirated foreign body, and chronic dysphagia that results in repeated aspiration. However; the cause of recurrent wheezing is often unknown.[6,7]

Wheezing problems are the leading cause of emergency room visits and hospital stays in the first few years of life in developed as well as developing countries, which has a substantial cost impact.[8] Reports from the last ten years indicate that between thirty-three and fifty percent of children have wheezed at least once before the age of three, and twenty percent exhibit wheezes frequently.[9] Over 85% of children with asthma were diagnosed before the age of three, and most of these children's lung

function deficits occurred during preschool, according to another study.[10]

Furthermore, the researchers found that preschool children with wheezing episodes experienced a 50% increase in outpatient visits, a two-fold increase in emergency visits, and a three-fold increase in hospitalization rates when compared to other usual children.[11]

Several risk factors for early wheeze in children have been connected in several prospective studies to the later development of asthma. A personal history of rhinitis or eczema, a family history of allergies, viral respiratory infections brought on by the rhinovirus or respiratory syncytial virus (RSV), maternal smoking during pregnancy or passive exposure following delivery, male gender, and daycare attendance are some of these risk factors.[12,14]

The aim of study is to determine the factors which increase emergency room admission rate among children with wheezy chest.

## 2- PATIENTS AND METHODS

This study is a cross-sectional study, include 200 children with recurrent wheezing form the period of October 2023 to March 2025. The study conducted in Al Salam Teaching Hospital (Nineveh-Iraq) in agreement with the ethical guidelines derived from the Helsinki Declaration, and approved by the ethical committee in Nineveh directorate of health.

Data were collected from admitted patients with recurrent wheezing by direct interview with the patients' families. Included patients were 6 months to 5 years old. Data collected included age, gender, residence whether urban or rural, prematurity, home condition (number of people at home), history of ICU admission, exclusive breast feeding for the first 6 months, anemia, GERD, history of atopy, exposure to smoking, inhaler use, and chest x-ray findings. Patients with chronic pulmonary disease, cerebral palsy and nasogastric tube feeding, under six months of age and those with first-time admission were excluded from the study.

The data was analyzed using SPSS (Statistical Package for Social Sciences) version 30 (IBM Corporation, USA). Categorical data are represented by frequency and percentage, whereas continuous data are represented by mean, median, and standard deviation. Chi-square was used to investigate the relationship between variables, while the T test was employed to evaluate the differences between the mean and median of continuous variables. All statistical tests were regarded as significant with a p-value $< 0.05$.

## 3 RESULTS

Two hundred children were studied; the mean age of the study patients is $2.77 \pm 1.78$ years. The basic information of the study participants was shown in table 3.1.

**Table 3.1: Basic information of the study participants. (number =200).**

| Variable | Number = 200 | Percent |
|---|---|---|
| **Age (year)**<br>- Less than 1<br>- 1-3<br>- More than 3 | <br>22<br>121<br>57 | <br>11%<br>60.5%<br>28.9% |
| **Gender**<br>-Male<br>-Female | <br>104<br>96 | <br>52%<br>48% |
| **Residence**<br>-Rural<br>-Urban | <br>91<br>109 | <br>45.5%<br>54.5% |
| **Home condition**<br>-Less than 3<br>-More than 3 | <br>17<br>183 | <br>8.5%<br>91.5% |
| **History of prematurity**<br>-Present<br>-Absent | <br>33<br>167 | <br>16.5%<br>83.5% |
| **History of intensive care unit admission**<br>-Present<br>-Absent | <br>29<br>171 | <br>14.5%<br>84.5% |
| **History of exclusive breast feeding for 6 months**<br>-Yes<br>-No | <br>54<br>146 | <br>27%<br>73% |
| **History of anemia**<br>-Yes<br>-No | <br>72<br>128 | <br>36%<br>64% |

| | | |
|---|---|---|
| **History of gastroesophageal reflux disease**<br>-Yes<br>-No | <br>59<br>141 | <br>29.5%<br>70.5% |
| **History of atopy**<br>-Yes<br>-No | <br>4<br>126 | <br>37%<br>63% |
| **History of smoking exposure**<br>-Yes<br>-No | <br>81<br>119 | <br>40.5%<br>59.5% |
| **Inhaler use**<br>-Yes<br>-No | <br>71<br>129 | <br>35.5%<br>64.5% |
| **Chest x-ray findings**<br>-Hyperinflation<br>-Hyperinflation and pneumonia<br>-Pneumonia<br>-Normal | <br>38<br>18<br>33<br>111 | <br>19%<br>9%<br>16.5%<br>55.5% |
| **Heart disease**<br>-Present<br>-Absent | <br>11<br>189 | <br>5.5%<br>94.5% |

Figure 3.1: Distribution of the study participants according to their emergency room admission

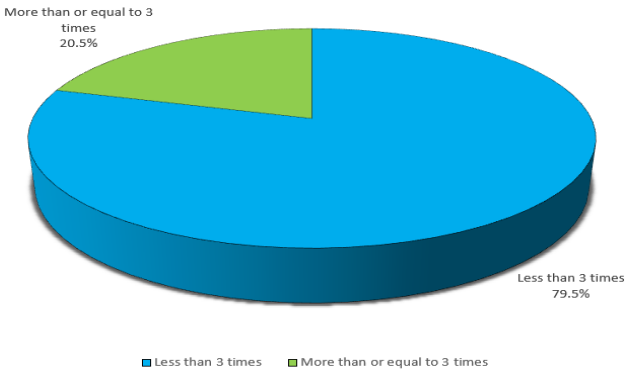


**Figure 3.1 shows than only 41 (20.5%) patients had more than or equal to 3 times emergency room admission while the rest 159 (79.5%) patients had less than 3 times.**

Table 3.2 shows comparison between patients with less than three times of admission and those with more than or equal to three times hospital admission. Statistically significant difference between the two groups regarding history of ICU admission (P value <0.001), history of GERD (P value <0.001), history of smoking exposure (P value <0.001), and regarding positive x-ray findings (P value <0.001). While no statistically significant finding regarding age, gender, residency, home condition, prematurity, history of exclusive breast feeding for 6 months, history of anemia, history of atopy, inhaler use, and heart disease (P value more than 0.05) for them.

**Table 3.2: Comparison between patients with patients with less than three times of admission and those with more than or equal to three times hospital admission. (number = 200).**

| Variable | Less than 3 times = 159 | More than or equal to 3 times = 41 | P-value |
|---|---|---|---|
| **Age (year)**<br>- Less than 1<br>- 1-3<br>- More than 3 | 22 (13.8%)<br>96 (60.4%)<br>41 (25.8%) | 0 (0%)<br>25 (60.9%)<br>16 (39.1%) | 0.731 |
| **Gender:**<br>-Male<br>-Female | 81 (50.9%)<br>78 (49.1%) | 25 (60.9%)<br>16 (39.1%) | 0.921 |

| | | | |
|---|---|---|---|
| **Residence**<br>-Rural<br>-Urban | 76 (47.8%)<br>83 (52.2%) | 15 (36.5%)<br>26 (63.5%) | 0.218 |
| **Home condition**<br>-Less than 3<br>-More than 3 | 16 (10.0%)<br>143 (90.0%) | 1 (2.4%)<br>40 (97.6%) | 0.693 |
| **History of prematurity**<br>-Present<br>-Absent | 22 (13.8%)<br>137 (86.2%) | 11 (26.8%)<br>30 (73.2%) | 0.192 |
| **History of intensive care unit admission**<br>-Present<br>-Absent | 9 (5.6%)<br>150 (94.4%) | 20 (48.8%)<br>21 (51.2%) | **<0.001** |
| **History of exclusive breast feeding for 6 months**<br>-Yes<br>-No | 42 (26.4%)<br>117 (73.6%) | 12 (29.3%)<br>29 (70.7%) | 0.903 |
| **History of anemia**<br>-Yes<br>-No | 56 (35.2%)<br>103 (64.8%) | 16 (39.0%)<br>25 (51%) | 0.872 |
| **History of gastroesophageal reflux disease**<br>-Yes<br>-No | 15 (9.4%)<br>144 (90.6%) | 26 (63.4%)<br>15 (36.6%) | **<0.001** |
| **History of atopy**<br>-Yes<br>-No | 55 (34.6%)<br>104 (65.4%) | 19 (46.3%)<br>22 (53.7%) | 0.120 |
| **History of smoking exposure**<br>-Yes<br>-No | 52 (32.7%)<br>107 (67.3%) | 29 (70.7%)<br>12 929.3%) | **<0.001** |
| **Inhaler use**<br>-Yes<br>-No | 54 (34%)<br>105 (66%) | 17 (41.5%)<br>24 (58.5%) | 0.328 |
| **Chest x-ray findings**<br>-Hyperinflation<br>-Hyperinflation and pneumonia<br>-Pneumonia<br>-Normal | 24 (15.1%)<br>10 (6.3%)<br>21 (13.2%)<br>104 (65.4%) | 14 (34.1%)<br>8 (19.5%)<br>12 (29.3%)<br>7 (17.1%) | **<0.001** |
| **Heart disease**<br>-Present<br>-Absent | 6 (3.8%)<br>153 (96.2%) | 5 (12.2%)<br>36 (87.8%) | 0.132 |

## 4. DISCUSSION

Wheezing, particularly during respiratory infections, is very common in early childhood. While asthma could be the cause of wheezing, other factors can also contribute, including viral infections (like bronchiolitis), allergies, and environmental factors.[15] It's important to have a thorough evaluation to determine the underlying cause of recurrent wheezing, as management strategies may differ.[16] The study found that the peak age for recurrent wheezing is typically between 1 and 3 years old (mean 2.77 years), which consistent to other studies findings.[17,18] Moreover; the study found that boys are more likely to experience wheezing episodes repeatedly compared to girls. This difference can attribute to anatomical variation, hormonal influences, environmental factors, genetic factors and consultation pattern. Comparable results were obtained form Wellington Fernando da Silva Ferreira et al.[19] and Yongjun Tang et al..[20] Urban residence found in this study to be more likely linked with recurrent wheezes, this is because increased exposure to environmental factors like air pollution, allergens (like cockroach and mouse allergens), which is runs with Yibing Zhu et al study findings.[21] In the same way; the majority of patients with wheezes lived in over crowed home condition. As living in overcrowded conditions can negatively impact respiratory health, potentially leading to wheezing and other respiratory problems. This is supported by many studies.[22,26]

The study found about four fifths of the patients with wheezes experienced less than three emergency room visits for their condition. This is in agreement with Sura Falah et al study finding.[27]

The study found that patients with history of intensive care unit admission were significantly had more subsequent ER admission for wheezes, this finding highlight the importance of monitoring children with a history of ICU admission for respiratory symptoms and providing them with appropriate long-term management to prevent future exacerbations, which is consistent to

another study conducted in UK.[28] Similarly; the study found children with GERD were more liable for recurrent ER admission for wheezes. As gastroesophageal reflux causes the stomach contents flow back into the esophagus, and irritate the airways and trigger or worsen wheezing. This is parallel to other study findings.[29,31]

Additionally; the study found children with passive smoking exposure were more liable for ER admission for wheezes, as secondhand smoke can irritate and inflame the airways, making them more prone to bronchoconstriction (narrowing of the airways) and wheezing. Tom Ruffles et al.[32] and Simret M. Asfaw et al.[33] had comparable results. The current study children with chest x-ray findings more likely to admit to ER than those without chest x-ray findings, which is consistent with Sura Falah et al study finding.[27]

## 5 CONCLUSION

The average age range for recurrent wheezing in children is one to three years old; the majority of them are males and live in urban areas; most children with recurrent wheezy chest have been hospitalized less than three times; and most babies with recurrent emergency room admissions due to recurrent wheezing attacks have a history of ICU admission, GERD, and a high exposure to smoking. Patients with current chest x-ray findings of hyperinflated chest, pneumonia or both were more likely to have a history of previous emergency room admission.

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