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Review Article

The Spectrum of Pediatric Respiratory Emergencies in King Fahad Hospital Albaha Saudi Arabia

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Abstract

Background: Respiratory diseases are common and remain significant causes of emergency in children, especially those less than 5 years old. Objectives: To determine the prevalence, clinical profile, outcome, and common causes of respiratory distress among pediatric patients presenting to the emergency department in King Fahad Hospital, Al-Baha, Saudi Arabia **Methods:** This was a hospital-based retrospective cohort study carried out at King Fahad Hospital, Al Baha, Saudi Arabia. Children older than 1 month and younger than 14 years who presented to the emergency department with respiratory distress were included in the study. **Results:** Files of 210 children with respiratory distress were reviewed in this study. The prevalence of respiratory diseases in children was 24%. Hyperactive airway disease was the most common causes of respiratory distress, diagnosed in 48 pts (22.85%), followed by bronchial asthma 45 pts, bronchopneumonia 45 pts (21.41%) each, P< 0.009. No mortality was register in this study. Age group less than 5 years was the most common presenting with respiratory distress, and male were affected more with male to female ratio was 1/1.8, (P<0.007). Tachypnea was the most common sign seen in 87.74% followed by cough in 79.90%. **Conclusion:** Respiratory diseases were found to be significant cause childhood illnesses and emergency admissions in our hospital. The common respiratory signs were tachypnea, cough, fever, nasal flaring and subcostal retractions. No mortality was documented in this study.

Keywords: Children; King Fahad Hospital; Emergency department; Cough; Respiratory distress

Abbreviations:

KFH: King Fahad Hospital

CRS: Clinical Respiratory Score

ACS: Acute chest syndrome

SCA: Sickle cell anemia

SPSS: Statistical package for social sciences

WHO: World Health Organization

BA: Bronchial asthma

BPN: Bronchopneumonia

Pts: patients

Introduction

Respiratory diseases remain significant causes of emergency in children, and bronchial asthma, bronchiolitis, and pneumonia are the most common types [1]. The profiles of respiratory illnesses may be influenced by different factors, including differences in climate and risk factors across, worldwide environmental problem [2]. Epidemiological studies have shown different prevalence of respiratory diseases between countries. As mentioned by [3] in his article, the prevalence of respiratory diseases of hospital admission among children are 25% in USA, UK, and 24.7% in Nigeria. Respiratory distress is the main cause to present in Emergency department in Egypt 24.4%, and appropriate hospital, emergency services improve the outcomes, [4]. Published study from Pakistan revealed the respiratory diseases were less common in emergency [5], while in Mozambique the respiratory diseases in children are 29.3% [6]. Bronchiolitis is common in children less than one year in United Kingdom, [7], foreign body inhalation is common in children < 7 year in South Korea [8], while pneumonia was the commonest cause 63% in India [9]. Recurrent reevaluation of the patient after admission in emergency department is important to improve the outcomes [10]. Acute respiratory distress in infants aged 0 to 90 days associated with positive COVID is mild and self-limiting in majority of the cases [11]. Ideal clinical evaluation, identification of etiology and risk factors and proper management can significantly improve the outcome of this illness [12]. The common symptoms and signs of respiratory distress presenting to the emergency department are cough, fever, breathing difficulty, tachypnea, and wheezing. In severe cases, irregular breathing has been documented. The detailed history, clinical examination, imaging, and laboratory evaluation can help to reach the diagnosis and exact cause of respiratory distress in the child.

Objectives

To determine the prevalence, clinical pattern, outcome, and common causes of respiratory distress among pediatric patients presenting to the emergency department in King Fahad Hospital, Al-Baha, Saudi Arabia. No published studies regarding respiratory diseases in the children of Al Baha region are currently available, and this article could serve as an epidemiological reference for respiratory diseases in children in this area.

Material and Methods

This was a hospital-based retrospective cohort study carried out at King Fahad Hospital, Al Baha, Saudi Arabia. Children older than 1 month and younger than 14 years who presented to the emergency department with respiratory distress were included in the study. Patients younger than 1 month and older than 14 years, patients had respiratory diseases associated with comorbid chronic diseases, and patients who tested positive for COVID-19 were excluded. Patients with mild or no respiratory distress treated and discharged from emergency department were also excluded. The data were analyzed using Microsoft Excel 2020. P value (<0.05) and confidence interval (95% CI) were used as the statistical measurements to evaluate outcomes in this study. Files of included patients from May 2022 to May 2023 were reviewed. This study followed the ethical principles for medical research presented in The Declaration of Helsinki [13]. Pediatrics emergency department protocols and guidelines were applied to evaluate all patients. Symptoms, signs, relevant investigation, length of stay, and treatment were registered and reviewed. Information regarding demographic and clinical details, including age, sex, history of contact, comorbidities, clinical features, and lab investigations, were recorded. As shown in (Table 1), this study used Clinical Respiratory Score (CRS) to divide children with respiratory distress into three categories: Mild (<3), Moderate (4–7), and Severe (8–12), [14,15]. CRS is used to quickly assess the patients in the emergency department, where a quick diagnosis is essential. The patient's mental status and appearance are also included in the score. The pediatric emergency unit is fully equipped for resuscitation and treatment, and it is managed by specialized staff including interns, pediatric residents, and pediatric emergency consultants. Records reviewed for patient care, age, sex, place, month of presentation, symptoms, signs, length of stay, and outcome were documented. Accepted cases were recorded every month to correspond to the prevalence by season.

Assess	Score 0	Score 1	Score 2
Respiratory Rate	Age 1–5 years: <30 Age>5 years: <20	Age 1–5 years: 30–40 Age>5 years: 20–30	Age 1–5 years: >40 Age>5 years: >30
Auscultation	Good air movement, Expiratory scattered wheezing or loose rales/ crackles	Depressed air movement, inspiratory and expiratory wheezes or rales/ crackles	Diminished or absent breath sounds, severe wheezing or rales/crackles or marked prolonged expiration
Use of Accessory Muscles	Mild to no use of accessory muscles. Mild to no retractions or nasal flaring on inspiration	Moderate intercostal retractions, mild to moderate use of accessory muscles, nasal flaring.	Severe intercostal and substernal retractions, nasal flaring
Mental Status	Normal to Mildly irritable	Irritable, agitated, restless	Lethargic
Room Air $Sp0_2$	>95%	90–95%	<90%
Color	Normal	Pale to normal	Cyanotic, dusky

Table 1: The Clinical Respiratory Score (CRS) in children with respiratory distress presenting to the emergency department; CRS score: Mild (<3), Moderate (4–7), Severe (8–12).

Results

Files of 210 children with respiratory distress were reviewed in this study. This study revealed that the prevalence of respiratory diseases in children 24%. The mean age of patients with respiratory distress was 3.6 years (SD 2.7), ranging from 1 month to 14 years. There were 114 male patients (54.28%) and 96 female patients (45.72%), with male to female ratio 1/1.8 (P< 0.007). As shown in (Table 2) shows, most patients were admitted during the winter, while the fewest patients were admitted during the summer (P< 0.03). In total, 174 patients (82.86%) were younger than 5 years, 30 (14.28%) were between 5 and 10 years, and 6 patients (2.86%) were older than 10 years. As shown in (Table 3) the most common age group presenting with respiratory distress was less than 2 years old, CI95% [1.55-4.21], (p< 0.002). Hyperactive airway was the most common cause of respiratory distress in 48 patients (22.85%), followed by bronchial asthma in 45 patients (21.41%), bronchopneumonia in 45 patients (21.41%), bronchiolitis in 44 patients (20.95%), pneumonia in 10 patients (4.76%), aspiration pneumonia in 10 patients (4.76%), foreign body aspiration in 3 patients (1.43%), croup in 3 patients (1.43%), and acute chest syndrome in 2 patients (1%) known cases of sickle cell disease (P< 0.009). The most common symptoms and signs documented in admitted patients were tachypnea in 179 patients (87.74%), cough in 163 patients (79.90%), fever in 158 patients (75.24%), and rhinorrhea in 149 patients (70.96%). Low saturation was documented in 103 patients (49%), retractions of intercostal muscles in 95 patients (45.24%), wheezing in 60 patients (28.57%), Abdominal pain was documented in 10 patients (4.76%). cyanosis in 5 patients (2.38%), chest pain in 4 patients (1.90%), irritability in 3 patients (1.43%), and miscellaneous symptoms in 20 patients (9.53%), (P< 0.009). Among all patients, 90% were fully vaccinated while 10% were scheduled to complete their vaccinations. Chest X-rays were taken for all patients. Chest X-rays were normal for 85 patients (40.48%), while 125 patients (59.52%) had abnormal findings. Respiratory acidosis was documented in 25 patients (11.90%), and metabolic acidosis was only recorded in 5 patients (2.38%). Four patients (1.90%) were admitted to pediatric intensive care, and inotropes support was required. The average hospital admission was 4 days (3–5 days), it was 5-7 days in patients less than one year (P<0.02). Patients with an improved condition were discharged and scheduled for regular follow-ups as outpatients. No mortality was documented in our study.

Month	Number	Male	Female	Month	Number	Male	Female
May 2022	16 (7.62%)	10	6	**Nov 2022**	23(10.52%)	10	13
Jun 2022	13 (6.19%)	8	5	**Dec 2022**	24(11.43%)	13	11
Jul 2022	11(5.24%)	6	5	**Jan 2023**	23(10.95%)	10	13
Aug 2022	12(5.71%)	7	5	**Feb 2023**	21(10%)	11	10
Sep 2022	16(7.62%)	10	5	**Mar 2023**	16(7.62%)	9	7
Oct 2022	20(9.52%)	12	8	**Apr 2023**	15(7.14%)	8	7

Table 2: Distribution of admitted patients per month.

Diagnosis	Number	Male	Female	<5 yrs.	5-10 yrs.	10-14 yrs
Hyperactive airway Pts < 2 year	48 (22.85%)	22	26	44 (20.95%)	4 (1.90%)	
Bronchial asthma	45 (21.41%)	22	23	34 (16.18%)	9 (4.28%)	2 (0.95%)
BPN	45 (21.41%)	25	20	36 (17.14%)	6 (2.85%)	3 (1.42%)
Bronchiolitis	44 (20.95%)	24	20	39 (18.57%)	5 (2.38%)	
Pneumonia	10 (4.76%)	6	4	7(3.33%)	2 (0.96%)	1 (0.47%)
Aspiration Pneumonia	10 (4.76%)	6	4	9 (4.29%)	1 (0.47%)	
Croup	3 (1.43%)	2	1	2 (0.96%)	1 (0.47%)	
Foreign body	3 (1.43%)	2	1	2 (0.96%)	1 (0.47%)	
ACS	2 (0.95%)	1	1	1 (0.475%)	1 (0.475%)	

Table 3: Distribution of pts by diagnosis, gender, and age.

Discussion

In the present study, the prevalence of respiratory distress among admitted children was 24%, similar to mentioned prevalence in other published studies, 25% in USA, UK, and 24.7% in Nigeria, 24.4% [3], in Egypt 24.4%, [4], 29.3% in [6]. A slight increase in the incidence of respiratory distress in male children compared to female children was observed. The male-to-female ratio was 1.18, which was comparable with study of [5]. Near equal admission was reported for respiratory cases during all seasons, with the highest admissions occurring in the winter. Patients younger than 5 years, especially infants, more commonly presented with respiratory distress compared to older children [7]. Small airways and inadequate compensatory mechanisms in infants may explain the higher number of cases. Average duration of admission was 4 days (3-5 days), while the average duration was 5 days in other studies [12]. Hyperactive airway was the most common cause of respiratory distress in diagnosed in 48 patients (22.85%) aged less than 2 years. followed by bronchial asthma 45 patients (21.41%), bronchopneumonia 45 patients (21.41%), bronchiolitis in 44 patients (20.95%), pneumonia in 10 patients (4.76%), aspiration pneumonia in 10 patients (4.76%), foreign body aspiration in 3 patients (1.43%), croup in 3 patients (1.43%), and acute chest syndrome in 2 (1%) patients known cases of sickle cell anemia were recorded. Pneumonia was the most common cause (66%) in the study of [9, 16], and foreign body was common in children < 7 year [8] and bronchiolitis were the commonest in UK, Green CA et al [7]. Similar to our result Acute chest syndrome was not common when was compare with other published studies [17]. In the present study, the most common presenting signs were tachypnea (87.74%), cough (79.90%), fever (77.45%), rhinorrhea (70.96%) and intercostal retractions (45.24%), which were higher than profile of presentation reported by [9]. No mortality was documented in this study when compared with low mortality in other studies [18], which may be due to the clear protocols and guidelines applied in evaluation and treatment in our center and emergency department.

Study limitations

Insufficient information about comorbidities and a short follow-up period may have influenced the assessment and outcome of the diseases in this study.

Conclusions

Respiratory diseases were found to be significant childhood illnesses and emergency cases in our hospital. This study revealed that hyperactive airway diseases and bronchial asthma were the most common causes for emergency department admission, followed by bronchopneumonia. The most common respiratory signs were tachypnea, cough, fever, and subcostal retractions. Male children were more likely to be diagnosed with respiratory diseases. No mortality was documented in this study.

Authors Declaration

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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