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Original Article:

Investigating the Causes of Hospitalization of Children under 15 Years Old during the COVID-19 Pandemic in Southern Iran

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Abstract

Introduction: Children are the future of any community and identifying their pattern of diseases is a reflection of the health status of that region. This study was conducted to investigate the frequency of hospitalization causes in children under 15.

Materials and Methods: This cross-sectional study was performed among 360 children under 15 in the pediatric ward of Imam Khomeini Hospital in Jiroft in 2020. Data were collected by a pre-designed checklist according to the patients' files. Data were analyzed by SPSS software using descriptive statistics and a chi-square test.

Results: The most common causes of hospitalization in both sexes were gastrointestinal disease (44.11%) and fever of unknown origin (FUO) (36.7%), and a significant relationship was observed between gender and the cause of hospitalization of children (P <0.001). In the age group of one month to one year, the most common cause of hospitalization was FUO (27%) followed by gastrointestinal diseases (25%). Otitis media (23%) was the most common cause of hospitalization in children aged 1 to 3 years, gastrointestinal diseases in children aged 3 to 6 years (16.4%) and 6 to 12 years (25%), respectively. There was also a statistically significant relationship between pediatric age and hospitalization causes (P <0.001).

Conclusion: Due to the high prevalence of diseases such as gastrointestinal diseases and FUO among the causes of hospitalization of children, epidemiological studies and the provision of preventative health services for said diseases in children seem necessary.

Keywords: COVID-19, Hospitalization, Children, Iran.

1. Introduction

Hospitalization of children is a persistent health problem in developing countries, and a large number of children are hospitalized each year due to various diseases and are at risk of death, despite that many of these diseases are preventable [1]. The pattern of diseases that leads to hospitalization in children is distinct from adults [2] and has different symptoms in

different age groups [3]. Moreover, some studies suggest that the most important causes of hospitalization of children under 5 years of age are respiratory diseases, accidents and poisoning, and gastrointestinal diseases, and the most prevalent cause of death is respiratory infections. Infectious diseases, including tuberculosis and urinary tract infections, are also fairly common among children. With more than one million cases, tuberculosis is the most common cause of death from single-agent infectious diseases in developing countries. A new case of the disease has been found among children under the age of 15, which highlights the principal status and significance of this disease [4]. Moreover, among the diseases that are considered pediatric emergencies are fever and seizures, which affect 4% of children and require follow-up, and are among the most typical neurological disorders in children [4].

Empirical studies have demonstrated that children in the early years of life, especially in their infancy, are more susceptible than in any other period, and good hygiene practices employed by parents and doctors during this period are crucial and can ameliorate hospitalization and mortality rates of this age group [5]. In recent years, the infant mortality rate in Iran has decreased, but this is not the case in developing countries [6]. Various factors, such as the spread of infectious agents and geographical, economic, social, and cultural factors are involved in the diversity of diseases, health problems, and the epidemiological status of diseases in different countries [7].

Accordingly, considering that children are the future of any community and identifying the pattern of various diseases, especially in children, is a reflection of the health status of that region, based on the health status of this group, effective planning, and follow-up can be implemented to aid improve community health. Therefore, this study was conducted to investigate the frequency of hospitalization causes in children under 15 in the pediatric ward of Imam Khomeini Hospital in Jiroft in 2020.

2. Materials and Methods

This cross-sectional study was performed to determine the causes of hospitalization of children under 15y in the pediatric ward of Imam Khomeini Hospital in Jiroft in 2020. The inclusion criteria were age between 1 month and 12 years, and the exclusion criteria were morbidity due to underlying disease. The data of 360 children were collected using a pre-designed checklist through reviewing the patient's files. This information included the gender, the referral reason, and the time of hospitalization. Patients who died before entering the ward or left the hospital with consent before completing diagnostic and treatment procedures, despite the physicians' opinion regarding discharge from the hospital, were excluded from the study. Children hospitalized in four age groups of 1 month to 1 year, 1 to 3 years, 3 to 6 years, and 6 to 12 years were examined. Data were analyzed using SPSS, software version 18, where descriptive statistics, including frequency and frequency percent and a chi-square test for inferential analysis were calculated. Before conducting the study, the required ethics approval was obtained from the ethics committee of Jiroft University of Medical Sciences (Ethics Code: IR.JMU.REC.1400) and the privacy of patients' information was maintained.

3. Results

Out of the 360 children studied, 54.6% were male and the rest were female. 53.3% of patients were aged one month to one year and hospitalization of patients for all reasons were presented across different seasons (spring, summer, fall, and winter). The frequency distribution of hospitalizations in the pediatric ward by age and gender are shown in Table 1.

The most common causes of hospitalization in both sexes were gastrointestinal diseases (44.11%) and fever of unknown origin (FUO) (36.7%), and a significant relationship was observed between gender and the cause of hospitalization of children ($P < 0.001$). The frequency distribution of research units according to the reason for hospitalization in the pediatric ward by gender is detailed in table 2.

In the age group of one month to one year, the most common cause of hospitalization was FUO (27%) followed by gastrointestinal diseases (25%). Otitis media (23%) was the most common cause of hospitalization in children aged 1 to 3 years, and gastrointestinal diseases in children aged 3 to 6 years (16.4%) and 6 to 12 years (25%), respectively. There was also a statistically significant relationship between pediatric age and hospitalization causes ($P < 0.001$). As shown in Table 3, the incidence of hospitalization for asthma, poisoning, and FUO in winter, scorpion stings in summer, diabetes, otitis, and snakebite in spring, and kidney, urinary tract, and pharyngitis diseases in fall are higher in the aforementioned seasons.

Table 1. frequency distribution of hospitalizations in the pediatric ward by age and gender

Variable	Quantity	Percentage
Age		
1 month to 1 year	192	53.3
1 to 3 years	13	3.6
3 to 6 years	79	12.9
6 to 12 years	64	17.8
12 years and above	12	3.3
Total	360	100
Sex		
Female	164	45.5
Male	196	54.6
Total	360	100

Table 2. The frequency distribution of research units according to the reason of hospitalization in the pediatric ward by gender

Referral reason	Male Quantity (Percentage)	Female Quantity (Percentage)	Total Quantity (Percentage)
Asthma	8(4.8)	5(2.5)	13(13.6)
Epilepsy	3 (1.8)	-	3(1.8)
Cardiovascular disease	2(1.2)	-	2(1.2)
Anemia and other homologous problems	9(5.4)	20(10.2)	29(15.6)
Diabetes	18(10.9)	2(1.02)	20(11.92)
Poisoning	11(6.7)	15(7.6)	26(14.3)
Metabolic diseases	11(6.7)	15(7.6)	26(14.3)
Immunological diseases	-	3(1.5)	3(1.5)
Snakebite	3(1.8)	6(3.06)	9(4.86)
Scorpion bites	2(2.1)	4(2.04)	6(4.14)
Kidney and urinary tract	7(4.2)	10(5.1)	17(9.3)
Pharyngitis	8(4.8)	2(1.02)	10(5.82)
Skin infections	5(3.04)	4(2.04)	9(5.08)
Otitis	14(8.5)	3(1.5)	17(10)
FUO	26(15.8)	41(20.9)	67(36.7)
Gastritis	-	3(1.5)	3(1.5)
respiratory diseases	8(4.8)	22(11.2)	30(16)
Digestive diseases	28(17.07)	53(27.04)	81(44.11)
Other	8(4.8)	3(1.5)	11(6.3)

Table 3. Frequency distribution of reasons for hospitalization in the pediatric ward by season

Referral reason	Spring Quantity (Percentage)	Summer Quantity (Percentage)	Fall Quantity (Percentage)	Winter Quantity (Percentage)
Asthma	3 (3.3)	1 (1.1)	1 (1.1)	8 (8.8)
Epilepsy	-	-	-	3 (3.3)X
Cardiovascular disease	-	1 (1.1)	1 (1.1)	-
Anemia and other homologous problems	7 (7.7)	17 (18.8)	4 (4.4)	1 (1.1)
Diabetes	6 (6.6)	4 (4.4)	5 (5.5)	5 (5.5)
Poisoning	9 (19)	5 (5.5)	2 (2.2)	10 (11.1)
Metabolic diseases	4 (4.4)	-	-	-
Immunological diseases	-	-	3 (3.3)	-
Snakebite	4 (4.4)	3 (3.3)	2 (2.2)	
Scorpion sting	2 (2.2)	4 (4.4)		
Kidney and urinary tract	4 (2.2)	3 (3.3)	6 (6.6)	4 (4.4)
Pharyngitis	1 (1.1)	2 (2.2)	5 (5.5)	2 (2.2)

Skin infections	4 (4.4)	4 (4.4)		1 (1.1)
Otitis	6 (6.6)	4 (4.4)		1 (1.1)
FUO	16 (17.7)	14 (15.5)	16 (17.7)	21 (23.3)
Gastritis	3 (3.3)	-		
Digestive diseases	20 (22.2)	23 (23.3)	24 (26.6)	16 (17.7)
Respiratory diseases	1 (1.1)	3 (3.3)	13 (14.4)	13 (14.4)
Other		4 (4.4)	5 (5.5)	2 (2.2)

4. Discussion

In the present study, the causes of hospitalization of children under 15y in the pediatric ward of Imam Khomeini Hospital in Jiroft in 2020 were investigated. Out of the 360 children surveyed, more than half (54.6%) were boys ranging from one month to 1-year-old. Given that infants and children under one-year-old are among the most vulnerable groups in terms of age, and because this age group is at a crucial developmental phase, its members require constant care since the risk of disease in this age group is greater. In our study, gastrointestinal diseases and fever of unknown origin were the leading causes of hospitalization among children, which is harmonious with the results of Barak et al [8]. Meanwhile, in the age group of one month to 1-year-old, fever surmounted gastrointestinal diseases, which could stem from the relatively weak immune system of this group, jaundice, or infections, such as pneumonia and urinary tract infections [7]. Also, since this study was conducted in 2020, while the country was dealing with the COVID-19 pandemic, COVID-19 may have been effective in causing fever in this group.

In this study, otitis was responsible for hospitalization in less than half of patients aged one to three years old. Studies have illustrated that otitis often occurs in the early stages of speech development in children and has a high prevalence in the age group younger than two years, which in our study was also more common in this age group [9,10]. Early onset of infection and cold season are among the risk factors for this disease in children. While, in our study, the most common cause of hospitalization in children aged one to three years in 2020 was otitis, in the same year, the Netherlands saw a sharp decline in ear infections among children, which could be due to the general measures to control the infection during the COVID 19 pandemic and more access to health services during this period [11]. Therefore, the high prevalence of otitis in this period in Iran is noteworthy. Finally, in the age group of 3 years and older, gastrointestinal diseases surpassed other diseases and were the most common reason for hospitalization of children. Various studies have shown that gastrointestinal diseases, including diarrhea, are among the most common diseases in children, especially in developing countries, with symptoms of vomiting, diarrhea, fever, and anorexia. These symptoms are typically fairly mild in children under 6 months, which indicates the pivotal role of breastfeeding in the early years of life in reducing the incidence of disease [12,13]. At the age of 3 years, when children often consume an adult diet, gastrointestinal diseases are also more likely to occur. Indeed, some studies have indicated the co-occurrence of gastrointestinal symptoms in children with COVID-19 [14], which in itself could have led to a high prevalence of gastrointestinal symptoms in the present study at the age of 3 years and older. In our study, which is consistent with the results of other studies, the incidence of asthma and FUO cases were higher in winter, while considering the cold weather, other infections could have led to fever development and exacerbation of asthma [7,15]. Scorpion stings were also more common in the summer. Past studies have shown that scorpion bites are among the health and medical challenges of underdeveloped tropical and subtropical countries in the world that endanger the lives of thousands of people every year. In Iran, Sistan and Baluchestan, Khuzestan and Kerman are among the most prevalent areas dealing with this challenge. Also, scorpions are more active during the summer, which makes scorpions more likely to bite in summer, which has also been reported in other studies [16,17]. Moreover, in this study, the incidence of diabetes, otitis, and snakebite in spring were higher than in other seasons. Reports indicate that most cases of type 1 diabetes, which most often occurs between the ages of 11 and 14, and is usually limited to children and adolescents, are diagnosed in spring and fall [18, 19]. Indeed, our study showed the highest incidence of diabetes-induced hospitalization in children was during spring. Ear infections in children also often occur in winter and spring, in which seasonal allergies in spring can play a role [20, 21]. Sone studies have shown that snakes are most active at temperatures between 25 to 32 ° C during the rainy season [22, 23] and affect women and children more, which can be a justification for a higher incidence of hospitalization. Snakebites in this study occurred during spring when, in Iran, there is heavy precipitation and moderate temperatures. In the present study, kidney and urinary tract diseases in children admitted during falls were at

the top of the list, which was contradictory to previous studies; this indicates that more studies are needed in this field [24]. Pharyngitis also had more cases of hospitalization during fall, which could be due to cold weather and respiratory infections. A study in Japan also showed this increase during fall [25], while the findings of some studies are inconsistent with those of the present study; the climate and geographical diversity of different regions can play a part [26].

5. Conclusion

The results of this study indicated that the most common causes of hospitalization of patients in the pediatric ward of Imam Khomeini Hospital in Jiroft in 2020 were gastrointestinal diseases and FUO. Since this study was carried out at the height of the COVID-19 epidemic, the reported symptoms may have overlapped with the symptoms of COVID-19. But in general, due to the high prevalence of diseases, such as gastrointestinal diseases and FUO, among the causes of hospitalization of children in this area, conducting epidemiological studies, and the provision of preventative health services these are necessary.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by Jiroft University of Medical Sciences Ethics Committee (Code: IR.JMU.REC.1400).

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Author's contributions

All authors have equally contributed to preparation of this article.

Conflict of interest

The authors declare no conflict of interest.

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