ORIGINAL ARTICLE

CONTENTS

Incidence rate and risk factors of respiratory tract infection for children under five years

Murtadha Kanim Adea Aljebory[1], Zainab Ali Hussein[2]

[1]COMMUNITY HEALTH NURSING IN NURSING DEPARTMENT, UNIVERSITY OF WARITH AL-ANBIYAA, KARBALA, IRAQ

[2]DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY, COLLEGE OF HEALTH AND MEDICAL TECHNOLOGY, UNIVERSITY OF HILLA, BABYLON, IRAQ

ABSTRACT

Aim: To determine incidence rate and risk factors of respiratory tract infection for children under five years at Hospital, and to find out relationship between incidence rate, risk factors and demographic data of children.

Materials and methods: A Descriptive case-control design is used through the study. The study was carried out from December 5, 2023, to August 8, 2024, in Al-Najaf City, Al-Najaf Al-Ashraf Health Directorate, and Al-Zahra Teaching Hospital. 471 patients with respiratory tract infections below the age of 5 who come to Al-Zahra Teaching Hospital for treatment, follow-up, or both are included in the non-probability (purposive sample). A panel of experts is used to examine clarity in order to determine the face validity of the early version of the questionnaire. Determination of reliability of the questionnaire is based on the internal consistency reliability, Alpha Cronbach's technique.

Results: Results reveal significant risk factors case and control group regarding respiratory tract infection are recent cold or influenza, exposure to smoke, allergy, low birth weight, duration of breastfeeding less than six months, early use of antibiotics before six months, exposure to indoor air pollution, incomplete immunization.

Conclusions: The result shows highly recurrent risk factors in participant are early use of antibiotics less than six months, allergy, and exposure to the smoke and recent cold or influenza. Mass media should utilize to provide health education to increase parents' knowledge and awareness about respiratory tract infection and these risk factors.

KEY WORDS: incidence rate; risk factors; respiratory tract infection

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ABBREVIATIONS

ARTI - Acute Respiratory Tract Infection
LRIs - Lower Respiratory Infections
RSV - Respiratory Syncytial Virus
Hib - Haemophilus influenza type b
WHO - World Health Organization

INTRODUCTION

One of the leading causes of morbidity and mortality among children in underdeveloped nations is acute Respiratory Tract Infections (ARTIs). This infection has the potential to become the most common illness in hospitals if it occurs frequently. One of the main causes of mortality and disability, especially in children under five, is respiratory tract infections, particularly lower respiratory infections (LRIs). The etiology of LRIs can be viral (e.g., respiratory syncytial virus (RSV), parainfluenza virus, influenza virus, adenovirus and coronavirus) or bacterial, e.g., Streptococcus pneumonia and *Haemophilus influenzae* type b (Hib). Moreover, *Streptococcus pneumonia* is the principal aetiological agent of LRIs and is responsible for around half of the deaths. LRIs also have a significant financial impact; on average, RSV-related LRIs cost e3, 452, and e299 for inpatient and outpatient treatment, respectively. These costs may increase if follow-up is necessary or there are underlying medical conditions [1]. Recurrent respiratory tract infections are common in young children because they represent a considerable burden on pediatric outpatient services and hospitalizations, particularly in developing nations. Both the upper and lower respiratory tracts can get infected, and the most common infectious cause of pediatric deaths under the age of five is still recurrent lower respiratory tract infections like pneumonia. The Global Burden of Disease Study from 2016 estimates that lower respiratory tract infections killed 0.65 million children [2]. One of the

most prevalent serious public health issues is respiratory tract infections (RTIs), which are more common among children and the poor in general. In 15% of instances, severe acute RTIs result in hospitalizations and death, especially pneumonia in children under five [3]. The World Health Organization (WHO) estimates that 6% of all diseases worldwide are caused by respiratory infections. Approximately 6.6 million children under the age of five die each year worldwide; 95 percent of these children live in low-income nations, and ARI accounts for one-third of these deaths [4]. The purpose of this study is to determine the prevalence and risk factors of respiratory tract infections in children under five years old at the hospital, as well as the correlation between these variables and the demographic information of the children.

MATERIALS AND METHODS

DESIGN

A Descriptive Case-Control Design is used in the current study to attain the study objectives. The period of the study is from 5th December 2023 to the August 2024.

SETTING

Al-Najaf City, Al-Najaf Al-Ashraf Health Directorate, and Al-Zahra Teaching Hospital are the study's locations.

SAMPLE

The study sample included 471 children under five years of age with respiratory tract infections, selected using non-probability (purposive) sampling. These children visited pediatric wards of Al-Zahra Teaching Hospital for treatment, follow-up, or both. The study group consisted of children diagnosed with respiratory tract infections like (bronchitis, pneumonia, and otitis media) via the pediatrician at Al-Zahra Teaching Hospital during the study period. These children presented with active symptoms and were undergoing treatment or follow-up. While the control group included healthy children under 5 years of age with no current symptoms or recent history of respiratory infections, some had mild enteritis or minor injuries, who had no signs of respiratory infection during admission or hospital stay. The purpose of including such a control group was to assess environmental and demographic risk factors for respiratory infections, not to compare disease outcomes across unrelated illnesses. Both cases and controls had a history and physical exam to check for risk factors. Both groups came from the same patient pool (matched by age and sex) to ensure comparability and were drawn from the same population seen at the hospital during the same time frame.

INCLUSION CRITERIA

1. All participants are medically diagnosed as respiratory tract infection
2. The age of the all participants is children under five years old.
3. All participants are from Iraqis nationality because of the nature of the Iraqi society that differs from other societies.
4. Willing participants who agreed to take part in the study.

EXCLUSION CRITERIA

1- Patients with other disease or acute condition because such cases are critical and the patients' yet not have enough knowledge regarding their case.

Study Instrument: To evaluate patients' incidence rate and risk variables following a respiratory tract infection, the researcher has designed a limited assessment tool. The final study instrument consists of three parts

Part 1: Child Demographic Data: A demographic data sheet consists of 2 items, which included age, gender.

Part II: Parents Demographic Data: A demographic data sheet consists of 6 items, which included level of education, monthly income, residency, Child live with, marital status, occupational status.

Part III: Clinical Data: Second part of the questionnaire is comprised of 5 items, which include diagnosis, duration of the disease, number of previous hospitalizations and risk factors.

Validity of the Study Instrument: The validity of the study instrument refers to its ability to collect the data for which it is intended. A panel of experts is used to assess the questionnaire's face validity by looking into its clarity, applicability, and suitability for measuring the concepts of interest. The consistency and dependability of the study instrument were assessed using internal consistency reliability. Cronbach's Alpha technique was applied to Part III of the questionnaire (Clinical Data), which includes five items: diagnosis, duration of illness, number of previous hospitalizations, risk factors, and incidence. The result yielded a Cronbach's Alpha coefficient of 0.78, indicating acceptable internal consistency.

STATISTICAL ANALYSIS

All data analyses were conducted using IBM SPSS Statistics (version 23). Descriptive statistics were used to

Table 1. Distribution of Socio-demographic characteristics of case and control groups

Socio-demographic	Control 171, Freq. & (%)	Case 300, Freq. & (%)	Total	p-value
Age in Months (Mean ± SD)	10.90(12.57)	11.81(13.04)	11.48(12.87)	0.463
Sex				
Male	93(54.40)	164(54.70)	257(54.60)	1.000
Female	78(45.60)	136(45.30)	214(45.40)	
Father's educational level				
Doesn't Read And Write	24(14.00)	42(14.00)	66(14.00)	0.000
Read and Write	19(11.10)	78(26.00)	97(20.60)	
Primary School Graduated	16(9.40)	29(9.70)	45(9.60)	
Intermediate School Graduated	19(11.10)	21(7.00)	40(8.50)	
Preparatory School Graduated	43(25.10)	31(10.30)	74(15.70)	
Institute Graduated	44(25.70)	32(10.70)	76(16.10)	
College Graduated	6(3.50)	46(15.30)	52(11.00)	
Post Graduated	0(0.00)	21(7.00)	21(4.50)	
Mother's educational level				
Doesn't Read And Write	38(22.20)	43(14.30)	81(17.20)	0.000
Read and Write	21(12.30)	82(27.30)	103(21.90)	
Primary School Graduated	5(2.90)	12(4.00)	17(3.60)	
Intermediate School Graduated	7(4.10)	21(7.00)	28(5.90)	
Preparatory School Graduated	50(29.20)	27(9.00)	77(16.30)	
Institute Graduated	43(25.10)	49(16.30)	92(19.50)	
College Graduated	7(4.10)	44(14.70)	51(10.80)	
Post Graduated	0(0.00)	22(7.30)	22(4.70)	
Economic status				
Not sufficient	44(25.70)	122(40.70)	166(35.20)	0.000
Somewhat sufficient	0(0.00)	6(2.00)	6(1.30)	
Sufficient	127(74.30)	172(57.30)	299(63.50)	
Residence				
Rural	57(33.30)	90(30.00)	147(31.20)	0.470
Urban	114(66.70)	210(70.00)	324(68.80)	
Child's residence				
With both parents	147(86.00)	251(83.70)	398(84.50)	0.597
With one parent	24(14.00)	49(16.30)	73(15.50)	
Marital status				
Married	140(81.90)	247(82.30)	387(82.20)	0.261
Widowed	4(2.30)	15(5.00)	19(4.00)	
Divorced	27(15.80)	38(12.70)	65(13.80)	
Father's occupational status				
Employee	131(76.60)	130(43.30)	261(55.40)	0.000
Housewife	0(0.00)	3(1.00)	3(0.60)	
Freelance	26(15.20)	98(32.70)	124(26.30)	
Unemployed	14(8.20)	60(20.00)	74(15.70)	
Retired	0(0.00)	9(3.00)	9(1.90)	
Mother's occupational status				
Employee	104(60.80)	124(41.30)	228(48.40)	0.000
Housewife	62(36.30)	123(41.00)	185(39.30)	
Freelance	5(2.90)	42(14.00)	47(10.00)	
Unemployed	0(0.00)	6(2.00)	6(1.30)	
Retired	0(0.00)	5(1.70)	5(1.10)	

Freq. = frequency, %= Percentage

Source: Own materials

Table 2. Distribution of clinical characteristics of case and control groups

Diagnosis	Control (171), (%)	Case (300), (%)	Total	p-value
Pneumonia	0(0.00)	171(57.00)	171(36.30)	
Bronchitis	0(0.00)	41(13.70)	41(8.70)	
Allergy	0(0.00)	13(4.30)	13(2.80)	
Otitis media	0(0.00)	27(9.00)	27(5.70)	
Upper airway obstruction	0(0.00)	1(0.30)	1(0.20)	
Influenza (Flu)	0(0.00)	45(15.00)	45(9.60)	
Laryngitis	0(0.00)	1(0.30)	1(0.20)	
Whooping cough	22(12.90)	1(0.30)	23(4.90)	0.000
Urinary tract infection (UTI)	9(5.30)	0(0.00)	9(1.90)	
Enteritis	60(35.10)	0(0.00)	60(12.70)	
Asthma	40(23.40)	0(0.00)	40(8.50)	
Chickenpox	3(1.80)	0(0.00)	3(0.60)	
Eczema	11(6.40)	0(0.00)	11(2.30)	
Allergy	21(12.30)	0(0.00)	21(4.50)	
Constipation	5(2.90)	0(0.00)	5(1.10)	
Duration of illness (Mean±SD)	15.93(17.52)	14.52(20.54)	15.03(19.54)	0.452
Number of hospitalizations				
1	69(40.40)	119(39.70)	188(39.90)	
2	60(35.10)	119(39.70)	179(38.00)	
3	33(19.30)	37(12.30)	70(14.90)	0.221
4	4(2.30)	13(4.30)	17(3.60)	
5 and above	5(2.90)	12(4.00)	17(3.60)	

% = Percentage
Source: Own materials

summarize demographic and clinical characteristics. The p-values presented throughout the results were computed based on these statistical tests, with $p < 0.05$ considered statistically significant.

RESULTS

The study provides a comprehensive overview of patient characteristics in the context of incidence rate and risk factors for respiratory tract infection. In the control group, participants' ages ranged from 10.9 (12.57%) months, with which as the high percentage for age at 11.81(13.04%) months case group. The control and case both showed a predominant male presence, with 54.70% and 54.40%, respectively. Fathers educational attainment varied, with 25.70% of patients in the control being Institute Graduated, while 26% of the case group had just read and write, while mothers educational achievement varied, with 29.20% of patients in the control being Preparatory School graduated, while 27.20% of the case group had just read and write. In terms of monthly income, 74.30% of individuals in the control group and 57.30% in the case group expressed having sufficient income up to a certain limit. Residency patterns revealed that a significant portion of participants were urban residents in both the control 66.70% and case 70% groups. Regarding child's residency most of study participant living with both parents in both the control 86% and case 83.70% groups. Marital status, most of patients in both the control group 81.90% and the case group 82.30% were married. Fathers' occupational findings highlighted that Employee dominated in both the control 76.60% and case 43.30% groups, while the mother's occupational findings highlighted that Employee dominated in the control 60.80% and Housewife is the dominated in the case 41% groups. These insights into patient demographics provide a nuanced understanding of the population under study, facilitating a more informed interpretation of the impact of gastritis and associated lifestyle modifications within different demographic segments (Table 1).

The study presents a thorough examination of the clinical characteristics of patients within the context of incidence rate and risk factors related to children with respiratory tract infection. Within the case group, 57% diagnosed with Pneumonia, while in the control group,

Table 3. Incidence of risk factors among children under five years in both study and control groups

Indicator	Control 171, Freq. (%)	Case 300, Freq. (%)	All 471, Freq. (%)	p-value
Recent cold or influenza	127(74.3)	193(64.3)	320(67.9)	0.03
Exposure to smoke	129(75.4)	118(39.3)	247(52.4)	0.00
Allergy	132(77.2)	81(27)	213(45.2)	0.00
Low birth weight	11(6.4)	43(14.3)	54(11.5)	0.01
Duration of breastfeeding less than six months	18(10.5)	19(6.30)	37(7.9)	0.11
Large family size	18(10.5)	53(17.7)	71(15.10)	0.04
Early use of antibiotics before six months	65(38)	31(10.3)	96(20.4)	0.00
Asthma	29(17)	95(31.7)	124(26.3)	0.00
Exposure to indoor air pollution	3(1.8)	49(16.3)	52(11)	0.00
Incomplete immunization	3(1.8)	77(25.7)	80(17)	0.00

Freq. = frequency, % = Percentage
Source: Own materials

Table 4. Risk factor affecting of respiratory tract infection for children under five years at hospital

Factor	Odd ratio	95% C.I.		p-value
		Lower	Upper	
Recent cold or influenza	2.94	1.53	5.63	0.00
Exposure to smoke	3.78	2.11	6.78	0.00
Allergy	10.49	5.79	19.01	0.00
Low birth weight	0.30	0.13	0.72	0.01
Duration of breastfeeding less than six months	2.81	1.07	7.41	0.04
Large family size	0.95	0.44	2.08	0.90
Early use of antibiotics before six months	12.58	5.77	27.42	0.00
Asthma	0.80	0.41	1.59	0.53
Exposure to indoor air pollution	0.25	0.07	0.95	0.04
Incomplete immunization	0.19	0.05	0.68	0.01

Source: Own materials

35.10% were diagnosed with enteritis. In terms of the duration of the disease, 57% of patients in the case group were diagnosed with Pneumonia within the 14.52 days' range, mirroring the same duration in the control group at 35.1% were diagnosed with enteritis. Notably, a significant proportion of both the control group 40.40% onetime enters to hospital, and the case group 39.9% one time, 39.9% two-time reported admission to hospital (Table 2).

The findings of the study indicate that the during the initial assessment phase, the control group's patients most responses for the highly risk factors allergy, the second risk factor is exposure to smoke and third risk factor recent cold or influenza, while the assessment phase, the case group's patients most responses for the highly risk factors recent cold or influenza, the second risk factors is exposure to smoke and a little less the and third risk factor (Table 3).

The results reveal the significant risk factors case and control group regarding respiratory tract infection are recent cold or influenza, exposure to smoke, allergy, low birth weight, duration of breastfeeding less than six months, early use of antibiotics before six months, exposure to indoor air pollution, incomplete immunization, underscored by a small effect size observed between the case and control groups η^2=0.00. Conversely, there were no significant differences in this risk factors are large family size and asthma at p= 0.000 (Table 4).

DISCUSSION

The result of the current study is illustrated by the frequency and percentage in the tables that provides a comprehensive overview of patient characteristics in the context of incidence rate and risk factors. In the study group, participants' in the control group, participants' ages ranged from 10.9(12.57%) months, with a which as the high percentage for age at 11.81(13.04%) months case group whose result is agree with [5-7] the results indicate that the study

that mean age of the patients less than 23 weeks. Furthermore, is young children had developing immune systems that are not yet fully mature to fight infections and stopped effectively. This makes them more susceptible to respiratory infections. Anatomically airways in the young children are smaller and more prone to obstruction. This can lead to more severe symptoms and complications from respiratory infections. Also may be more exposed to environmental factors such as secondhand smoke, air pollution, and allergens, which can aggravate respiratory problems. The case and control groups both showed a predominant male presence, with 54.70% and 54.40%, respectively. This result is supported by a several descriptive studies conducted in many different countries [8-11], in this studies that the majority of participant are male. The biological differences between female and Male may have differences in immune system function compared to females. Research suggests that females generally had stronger immune responses, which can provide better protection against infections. These factors, combined with the general vulnerabilities of young children, contribute to the higher incidence of respiratory tract infections in male children below 5 years old. Fathers' educational attainment varied, with 25.70% of patients in the control being primary school graduated, while 26% of the case group had just primary school graduated. This result is supported by a several descriptive studies conducted in many different countries [12-14], while mothers educational achievement varied, with 29.20% of children in the control being preparatory school graduated, while 27.20% of the case group had just preparatory school graduated. This result is supported by [15-18] all this study up there reveal the parents of children had middle school, Parents with higher education generally to be more knowledgeable about dietary needs and healthy eating behaviors, leading to diverse dietary practices, and obviously to be aware of the importance of vaccinations, various examinations, and definitive interventions for health problems, risk factors, and are associated with better health after literacy, and inclusion enables understanding of medical preparedness, chronic conditions, and comprehensive health monitoring, which can create more support and stability. Educated parents emphasize more on the influence that has contributed to the development of creativity, such as reading and educational games, which can control the health of their children. Regarding monthly income, 74.30% of individuals in the control group and 57.30% in the case group expressed having sufficient income. This study supported by [19-22] all this study shows the most parents participant had high level income, a good monthly income significantly impacts children's health through improved access to healthcare, better nutrition, safe living conditions, enhanced educational opportunities, and positive psychosocial factors. Financial stability allows families to provide a healthier and more supportive environment, fostering the overall well-being and development of children, Residency patterns revealed that a significant portion of participants were urban residents in both the control 66.70% and case 70% groups. Regarding child's residency most of study participant living with both parents in both the control 86% and case 83.70% groups. This result is supported by [3, 14, 23] all this study shows the parents and their children live in the urban residential area, being in an urban area brings together the opportunities and challenges of children's health. While urban environments often experience better access to health, health and social care, many also have higher levels of air and noise production, which can lead to organ problems and contribute to the onset of heart disease and other health impairments in children, Sedentary life due to limited space for outdoor activities and dependence on screen-based data pattern. Modern social inequalities, life can take over with a higher level of problems due to noise. This includes safety concerns, which can include the general health of children. These challenges require inclusive urban planning and policies to create healthier living requirements for children. In addition, the delayed time to diagnosis in some cases was likely due to resource limitations in our region, including access to diagnostic testing and specialists. This may have affected the timing of treatment and clinical outcomes. Marital status, the majority of patients in both the control group 81.90% and the case group 82.30% were married. Regarding child's residency most of study participant living with both parents in both the control 86% and case 83.70% groups, this study agrees with [24-27]. Married families often feel a sense of security and stability in the family structure, which contributes to improved emotional and psychological health. A harmonious marital relationship can reduce stress within the family, and creating a more positive environment can have a profound impact on children's health, while a stable marriage can provide emotional, economic, and social benefits that promote better health outcomes, marital conflict and divorce can lead to stress and instability that negatively impacts children's well-being. The key is to foster a supportive and healthy family environment, regardless of marital status, to ensure the best possible health outcomes for children. Fathers' occupational findings highlighted that Employee dominated is employee in both the control 76.60% and case 43.30% groups. Behavior et al., (2022) [9] this study shows most participant are employee, the basic good occupation can be significantly unsafe for children's health through social investment, time availability, exposure to working hazards, and psychological factors. Ensuring alignment between work demands and family needs, healthy work environments, and positive medication supplies can contribute to better health outcomes for children, while the mother's occupational findings highlighted that

Housewife dominated in the control 60.80% and Housewife is the dominated in the case 41% groups. These insights into patient demographics provide a nuanced understanding of the population under study, facilitating a more informed interpretation of the impact of associated incidence rate and risk factors within different demographic segments. This study supported by [28-30] this studies reveal most participant are housewife, The role of a mother, either as a wife or we maintain our interest, which greatly impacts the health of the children in many different ways. Here's a quick look at how mothers influence the health and well-being of their children. They often do not include an essential part of their plans and preparations, which directly affects the eating habits of children. We can know by nutrition that a healthy diet is rich in fruits and whole grains, which is important for healthy growth. Mothers are also responsible for scheduling and attending medical appointments for their children, and ensuring that they receive the necessary vaccinations and medical examinations. The study presents a thorough examination of the clinical characteristics of patients within the context of incidence rate and risk factors related to children with respiratory tract infection. Within the case group, 57% diagnosed with Pneumonia. This study supported by [31-35] this studies reveal that most participant diagnosed with pneumonia, it is one of the most common respiratory tract infections in children under five years of age due to several factors. Understanding these factors can help in addressing and mitigating the risk of pneumonia in young children. Pneumonia is the most common respiratory tract infection in children under five years old due to a combination of factors including their immature immune system, high exposure to pathogens, anatomical and physiological vulnerabilities, environmental and nutritional factors, pre-existing health conditions, and lack of access to adequate healthcare. Addressing these factors through preventive measures such as vaccination, improving living conditions, promoting good nutrition, and ensuring access to healthcare can help reduce the burden of pneumonia in this vulnerable age group, while in the control group, 35.10% were diagnosed with gastroenteritis. This study supported by [36-40] all this studies shows the biggest study participant diagnosed with gastroenteritis. Gastroenteritis is the most common gastrointestinal tract infection in children under five years of age due to several factors. Inadequate access to clean drinking water and poor sanitation facilities can increase the risk of children consuming contaminated water or food, Certain viruses that cause gastroenteritis, such as rotavirus, are more prevalent during winter and early spring. This seasonal peak contributes to higher infection rates among young children during these periods. Gastroenteritis is highly prevalent in children under five years of age due to their immature immune systems, high exposure to pathogens, inadequate hygiene practices, and susceptibility to common viral agents, environmental and nutritional factors, and seasonal variations. Addressing these factors through improved hygiene, better sanitation, vaccination, and proper nutrition can help reduce the incidence and impact of gastroenteritis in this vulnerable age group. In terms of the duration of the disease, 57% of patients in the case group were diagnosed with Pneumonia within the 14.52 days' range, mirroring the same duration in the control group at 35.1% were diagnosed with gastroenteritis. The duration of respiratory tract infections can significantly impact children's health through prolonged symptoms, increased risk of complications, effects on growth and development, educational and social disruptions, family and caregiver burden, and strain on the healthcare system. Addressing these infections promptly and effectively is crucial to minimize their impact and support the overall well-being and development of children. In addition, the delayed time to diagnosis in some cases was likely due to resource limitations in our region, including limited access to diagnostic testing, laboratory infrastructure, and pediatric specialists. These constraints may have affected the timing of treatment and, consequently, the clinical outcomes. Notably, a significant proportion of both the control group 40.40% onetime enters to hospital, and the case group 39.9% one time, 39.9% two-time reported admission to hospital, Readmission for respiratory tract infections can significantly affect children's health by increasing the risk of complications, impacting growth and development, causing emotional and psychological stress, disrupting family dynamics, hindering educational and social progress, and burdening the healthcare system. Effective management of RTIs, including preventive measures, timely treatment, and proper follow-up care, is crucial to minimize these impacts and support the overall health and well-being of children. Discussion of their Tables (3-4) incidence of risk factors among children under five years in both study and control groups. The findings of the study indicate that the during the initial assessment phase, the control group's patients most responses for the highly risk factors allergy, the second risk factor is exposure to smoke and third risk factor recent cold or influenza. while the assessment phase, the case group's patients most responses for the highly risk factors recent cold or influenza, the second risk factors is exposure to smoke and a little less the and third risk factor is. It is important to highlight that there were no statistically considerable differences in risk factors for respiratory tract infection scores between the control and case groups during the initial assessment. This emphasizes the similarity in the baseline understanding between the two groups at the outset of the study. This study supported by [41-44] all this study reveal the most frequent risk factors for respiratory tract infection among children under five years old are exposure to smoke, allergy, low birth weight,

duration of breastfeeding less than six months, early use of antibiotics before six months, exposure to indoor air pollution, incomplete immunization, influenza, Air pollution exposure to smoke from cooking stoves, heating devices, or tobacco smoke can irritate the respiratory tract and increase the risk of infections [45]. Also nitrogen dioxide and sulfur dioxide from vehicle emissions, industrial activities, and other sources can impair lung development and function, leading to respiratory illnesses. Poor nutrition can weaken the immune system, making children more vulnerable to infections and hindering their ability to recover from illnesses. Premature infants often have underdeveloped lungs and Low birth weight and premature babies tend to have a weaker immune system increasing their susceptibility to respiratory illnesses. Children who are around secondhand smoke are more likely to get respiratory infections. Lack of vaccination against common respiratory pathogens, such as influenza, pertussis, and *Haemophilus influenzae* type b (Hib), can leave children vulnerable to severe respiratory infections. Malnourished children may experience stunted growth and development, which can include compromised respiratory health. Finally, multiple risk factors, including environmental, socioeconomic, biological, behavioral, and nutritional factors, can significantly affect the respiratory health of children under five years. Young children's respiratory health must be protected and improved by addressing these risk factors through better access to healthcare, better nutrition, better living conditions, full vaccination, and less exposure to secondhand smoke and pollutants.

CONCLUSIONS

This study underscores the vulnerability of infants under 12 months to respiratory tract infections, particularly pneumonia. Key modifiable risk factors include early antibiotic exposure, environmental smoke, and insufficient immunization. These findings highlight the need for targeted community-level interventions and caregiver education programs to reduce preventable respiratory infections in children.

RECOMMENDATIONS

1. Mass media should utilize to provide health education to increase parents' knowledge and awareness about respiratory tract infection and these risk factors.
2. Booklets containing an explanation and instructions about respiratory tract infection and these risk factors should distribute to parents'.
3. Since nurses continue to care for patients 24 hours daily, health management should be implemented, and nurses' roles in the health education process should be expanded to better inform and educate parents.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

CORRESPONDING AUTHOR

Murtadha Kanim Adea Aljebory
Community Health Nursing in Nursing Department,
University of Warith Al-Anbiyaa; Karbala, Iraq
e-mail: sgahmed1331962@outlook.com

ORCID AND CONTRIBUTIONSHIP

Murtadha Kanim Adea Aljebory: 0009-0006-1063-0331 A E F
Zainab Ali Hussein: 0009-0007-4770-3028 B C D

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis, D – Writing the article, E – Critical review, F – Final approval of the article

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