

# RETROSPECTIVE STUDY OF MULTI-INFECTION AGENTS AMONG CHILDREN ATTENDING TO PEDIATRIC TEACHING HOSPITAL IN THE HOLY CITY OF KARBALA, IRAQ

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## ARTICLE INFO

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## ORIGINAL ARTICLE

### ABSTRACT

**Background:** Globally, infectious diseases continue to be significant contributors to both morbidity and mortality, particularly in nations with limited resources. **Objective:** The present study aimed to identify the most important of multi-Infection causal factors for children admitted to the Children's Teaching Hospital in the holy city of Karbala- Iraq. **Methodology:** A total of 5089 cases (2940 male and 2149 female) children aged between few months to 15 years of age with positive different clinical manifestations checked by specialist physicians. At Al-Hussein Teaching Hospital for Children by a cross- sectional retrospective study during the period from first of January until 1st of May 2024 . The data were gathered by using specific formula sheet.

**Results:** The study shows relationship between gender and pathogenic agents (2888 male than 1826 female) cases  $p=.000$ . Also, 2487 cases under one year, followed by 1871 cases for 1-4 years of age with highly significant difference between age  $p=.000$ . On the other hands, bacteria was the high incidence with p-value was ( $p=.000$ ) between gender. **Conclusion:** There was high significant relationship between age group and gender with the many pathogens causes illness to children, especially bacterial infection from the Pneumonia species. **Key words:** Multi infection, Parasite infection, Pneumonia..

## INTRODUCTION

The global rate of child mortality and morbidity is alarmingly high, with about one percent of children dying every year<sup>1</sup>. In 2018, it was estimated that there were 700 million children under the age of five in the world. An estimated 5.6 million of these children perished globally in 2016<sup>2</sup>. Annually, around 8 million children in underdeveloped nations die before reaching the age of five, with a significant number succumbing within their first year of life. 80% of these fatalities result from newborn ailments, acute respiratory infections (mostly

pneumonia), diarrhea (including dysentery), malaria, or severe malnutrition - or a combination of these factors<sup>3</sup>. The global mortality rate for children under the age of five has decreased by 50% since 1990, dropping from 93 deaths per 1000 live births to 41 deaths per 1000 live births in 2016<sup>4</sup>.

Acute respiratory infections (ARI) provide a challenge to the health systems of developing nations as they are a leading cause of morbidity and death among children under the age of five<sup>5</sup>. Globally, infection of the lower respiratory

tract, such as pneumonia, is one of the main reasons for the death of children globally. It caused about one million fatalities in children under the age of 5 in 2013<sup>6</sup>. Both bacteria and viruses have been identified as the agents of ARI, however, it is known that 90% of these infections have viral origin<sup>7</sup>. The most commonly found viruses in children with ARI include respiratory syncytial virus (RSV), influenza virus types A and B (Flu A and Flu B), adenovirus (ADV), parainfluenza virus (PIV), human metapneumovirus (hMPV), and human rhinovirus/enterovirus (HRV/EV) 6. Bacteria such as *Streptococcus pneumoniae*, *Staphylococcus aureus* and *Klebsiella pneumoniae* are less frequently reported<sup>8</sup>. Moreover, there is a significant variation in the reported rates of virus and bacteria identification, which might be attributed to disparities in the definitions of cases and the diagnostic methods used and the lack of clarity regarding the epidemiology and etiology of ARI persists due to variations in the methods and approaches employed across different studies<sup>9</sup>.

Additional studies have indicated notable reductions in pneumococcal and *Haemophilus influenzae* type b (Hib) illnesses, possibly attributed to the extensive utilization of conjugate vaccinations<sup>10</sup>. *Giardia lamblia* is a significant intestinal protozoan that is found globally and is prevalent in warm and humid regions, global etiology of diarrheal illness in individuals of all ages.

*Giardia lamblia* is a significant concern that contributes to public health issues in many poor nations, as well as many developed nations. Prevalence rates are on the rise in developing nations. The prevalence can range from 20% to 30% in impoverished nations and from 2% to 5% in wealthy nations. *Giardia* outbreaks have been documented on multiple occasions. The most prevalent mode of

infection is through the consumption of contaminated food and drink 11. The current study aimed to distinguish the most important etiological agents to children admitted to the pediatric Teaching Hospital in the holy city of Karbala.

## MATERIAL AND METHODS

**Study design:** Across-sectional retrospective study.

**Settings:** The study was carried out at Al-Hussein Teaching Hospital for Children in Karbala city, Iraq.

**Duration:** From first of January to the first of May 2024.

**Sampling technique:** Convenient sampling technique was utilized to gather the data.

### SAMPLING CRITERIA:

#### Inclusion criteria:

All patients in this study were patients aged between <1 year - ≤ 15 years old.

Divided in to four category <1 year, 1-4, 5-9, 10-14. Patients fulfilling the above criteria and having any of Measles, Typhoid Fever, Meningitis, Pneumonia, Amoebiasis, Giardiasis

#### Exclusion criteria:

Patients with incomplete record.

#### Data collection procedure:

The Research Ethics Committee of the Council of the Technical Institute of Karbala granted all necessary clearances and ethical approvals, then Karbala Health Directorate, and then Human Development Training Center-Unit of Research which provided the researcher with official permission directed to Al-Hussein Teaching Hospital in accordance with document number 7/37/11242, issued January 5, 2023. This study was performed on clinical information of patients extracted from medical records such as age, gender, the type of infection, etc. In addition, the isolates were stored in 15% glycerol and stored at -70°C for further examinations. All microbiological isolates were identified with standard microbiological tests A specific formula sheet was applied in order to collect data from a total of 5089 children (2940 males and 2149 females)

ranging in age from a few months to less than 15 years. These children were suspected to be experiencing diverse clinical symptoms and were assessed by a healthcare professional.

**Data analysis:** The statistical analysis was conducted using SPSS version 24. The test of chi-square was applied to assess the correlation between the variables under investigation gender and age group. P-values  $< 0.05$  were considered statistically significant.

## RESULTS

Table 1: Demographic characteristic among the studied groups are outlined in (Table 1). The most common age group was ( $<1$  year/49.9%) cases, follows by (1-4/36.8%) cases, (5-9/11.9%) cases, and finally (10-14/1.4%) cases. Gender distribution results revealed that the male cases were high percentage versus female (2940 /57.8% male) while ( 2149/42.2% female). Table 2: Reveal the distribution of disease with month of year, the majority of admitted cases was in the 1st quarter of the

year Winter (January, February, March) 3191 cases and the highest incidence of disease was Pneumonia (3091/97%), follow by (39-1.2%) cases of Amoebiasis for the same time, for the 2nd quarter of the year (April, May, June) it's also record for Pneumonia (706-88%) cases in Spring and followed by (59-8%) cases of Amoebiasis for the same season. The table also showed the high incidence of Pneumonia throughout the year followed by Amoebiasis, Giardiasis.

Table 3: Demonstrated that there is a great statistically significant association between variables (age group and gender) in compared with pathogenic agents. For age group found the highest percentages under one year (2487) cases, and the causative agents was bacteria with high significant association p-value  $< 0.05$ . The relationship between gender and pathogenic agents showed the male recorded high number of cases (2888) versus female (1826) cases and the bacteria was the high incidence and p-value was  $< 0.05$ .

**Table 1: Demographic characteristic for studied sample.**

AGE	NO.	%
<1 year	2539	49.9
1-4	1871	36.8
5-9	606	11.9
10-14	73	1.4
Total	5089	100
Gender	NO.	%
Male	2940	57.8
Female	2149	42.2
Total	5089	100

**Table 2: Type of disease and month of year distribution**

Type of disease	Month of year			
	1st quarter (Winter) (January, February, March)	2nd quarter (Spring) (April, May, June)	3rd quarter (Summer) (July, August, September)	4th quarter (Autumn) (October, November, December)
Measles	30 (0.9%)	4 (0.5%)	-	-
Typhoid Fever	7 (0.2%)	-	-	4 (0.4%)
Meningitis	7 (0.2%)	7 (0.9%)	-	3 (0.3%)
Pneumonia	3091 (97%)	706 (88%)	154 (78%)	762 (84%)
Amoebiasis	39 (1.2%)	59 (8%)	34 (17%)	118 (12.3%)
Giardiasis	17 (0.5%)	21 (2.6%)	9 (5%)	26 (3%)
<b>Total</b>	3191	797	197	913

**Table 3: Relationship between pathogenic agents and variables**

Pathogenic agents	Age group				Total	P-Value
	<1 year	1-4	5-9	10-14		
Virus	52 (2%)	0	0	0	52	.000
Bacteria	2487(98%)	1871(100%)	356(59%)	0	4714	
Parasite	0	0	250(41%)	73(100%)	323	
<b>Total</b>	2539	1871	606	73	5089	
Pathogenic agents	Gender		Total	P-Value		
	Male	Female				
Virus	52 (1.77%)	0(0%)	52	.000		
Bacteria	2888 (98.23%)	1826(84.96%)	4714			
Parasite	0 (0%)	323 (15%)	323			
<b>Total</b>	2940	2149	5089			

\*The result is significant at  $p < 0.05$

## DISCUSSION

Children with respiratory illness often have viral-bacterial co-infections, and there is compelling evidence that co-infections lead to more severe acute respiratory illness (ARI) in children compared to single infections<sup>4</sup>. Although the majority of research indicate that prevalence of co-infection between viruses and bacteria range from twenty to fifty percent, there have been instances where rates as high as 66-77% have been found.

The study result revealed a high incidence of admitted cases between the children (5089) cases in Al-Hussani teaching hospital for children in Karbala city. The socio-demographic characteristics of the study population as showed maximum incidence of age as shown in table 1. almost 50 percentage - 2539 of studied cases was under one year of age, Children under one year old can get ill due to various factors, including infections, malnutrition, the result of this study was correspond with many various study such as study conducted in South Africa found that malnutrition is a significant risk factor for ill health among children under 5 years of age<sup>12</sup>. Additionally a study done in Karbala city found bacteremia cases were most prevalent (63.1%) among infants aged 0-1 month<sup>13</sup>. The increased vulnerability of neonates to bacteremia may be attributed to their underdeveloped humoral, phagocytic, and cellular immunity<sup>14</sup>. In addition, previous investigations have indicated that children in this age group are particularly susceptible to get ill, particularly in the urinary tract infections and respiratory tracts, which can result in secondary illnesses such as bacteremia<sup>15</sup>. The gender distribution study revealed a notable increase in infection rates among males. Similar findings have been observed in other research conducted in Iraq<sup>16</sup>. The study revealed that the rate of infection in

males exceeded that of females. For all pathogens, an imbalance that can be related to physiological variances between genders.

According to the results of table 2 showed type of disease and month of year as determined by analysis of distribution, considerably greater proportions of infection were identified among children attending to pediatric teaching hospital specially in first quarter of the year in Winter season (January, February, March) and the incidence was 3191/63% cases out of 5089 cases totally, and the most frequent infection disease was Pneumonia and Amoebiasis (3091/97%-39/1.2%) out of 3191 cases respectively in winter season. It is noticeable in the spring season (April, May, June) an increase in the incidence of pneumonia and Amoebiasis (706/88% - 59/8%) out of total 797 cases. It's also seen a slight decrease in the incidence of infection of pneumonia in summer season 154/78% out of total cases 197/ 3.5% out of 5089 and increase in the number of infection with Amoebiasis 34/17% out of 197 cases. The infection rise again in autumn season and the incidence of infection was high for pneumonia 762/84% out of total 913/17% out of total 5089 cases versus 118/12.3% cases out of 913 cases for Amoebiasis. The present study shows positive correlated with a study conducted in China indicated that MP and RSV were the primary pathogens associated with pneumonia, and it revealed that infection rates were higher among males compared to females<sup>17</sup>. Thus, several studies indicate that the occurrence of MP and RSV infections varies across different geographical regions and seasons, primarily due to alterations in environmental factors such as temperature, relative humidity, and rainfall. Our results correspond with a study conducted in Queensland, Australia, indicating that the



influence of temperature on children pneumonia may primarily stem from its impact on the causative microorganisms. Current scientific evidence indicates that low temperatures are linked to the occurrence of Respiratory syncytial virus (RSV) and Streptococcus Pneumonia. On the other hand, high temperatures may enhance the reproduction and longevity of Mycoplasma Pneumonia<sup>18</sup>.

Likewise, a higher prevalence of parasitic infections during the cold season compared to the hot season among the study sample, our results contradict previous studies conducted in Jordan and Iraq, which reported a higher incidence of Entamoeba histolytica infections during the spring and summer months compared to the autumn and winter. This discrepancy may be attributed to various factors, including poor sanitation, which is known to be associated with intestinal parasitic infections among children, contaminated water sources, and low socioeconomic status<sup>19</sup>. Current study established a robust correlation between age groups and causative agents. Our findings align positively with the data outlined in table (3), indicating that bacterial infections in the gastrointestinal tract ranked highest in prevalence, followed by bacteremia, urinary tract infection, and respiratory tract infection. These results may reflect the reality that gastrointestinal tract infections contribute significantly to mortality among younger individuals<sup>20</sup>.

Finally, the distribution of gender analysis, found a high significantly infection rates were observed among children males. Our results are consistent with a study conducted in Erbil/Iraq, which also reported higher infection rates among males across all pathogens. This disparity was attributed to physiological

differences between genders, with the higher number of male patients often attributed to increased exposure to the external environment from a young age, as dictated by societal norms<sup>21</sup>.

## CONCLUSION:

Majority of children between aged (<1 year to 5 years) are more susceptible to infection with many pathogens and the study conclude that the high significant relationship between age group and gender with the many pathogens causes illness to children, especially bacterial infection from the Pneumonia species.

## AUTHOR'S CONTRIBUTION

**AK:** Data Collection, Review analyst,

**BJ:** Literature review,

**MN:** Statistical analyst and Interpretation of data

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