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Factors associated with acute respiratory tract infection in children under five years old in Diyala governorate, Iraq.

Submitted to the Council of the College of Medicine, Diyala University, In Partial Fulfillment of Requirements for the Bachelor Degree in medicine and general surgery.

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Abstract

Acute respiratory infections (ARIs) are a major cause of morbidity and mortality worldwide. Each year, about 1.3 million children under 5 years die from acute respiratory infections worldwide. ARI constitute one third of the deaths in under five in low-income countries. Acute respiratory infections include both upper and lower respiratory tract infections, with the common cold and influenza being the most common ARIs.

Aim of study: To identify the factors associated with acute respiratory tract infection in under five years old children in Diyala governorate, Iraq.

Patients and methods: This is a case-control study. It was conducted in the period from July 2022 to January 2023. We collected 100 patients with acute respiratory tract infection and 50 patients without acute respiratory tract infection as control. Samples were collected from the patients who attend Al-Batool teaching hospital. Information about gender, parents age, weight, mode of feeding and other factors. were taken using prepared written questionnaire and by direct interview with the mothers of the patients.

Results: The mean age of the study group was 16.17 months with lower limit of 1 month and upper limit of 60 months and their mean weight was 9.58 kilograms. 66% of them were males and 34% were females. There were statically significant association between ARI and the educational state, economical state and the crowding index ($P < 0.05$).

Conclusion: we concluded that the low socioeconomic state, the overcrowding, the maternal education can be considered significant risk factors for ARI in our study.

Introduction

Acute respiratory infections (ARIs) are a major cause of morbidity and mortality worldwide. Each year, about 1.3 million children under 5 years die from acute respiratory infections worldwide. ARI constitute one third of the deaths in under five in low-income countries [1]. The World Health Organization (WHO) estimates that respiratory infections account for 6% of the total global burden of disease; this is a higher percentage compared with the burden of diarrheal disease, cancer, human immunodeficiency virus (HIV) infection, ischemic heart disease or malaria [2].

About 90% of ARI deaths are due to pneumonia which is usually bacterial in origin. The incidence of pneumonia in developed countries may be as low as 3-4%, whereas in developing countries range between 20-30%. The difference is due to high prevalence of malnutrition, low birth weight and indoor air pollution in developing countries [3].

Acute respiratory infections include both upper and lower respiratory tract infections, with the common cold and influenza being the most common ARIs. Symptoms of ARI consist of short, rapid breathing, or difficulty breathing that is chest related. Pneumonia is a presentation of ARI and is solely responsible for 15% of global childhood deaths across the world. Symptoms presented with pneumonia include fast breathing and chest indrawing [4]. The Global Burden of Disease (2019) study reports that lower respiratory tract infections are the second highest cause of burden in children [5]. As of 2015, pneumonia kills 0.9 million children under five every year and is responsible for 15% of under-five deaths in South Asia [6].

Infants have the highest risk of pneumonia in their first three months of life. Nearly 70-75% of all deaths in infants are due to pneumonia. In both developing and developed countries, children of smokers exposed to passive smoking are more susceptible to pneumonia than those not exposed to cigarette smoke. Indoor air pollution is also strongly suspected of being an important contributor to ARI child death [7]. Victora added a few socio-economic causes (particularly low income, parental low educational levels and place of residence), demographic (age, birth spacing and gender of child), nutritional and behavioral (including low birth weight, malnutrition, and lack of breast-feeding), and environmental (overcrowding, biomass-burning stoves) factors as the risk factors. Boys are more likely to suffer than girls, and infants are more vulnerable to suffer from ARI compared to toddler and child who may have the chance to build up some natural immunity [8]. This study aimed to identify the factors associated with acute respiratory tract infection in under five years old children in Diyala governorate, Iraq.

Patients and methods

This is a case-control study. It was conducted in the period from July 2022 to January 2023. We collected 100 patients with ARI and 50 patients without ARI as a control. Samples were collected from the patients who attend Al-Batool teaching hospital. Information about age, gender, weight, mode of feeding, immunization, parents age, maternal educational status, socio-economic state and crowding index were taken by using prepared written questionnaire and by direct interview with the mothers of the patients. We preserved the privacy and we coded the patients for the reasons of confidentiality and risk of bias.

SPSS Version 25 was used for the description of the data and to calculate the odd ratio. We expressed the quantitative data by arithmetic mean, standard deviation and mode and the qualitative data by frequencies. Chi square was used to identify the association between the variables when P value less than 0.05 considered significant.

Results

The mean age of the study group was 16.17 months with lower limit of 1 month and upper limit of 60 months and their mean weight was 9.58 kilograms. 66% of them were males and 34% were females, while the mean age of the control group was 15. Months. as shown in table (1)

Table(1): Gender of study group

		Male	Female	Total
Cases	No.	72	27	100
	%	72	27	100.0
Controls	No.	28	23	51
	%	54	46	100.0
Total	No.	100	50	150
	%	66.7	33.3	100.0

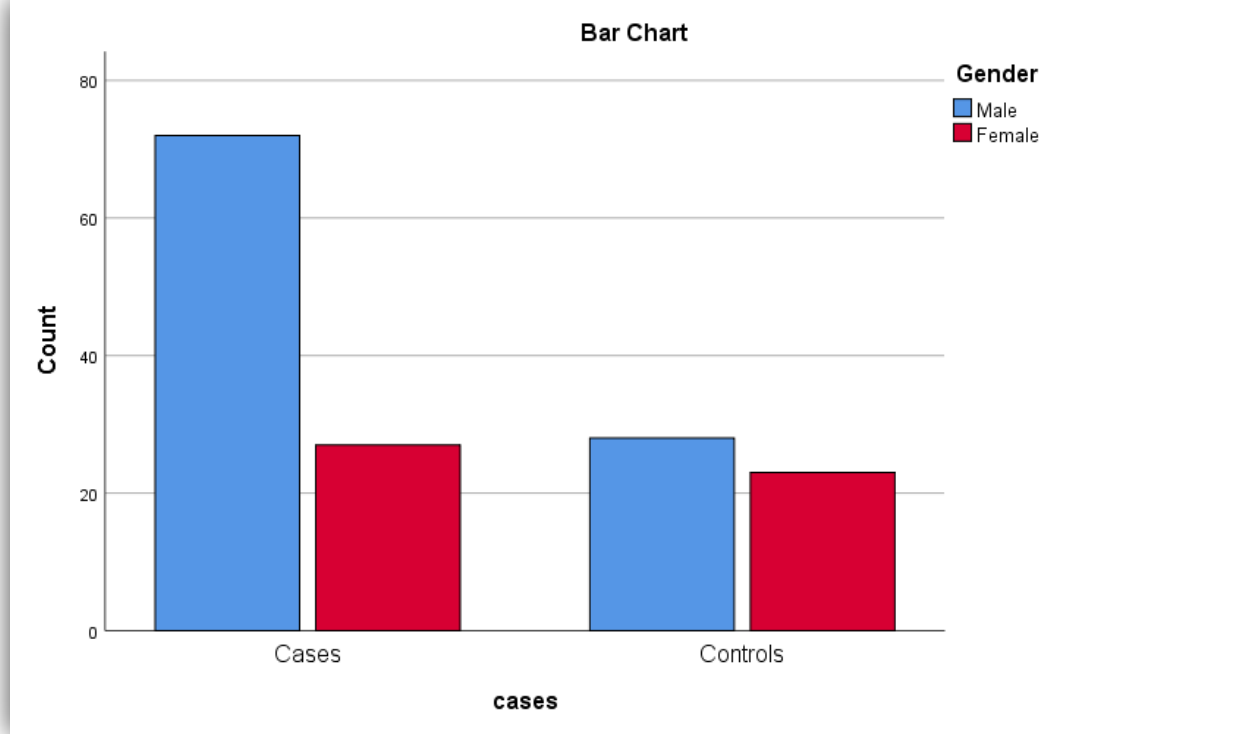

Figure (1): gender distribution in the study.

This study revealed that the percentage of children with breast feeding in study group was 19%, with bottle feeding was 61% and with mixed feeding was 20% With statistically insignificant relation when compared with control group ($P > 0.05$) as shown in table (2).

Table (2): Type of feeding in study group

Study groups		Mode of feeding: Breastfeeding	Bottle feeding	Mixed feeding	Total	Sig
Cases	No.	19	61	20	100	
	%	19.0	61.0	20.0	100.0	
Controls	No.	8	34	8	50	P = 0.540
	%	16.0	68.0	16.0	100.0	
Total	No.	27	95	28	150	
	%	18.0	63.3	18.7	100.0	

This study showed that the percentage of children with complete immunization in study group was 50.0%, with partial immunization was 40.0% and nill immunization was 10.0% with statistically insignificant relation when compared with control group (P>0.05) as shown in table (3)

Table (3): Immunization status in study group

Study groups		Immunization status: Complete	Partial	Nill	Total
Cases	No.	50	40	10	100
	%	50.0	40.0	10.0	100.0
Controls	No.	33	14	3	50
	%	66.0	28.0	6.0	100.0
Total	No.	83	54	13	150
	%	55.3%	36.0%	8.7%	100.0%

this study was also found that the percentage of ARI in children associated with diarrhea was 44.0% and the percentage of ARI in children not associated with

diarrhea was 56.0% with statistically insignificant relation when compared with control group (P>0.05) as shown in table (4)

Table (4): Association of diarrhea in study group

Study groups		Diarrhea Yes	Diarrhea No	Total
Cases	No.	44	56	100
	%	44.0	56.0	100.0
Controls	No.	29	21	50
	%	58.0	42.0	100.0
Total	No.	73	77	150
	%	48.7	51.3	100.0

This study also revealed that the percentage of ARI among children with illiterate mothers was 11.0%, those whose mothers read and write was 2.0%, with primary school mothers was 54.0%, with secondary school mothers was 27.0% and with high graduate mothers was 6.0% there was significant difference between the risk of ARI among the children with low educated mothers especially the illiterates as shown in table(5).

Table (5): Maternal educational status of the study group

Study groups		Educational status of the mother: Illiterate	read and write	Primary	Secondary	High graduate	Total	Sig.
Cases	No.	11	2	54	27	6	100	
	%	11.0	2.0	54.0	27.0	6.0	100.0	P < 0.001
Controls	No.	1	2	19	14	14	50	
	%	2.0	4.0	38.0	28.0	28.0	100.0	
Total	No.	12	4	73	41	20	150	
	%	8.0	2.7	48.7	27.3	13.3	100.0	

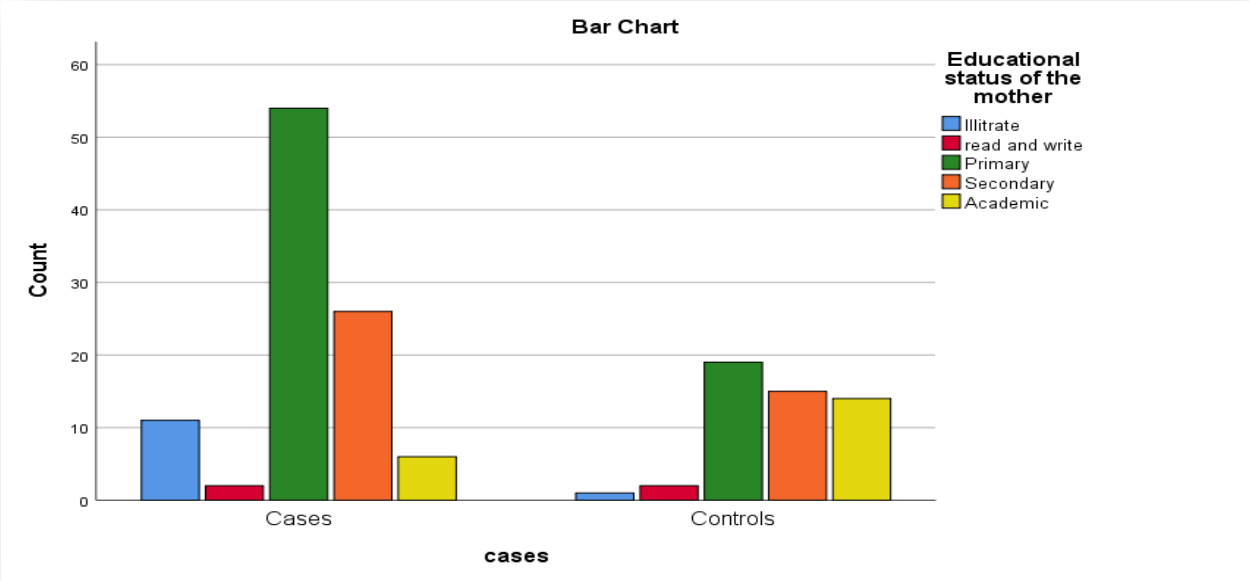

Figure (2): maternal educational state

This study also indicated that the percentage of ARI in children living in urban areas was 48.5% and for those living in rural areas was 51.5%. this result was statistically insignificant(P> 0.091) as shown in table (6).

Table (6): Residency in study group

Study groups		Residency			Sig.
		Urban	Rural	Total	
Cases	No.	48	51	99	P < 0.091
	%	48.5	51.5	100.0	
Controls	No.	32	19	51	
	%	62.7	37.3	100.0	
Total	No.	80	70	150	
	%	53.3	46.7	100.0	

This study also showed that the percentage of ARI in children whose mothers are housewives was 94%, for those whose mothers are students 3.0% and those whose mothers are employees was 3% this result was statistically insignificant (P> 0.05) as shown in table (7)

Table (7): Maternal occupations in study group

Study groups		Occupation of mother			
		Housewife	Employee	Student	Total
Cases	No.	94	3	3	100
	%	94	3	3.0	100.0
Controls	No.	40	8	2	50
	%	80	16	4	100.0
Total	No.	134	11	5	150
	%	89.3	7.3	3.3	100.0

This study also revealed that the percentage of children with ARI those living in poor economic state was 28.0%, those living in middle economic state was 72.0% and the percentage of children with ARI those living in good economic state was 0.0% which represent a statistically significant difference between the risk of ARI and poor economic state (P<0.05) as shown in table (8)

Table (8): Economical state in study group

Study groups		Economic status				Sig.
		Poor	Middle	Good	Total	
Cases	No.	28	72	0	100	P = 0.002
	%	28.0	72.0	0.0	100.0	
Controls	No.	7	41	2	50	
	%	14.0	82.0	4.0	100.0	
Total	No.	35	113	2	150	
	%	23.3	75.3	1.3	100.0	

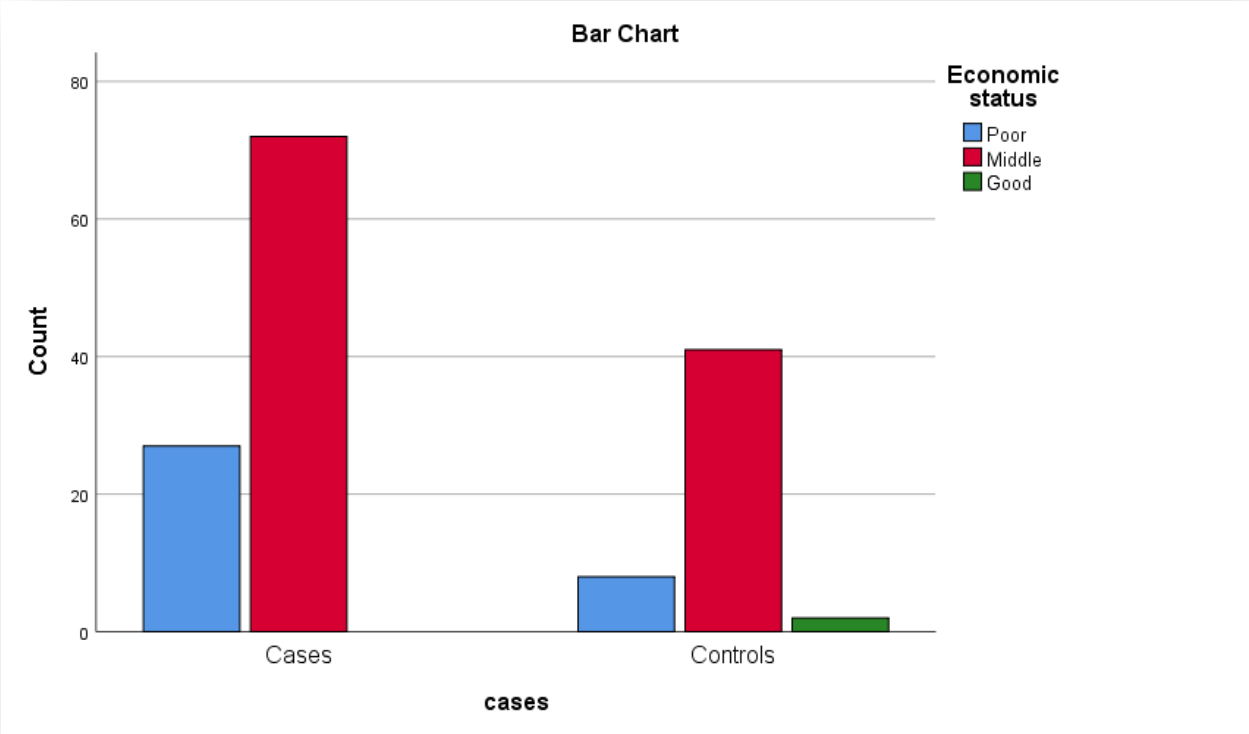

Figure (3): socioeconomic status.

This study indicated that the percentage of ARI in children those living in crowded houses(two people or more in one room) was 76% and the percentage of ARI in children those living in normal houses(less than two people in the same room) was 24% there was statistically significant difference between crowding index and risk of ARI ($P<0.05$) as shown in table (9)

Table (9): crowding index in study group

case/control	Crowding index: Crowded (2 people in one room or more)	Crowding index: Normal (less the 2 People in the same room)	Total	Sig.
Cases	76 (76%)	24 (24%)	100	P < 0.05
Controls	29 (58%)	21 (42)	50	
Total	105	45	150	

Discussion

This study aimed to determine the relation of ARIs and identifying some related risk factors in children under 5 years attending Al-Batool teaching hospital in Diyala governorate, Iraq.

This study revealed that there was a statistically significant relationship between low maternal educational state, low socioeconomic state and overcrowding with incidence of ARI (P<0.05).there was also an increase incidence of ARI associated with urban residency, bottle feeding and lack of immunization but without significant statistical difference.

Low socioeconomic class is associated with increased risk of ARI, due to less annual income of the family compared to the number of living family members and inadequacy of benefits of health care facility. Our study shows that majority of cases belonged to the low socioeconomic group 28% compared to 14% in control group, low socioeconomic class being significantly ($p < 0.0001$) associated with ARI and this consistent with the findings of Berman et al [9]

Overcrowding also proves to be a significant risk factor, resulting in high risk of acquisition of ARI in children. Study done by Savitha et al. [10] showed

slightly more cases associated with ARI, 91.35% and 80.87%, respectively. Our study found that 76% of cases with history of overcrowding in family had a high risk of ARI compared to the control group 58%.

A significant association was found between maternal literacy status and ARI ($p < 0.01$) but not with father's literacy ($p > 0.05$). Victora et al. [11] revealed risk of pneumonia declined with education of parents. Usually father remains outside for job most of the times but mother is always in the home taking care of children and household activities. Mother due to her close association with child recognizes the minor changes in child's health than father. Because of such factors mother's literacy might play important role in child's disease than father's literacy [11].

Feeding pattern (exclusive breast-feeding, bottle feeding or mixed feeding) was not statistically significant in relation to ARI ($P>0.05$) even when plotted in two categories (exclusive breastfeeding versus other feeding patterns) it was possible that the number of cases in this study was not sufficient. This in agreement with previous study in Iraq by Albargish and Hasony [12] in which breastfeeding had no clear protective effect against ARI, whereas Arifeen et al. compared exclusive breastfeeding in first few months of life with partial or no breastfeeding and its effect on ARI as mortality rate increase by 2.23 fold in those with no exclusive breastfeeding [13].

This study concluded that ARIs are affected by socioeconomic status, low maternal educational state and the crowding index.

This study recommends improving the socioeconomic status of the families, promotion of the maternal educational status and improving housing condition, as well as doing other studies in this aspect.

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