

PREVALENCE AND RISK FACTORS OF RESPIRATORY TRACT INFECTION IN UNDER FIVE YEAR MALNOURISHED CHILDREN AT DISTRICT HEADQUARTER HOSPITAL, DISTRICT SHANGLA

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ABSTRACT

Objectives: To determine the frequency and the risk factors associated with respiratory tract infection (RTI) in under five year malnourished children.

Materials and Methods: A total of 203 malnourished children of less than 5 years of age and resident of district Shangla were included. Malnourished children with congenital cardiac diseases, any metabolic disorders and non-cooperative attitude of the parents were excluded. Demographics and risk factors about RTI were recorded from each participant. The association of each risk factor for RTI was assessed using Chi-square test. Logistic regression was run for the significant risk factors.

Results: The mean age of the participants was 18.55 ± 13.535 months. The males were 108 (53.2%). All socio-demographic factors were not statistically associated with RTI. Among the clinical factors for RTI only significant association was found with consultant clinician ($P=0.002$). Among the environmental factors for RTI the significant association was found for history of allergy in parents ($P=0.024$) and sibling affected by RTI ($P<0.001$). RTI was more in common in children whose siblings were affected by RTI ($n=100$, 87.75%).

Conclusion: The prevalence of RTI is quiet higher among malnourished children. The statistically significant risk factors associated with RTI among malnourished children are non-qualified clinician, sibling affected by RTI, and history of allergy in parents.

Key words: Respiratory tract infection, malnourished children, under five years children, district Shangla

INTRODUCTION

Respiratory tract infections (RTIs) can be classified into upper and lower respiratory tract infection^{1,2}. Rhinitis, sinusitis, pharyngitis, epiglottitis, tonsillitis, and nasopharyngitis etc are infectious diseases of upper respiratory tract. The infectious diseases of lower respiratory tract includes pneumonia, bronchitis, bronchiolitis, tracheitis and tuberculosis etc³.

Malnutrition is the term used for deficiencies or imbalances in personal intake of energy and/or nutrients. In the developing countries, malnutrition among under five years children remained a leading public health problem^{4,5}.

RTIs are the commonest cause of morbidities and mortalities among under five years malnourished children leading to more than 900,000 deaths each year⁶. Indian research on acute RTI among under-five years children reported that lower RTI was 8% and upper RTI was 19.25%.² The recent investigation conducted by Henok Dagne et al. in Ethiopia on prevalence of RTI among 422 under five

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years children and 27.3% prevalence⁷. Another study reported that the frequency of RTI was 8.3% among these age children⁶.

Risk factors for RTI in malnourished under five year children are socio-demographic, environmental and clinical. The risk factors which end with death among under five children affected with respiratory infection are HIV infection, preterm birth acute malnutrition and household over-crowding⁸⁻¹⁰. Similarly, among under five children, there are demographic, socio- cultural, and environmental risk factors for RTIs^{11,12}. Koirala et al.¹³ reported that environmental and social factors are associated with respiratory tract infection in under five year children. Another study conducted in Cameroon, Africa on risk factors of respiratory tract infection among under five years children showed that overall frequency of RTI was 54.7%¹¹. The frequency of acute respiratory tract infection among children aged 2 months to 5 years in Pakistan population was reported to be 44%¹⁴.

Many investigations have been conducted on frequency and risk factors for respiratory tract infection among under five year children^{7,11,15}. RTI is lethal disease in children of less than five years age. Conceptually the RTI is more severe and prevalent among malnourished children. To our knowledge no study was traced on the frequency and risk factors for respiratory tract infection among under five years malnourished children. Additionally there is no previous study on district Shangla, KP.

The objective of this study was to determine the frequency and risk factors associated with RTI in under five years malnourished children reporting to district headquarter hospital (DHQ), Shangla.

MATERIALS AND METHODS

This cross sectional descriptive study was conducted at DHQ, district Shangla, KPK from January 2021 to September 2021 on 203 malnourished having less than 5 years age. The participants were selected by non-probability consecutive technique. sample size was 183 using WHO calculator at 95 % confidence interval and at 4% margin of error and using the frequency of 8.3% of respiratory infection. The among under five year children from previous study.⁵ The sample was increased to 203 by adding 10% for design effect.

Verbal informed consent was obtained from all

parents of the participants. Permission from Medical Superintendent of DHQ Hospital Shangla was taken. Malnourished children under five years of age and resident of district Shangla (on basis parent NIC) were included. Malnourished children with congenital cardiac diseases, any metabolic disorders by history and previous record, and non-cooperative attitude of the parents were excluded. Parents of children fulfilling the inclusion criteria were invited to take part in the study.

Data were collected in the form of closed ended questions. Malnutrition was defined as very low weight for height i.e. less than 3 median Z- scores of WHO growth charts(attached), visibly severe wasting, or nutritional edema.¹⁶ By putting weight(kg) and height (cm) of a given child in a standard WHO chart and reading Z score directly. RTI was both diagnosed clinically and on chest X-ray examination by a medical specialist. The clinical parameters were child having cough from more than one day, fever, equal to or greater than 100°F, breathing difficulty(unable to breath normally), flue, wheezes, bronchi or other abnormal breathing sounds on clinical auscultation. Factors for RTI were socio-demographics, environmental and clinical. Socio-demographic factors were child's age (months), gender, birth weight, parental age, and parental educational level. The environmental factors were family size, financial status of parents, sibling affected by RTI, passive smoking, status of residence (own or rented), use of diaper, regular changing of diaper, parental habit of regular hand washing, and child sharing beds with other under 5 years children. The clinical factors are vaccination (for polio and influenza), breast feeding, any other co-morbid disease, regular medical checkup, and history of allergy to parents, consultant clinician (qualified doctor, dispenser, or medical technician). These were asked through history from parents and checking record available with parents.

The data were analyzed using SPSS version 22.0. Mean and standard deviation were calculated for quantitative variables like age (months), weight, and height of children. Frequency and percentages were computed for qualitative variables like gender, frequency of RTI and its possible risk factors. The association of each categorical risk factor for RTI was assessed using Chi-square test/fisher exact. Risk factors demonstrating significant association at $P < 0.05$ was entered into binary logistic regres-

sion model using categorical risk factors as an independent variable and RTI as dependent variable to control for confounding. $P < 0.05$ was considered significant.

RESULT

The mean age of the participants was 18.55 ± 13.535 months with range from 1 to 55 months. The mean father and mother age were 41.98 ± 10.01 years and 38.99 ± 10.01 years respectively. Mean years of education of father was 8.21 ± 4.116 years while of mother was 2.22 ± 3.429 years. The family size ranged from 3 to 14 members. The most common age group was upto 6 months ($n=50$, 24.63%) followed by 6-12 months ($n=44$, 21.67%) then 13-24 months ($n=56$, 27.59%). The least number of children belonged to age group 49-55 months ($n=3$, 1.48%). Out of 203 children 114(56.16%) had respiratory tract infection as shown in Figure 1.

The males were 108(53.2%) and females were 95(46.8%). Less than 2500gm birth weight and stunted height was found in 117(57.6%). In both parents less than 50 years of age was present in 179(88.2%). Most of the fathers were illiterate ($n=80$, 39.4%) followed by matric level of education ($n=64$, 31.5%). Father with primary level were 25(12.3%) and higher education were 34(16.7%). Most of the mothers were illiterate ($n=100$, 49.2%) followed by matric ($n=44$, 21.7%). Most common category of family size was 6-10 ($n=138$, 68%) followed by 3-5 ($n=60$, 29.6%) and least was 3-5 ($n=5$, 2.5%). The use of diaper was found in 17(8.3%) and regular change of diaper was found in 16(7.9%).

Clinical factors for RTI in malnourished children show that all cases were vaccinated for polio. Only 2(1%) children were vaccinated for influenza. Other comorbidities were found in 9(4.4%) children. Most of participants were receiving medical treatment from medical technician ($n=75$, 36.9%)

Table 1: Association of socio-demographic factors for RTI among malnourished children

Socio-demographic Factors		RTI		P-Value*
		Yes	No	
		n(%)	n(%)	
Gender	Male	61(53.5)	47(52.8)	.921
	Female	53(46.5)	42(47.2)	
Birth weight	<2500g	67(58.8)	50(56.2)	.711
	>2500g	47(41.2)	39(43.8)	
Height	Stunted	65(57)	52(58.4)	.840
	Normal	49(43)	37(41.6)	
Father age	<50 years	99(86.8)	80(89.9)	.505
	>50 years	15(13.2)	9(10.1)	
Mother age	<50 years	99(86.8)	80(89.9)	.505
	>50 years	15(13.2)	9(10.1)	
Father education	Nil	41(36)	39(43.8)	.105
	Primary	18(15.8)	7(7.9)	
	Matric	32(28.1)	32(36)	
	Higher education	23(20.2)	11(12.4)	
Mother education	Nil	55(48.2)	45(50.6)	.725
	Primary	21(18.4)	13(14.6)	
	Matric	26(22.8)	18(20.2)	
	Higher education	12(10.5)	13(14.6)	
use of diaper	No	105(92.1)	81(91)	.078
	Yes	9(7.9)	8(9)	
Regular change of diaper	Nil	106(92.3)	81(91)	.56
	Yes	8(7)	8(9)	

*Chi-square test/Fisher exact

followed by dispenser (n=69, 34%). Only 59(29.1%) were under the care of qualified doctor.

Environmental factors for RTI among malnourished children shows that most common monthly income was 20,000 per month (n=48, 23.6%) and less than 15000 per month (n=49, 24.1%). In 49.3% cases siblings were also affected by RTI. Passive smoking was found in 11.3% children. Breast feeding was present in 146(71.9%) cases. History of allergy in children parents was present in 20(9.9%). Most of the parents were residing in their own houses (n=139, 68.5%). Regular hand washing was present in one third parents (n=67, 33%). Habits of sharing beds with other kids were present in 76(37.4%).

All socio-demographic factors i.e. gender (P=.921), birth weight (P=.711), height (P=.840), father's age (P=.505), mother's age(P=.505), father's education(P=.105), mother's education (P=.725), use of diaper(P=.725) and regular change of diaper(P=.078) were not statistically associated with RTI among malnourished under five years children. (Table 1)

Among the clinical factors for RTI in malnourished children only significant association was found with consultant clinician (P=.002). RTI was more common in cases who received treatment from dispenser (41.2%). The details are given in table 2.

Among the environmental factors for RTI in malnourished children significant association was found for history of allergy in parents (P=0.024) and

sibling affected by RTI (P<0.001). RTI was more in children whose siblings were affected by RTI (n=100, 87.75). (Table 3)

In 84.9% the variation in RTI is explained by the consultant clinician, sibling affected by RTI, and history of allergy in parents. The odds of RTI is 4.4 times higher in cases receiving treatment from dispenser as compared qualified doctors (OR=4.400; 95% CI=1.834, 23.225). The odds of RTI was 8.14 higher in cases whose siblings were affected by RTI (OR=8.143 95% CI =4.9, 13.3). (Table 4)

DISCUSSION

This study was aimed to determine the frequency and assess the factors associated of RTI in malnourished children of less than 5 years age visiting to

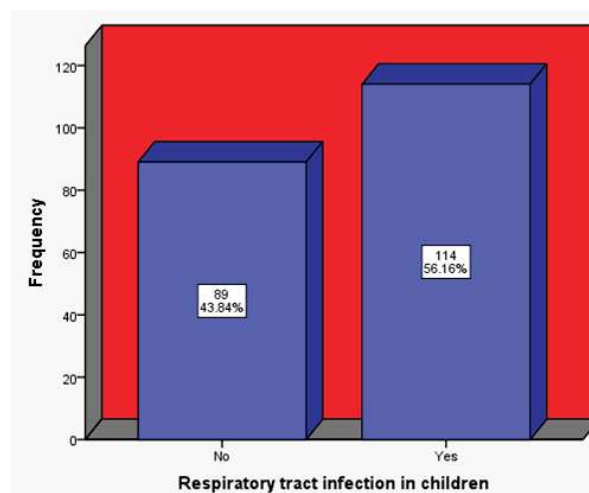


Fig 1: Frequency of RTI in children

Table 2: Association of clinical factors for respiratory tract infection in malnourished children

Socio-demographic Factors		RTI		P-Value*
		Yes	No	
		n(%)	n(%)	
Vaccinated for polio	No	0(0)	0(0)	-
	Yes	114(100)	89(100)	
Vaccinated for influenza	No	112(98.2)	89(100)	.209
	Yes	2(1.8)	0(0)	
Other comorbidities	No	110(96.5)	84(94.4)	.469
	Yes	4(3.5)	5(5.6)	
Regular visit to Doctor	No	58(50.9)	45(50.6)	.964
	Yes	56(49.1)	44(49.4)	
Consultant clinician	Qualified doctor	37(32.5)	22(24.7)	.002
	Medical Technician	30(26.3)	45(50.6)	
	Dispenser	47(41.2)	22(24.7)	

*Chi-square test

DHQ hospital, Shangla. Our findings showed that 114(56.16%) had RTI. Three factors were statistically with occurrence of respiratory tract infection which was consultant clinician, sibling affected by RTI, and history of allergy in parents.

Respiratory tract infection in children is not restricted to the respiratory tract only but is associated with systemic clinical signs and symptoms due to probable spread of infection or bacterial toxins, inflammatory mediators, and decreased lung function¹⁷.

Our study showed that frequency of RTI among under five malnourished children was 56.16%. To our knowledge no study has been conducted on malnourished children. However many studies have been conducted on RTI among under five years children.

An Indian study reported that lower RTIs was 8% and upper RTIs was 19.25% among under-five years children². Another study performed by Henok Dagne et al. in Ethiopia on prevalence of RTI on 422 under five years children and found 27.3% prevalence⁷. Another study reported that the frequency of RTI was 8.3%⁶.

Our result showed that none of the socio-demographic factors were not statistically significant associated with RTI in malnourished children. Three factors were statistically with occurrence of respiratory tract infection which was consultant clinician, sibling affected by RTI, and history of allergy in parents. Our results revealed that cases treated by dispensers and non-qualified doctors have more common RTI than treated by qualified doctors. This can

Table 3: Association of environmental factors for respiratory tract infection among malnourished children

Socio-demographic Factors		RTI		P-Value*
		No	Yes	
		n(%)	n(%)	
Monthly income	<15000	26(22.8)	22(24.7)	.289
	15000	23(20.2)	14(15.7)	
	20,000	27(23.7)	22(24.7)	
	30,000	23(20.2)	11(12.4)	
	>30,000	15(13.2)	20(22.5)	
Sibling affected by RTI	No	14(12.3)	89(100)	<0.001
	Yes	100(87.7)	0(0)	
Passive smoking	No	104(91.2)	76(85.4)	.193
	Yes	10(8.8)	13(14.6)	
Breast feeding	No	34(29.8)	23(25.8)	.531
	Yes	80(70.2)	66(74.2)	
History of allergy in parents	No	98(86)	85(95.5)	.024
	Yes	16(14)	4(4.5)	
House of parents	Rented	39(34.2)	25(28.1)	.352
	Own	75(65.8)	64(71.9)	
Habit of parents washing hands	No	81(71.1)	55(61.8)	.164
	Yes	33(28.9)	34(38.2)	
Habit of sharing beds with other kid	No	73(64)	54(60.7)	.623
	Yes	41(36)	35(39.3)	

*Chi-square test

Table 4: Multivariate analysis for significantly associated risk factors for RTI among malnourished children

	P-Value	Odds ratio	95% CI for OR	R2
Medical technician	.980	1.023	.174, 6.028	0.849
Dispenser	.041	4.400	1.834, 23.225	
Sibling affected by RTI	<0.001	8.143	4.9, 13.3	
History of allergy in parents	.024	3.469	1.11, 10.77	

be due to maltreatment by quacks because inadequate diagnosis and undue prescription of antibiotics which can create antibiotics resistance¹⁸. Another risk factor which has significant association with RTI among malnourished children in our study was the presence of RTI in siblings. RTI is an infectious disease mostly due to viral etiology and easily transmissible from one person to other¹⁹. In district Shangla in most instances there are joint family systems. Children are mostly in intimate contact with siblings so there is higher chance of transmission of these aerosol born infections.

Many studies have reported about risk factors for RTI among children in literature. The risk factors which end with death among under five children affected with respiratory infection are HIV infection, preterm birth acute malnutrition and household over-crowding^{13,20}. Similarly, among under five children, there are demographic, socio-cultural, and environmental risk factors for respiratory tract infections (RTIs)¹².

Koirala et al.¹³ reported that environmental and social factors are associated with respiratory tract infection in under five year children. Another study conducted in Cameroon, Africa on risk factors of respiratory tract infection among under five years children showed that overall frequency of RTI was 54.7%¹¹. The frequency of acute respiratory tract infection among children aged 2 months to 5 years in Pakistan population was reported to be 44%¹⁴.

In this study we included malnourished children. We used the standard definition of WHO for malnutrition. The operational definition of malnutrition was less than 3 median Z- scores of world health organization's growth charts, visibly severe wasting, or nutritional edema. The mortality risk in children with acute malnutrition is ten-fold higher than that of children without it¹⁶.

In our study the frequency of respiratory tract infection is little higher than previously conducted studies. One of the most obvious differences between our study and already published literature can be the fact that in our study we include only malnourished children. Malnutrition is one major cause of mortality and morbidity in developing countries for children. Malnourished children have weak immunity and prone to infections. RTI is also linked immune status of the individuals²¹.

CONCLUSION

The frequency of respiratory tract infection is quiet higher among malnourished children. The significant risk factors associated with RTI among malnourished children are consultant clinician, sibling affected by RTI, and history of allergy in parents.

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