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Original Research Article

A Cross-Sectional Study for Assessment of Factors Related to Acute Respiratory Infection in Pre-School Children in an Urban Slum

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ABSTRACT

Background: Acute respiratory infection is a major public health problem particularly in developing countries like India where most of people belong to poor economic strata and reside in slums and are exposed to fatal illnesses. Under-five children are particularly vulnerable to this Sort of infections and it has posed a great economic burden to the developing world particularly in the urban slums.
Objectives: To assess prevalence of acute respiratory infections amongst children in an urban slum; sociodemographic profile of study population & assess health seeking behaviour of parents for these morbidities.
Materials & Methods: It was a Cross-sectional study carried out in 256 under-five children which was conducted in vulnerable urban slum in UHC field practice area of tertiary care hospital for 12 months duration.
Results and Discussion: The overall prevalence of ARI was found to be 30.4%. Children in age group of 1-3 years were most commonly affected with ARI (57.1%). In social class IV & V, prevalence of ARI was highest with 40.70 %. There was a significant association between immunization status, birth weight, family composition, malnutrition status and Occurrence of ARI in under-five children.
Conclusion: The present study found poor birth weight, low socio economic class, delay in initiation of breast feeding, pre-lacteal feeding, and immunization status as significant risk factors for ARI in under-fives.

Keywords: Acute respiratory infection (ARI), Urban Slum, Cross sectional study, under five children.

INTRODUCTION

Progress of nation is not only judged by its economic growth but also by how much weaker section of community receives care and support during most vulnerable period i.e. childhood wherein growth and development occurs in various dimensions and child needs special attention and care.

Globally, in 2015, a total of 236 million children died before reaching their fifth birthday. About 16,000 children under the age of five still die every day. Still, 11 under-five children die every minute. Most of these deaths occur in developing and under developed countries. [(29)] Seventy four countries still fall short of the MDG 4 target of a two-thirds reduction in the under-five mortality rate. [(29)] Fortunately, during the same period, the annual number of under-5 deaths worldwide dropped from 12·7 million (12·6 million–13·0 million) to 5·9 million (5·7 million–6·4 million).

Among under-fives, ARI cause specific mortality in 20-25%. On this basis, one million deaths among under-fives in our Country are due to ARI and most of these occur in infants. [(1)] Cause specific mortality due to ARI is 10 to 50 times higher in

developing countries than developed countries. [(1)] In our country, 14.3% of deaths during infancy and 15.9% of deaths between 1-5 years of age are due to ARI. [(3)] In India, pneumonias are estimated to be responsible for 75% of ARI deaths. [(4)]

Estimating the morbidity burden has inherent challenges due to lack of uniformity in study definitions, spectral nature of illness and misclassification errors. Recent estimates suggest 3.5% of the global burden of disease were caused by ARI. [(3)] In developing countries, on an average every child had five episodes of ARI/year accounting for 30%-50% of the total paediatric outpatient visits and 20%-30% of the paediatric admissions. [(3)] India had been predicted to have over 700 million episodes of ARI and over 52 million episodes of pneumonia every year. [(3)]

Studies in developing countries have identified risk factors to be among others over-crowding, nutritional factors, Parental Education, Socioeconomic status, poor housing condition, sex of child. Population in the urban slums is a heterogeneous conglomerate of all caste, creed, and religion with a diversified lifestyle. In addition, the risk factors for childhood ARI is also present in respect to the environmental, socioeconomic, and health seeking behaviour of the inhabitants. [(5)]

In India, despite various researches and recent advances, problems and issues relating to childhood had not received serious consideration. This was exemplified by the fact studies in urban slums show relation between environmental factors and risk factors complicating A.R.I. With the changes in the social scenario and the emergence of nuclear family concept, they have been exposed to emotional, physical and financial insecurity. Studies in developing countries have identified risk factors to be among others over-crowding, nutritional factors, Parental Education, Socioeconomic status, poor housing condition, sex of child. Population in the urban slums is a heterogeneous conglomerate of all caste, creed, and religion with a diversified lifestyle. In addition, the risk factors for childhood ARI is also present in respect to the environmental, socioeconomic, and health seeking behaviour of the inhabitants. [(5)]

Hence, this study was aimed to find the prevalence and socio demographic factors in preschool children (0 – 5 years of age) of an urban underprivileged area, where such vulnerable population exposed to various risk factors can be found. It also assessed health seeking behaviour among this population by looking at utilization of health care services. This provided an insight into the present scenario of health status of study population which helped identifying strategies for improving their health status and quality of life.

Objectives

1. To assess prevalence of acute respiratory infections amongst children in an urban slum.
2. To assess socio-demographic profile of study population
3. To study risk factors associated with prevalence of acute respiratory infections
4. To assess health seeking behaviour of parents for these morbidities.
5. To suggest recommendations for reducing the burden of A.R.I among preschool children.

MATERIALS AND METHODS

This cross sectional study was conducted amongst the children below 5 years of age, living in urban slum area of an urban health centre attached to tertiary care teaching medical institute involving 256 children. Multistage simple random sampling was done and data was collected from informants using a semi structured pre-validated questionnaire after obtaining informed consent, by house visits over a period of one year. The data hence collected was studied and study identified a high prevalence of ARI among under-fives and pointed out various socio-demographic, nutritional, and environmental factors as the

modifiable risk factors and recommendation were made based on statistical analysis which would help to strengthen the approach towards paediatric care.

Statistical Analysis: Data was analysed using MS excel and SPSS software version 17.Chi-square test was for finding association and p-value (<0.05) was considered significant.

Diagnostic criteria:
History of nasal discharge, cough, cold, fever and sore throat, breathing difficulty, any discharge from ear alone or in combination was used in recognition of an episode of ARI.
An absence of symptoms for three days or more was the criteria used for differentiating one episode from other.
Respiratory rate >60/minute(among children <2months), RR>50(2-11 months), >40 (12-60 months), in case with cough , running nose or fever, singly or in combination was the criteria for recognition of the Severity of ARI.

Grading of ARI:
Mild Episode:
Running nose and/or cough with or without expectoration and/or fever with no other symptoms.
Moderate episode:
Combination of these 3 symptoms or any of these 3 symptoms along with sore throat &/or breathing difficulty &/or discharge from ear.
Severe episode:
Chest in-drawing &/or cyanosis &/or loss of consciousness &/or inability to drink water &/or convulsions&/ or etc. along with other symptoms.

RESULTS

Table 1: Sociodemographic characteristic wise sample distribution and prevalence of Acute Respiratory Infection in under-five children.

Variable		Sample	ARI Case	χ^2 P-value
Age	12 months or less	51(19.9%)	10(13.00%)	χ^2= 0.121
	13- 36months	131 (51.2%)	44 (57.10%)	Df-2
	37-60 months	74(28.9%)	23 (29.90%)	p- value=0.941
Sex	Male	141 (55.1%)	38(49.5%)	χ^2= 2.931
	Female	115 (44.9%)	39(50.6%)	p-value=0.087
Birth Weight	Less than 2.5 kg	62 (24.2%)	42 (67.7%)	χ^2= 15.503
	2.5 kg or more	181 (70.7%)	81 (44.8%)	
	Not known	13 (5.1%)	11 (84.6%)	p-value <0.001
Immunization status	Fully Immunized	187(73%)	43 (23.00%)	χ^2= 16.552
	Partially/ Not immunized	69 (27%)	34 (49.30%)	p-value <0.001
Mothers education	Illiterate/ Primary	63 (24.6%)	28 (44.40%)	χ^2= 14.621
	Till S.S.C	151(59%)	45 (29.80%)	Df-2
	Above S.S.C	42 (16.4%)	4 (9.50%)	p-value= 0.001
Overcrowding	Present	191 (74.6%)	68 (35.60 %)	χ^2= 10.914
	Absent	65 (25.4%)	9 (13.80%)	p-value <0.001
Family composition	2 or less	158 (61.7%)	34 (21.50%)	χ^2= 14.337
	3 or more	98 (38.3%)	43 (43.90%)	p-value <0.001
Socio-economic Status	Class I/II	32(12.5%)	2 (6.30%)	χ^2=21.017
	Class III	74 (28.9%)	14 (18.90%)	
	Class IV/V	150 (58.6%)	61 (40.70%)	p-value <0.001

Total 256 participants were part of study. Majority were male and belongs to 12-36 months age group.70.7% children were having birth-weight more than 2.5, whereas 73% children were fully immunized and overcrowding was present in 74.6% houses. Majority (58.6%) belongs to low socioeconomic status. However, all this factors were significantly associated with occurrence of Acute Respiratory infection.

Table 2:Cultural factors influencing ARI status of under-five children:

Variable		Sample	ARI cases	χ^2 / P value
Exclusive breast feeding	Yes	184 (71.9%)	39 (21.20%)	χ^2=24.542
	No	72 (28.1%)	38 (52.80%)	p-value <0.001
Discarding Colostrum	Yes	18 (32.8%)	16 (88.9%)	χ^2= 10.366
	No	238 (93%)	118 (49.6%)	p-value =0.001
Pre-lacteal feeds	Yes	68 (26.6%)	36 (52.90%)	χ^2=23.014
	No	188 (73.4%)	41 (21.80%)	p-value <0.001
Early Weaning	Yes	84 (32.8%)	62 (73.8%)	χ^2= 23.094
	No	172 (67.2%)	72 (41.9%)	p-value <0.001

From above table, it can be seen that exclusive breast feeding (71.9%) have negative impact on occurrence of ARI whereas practices of discarding colostrum (88.9%), administration of pre-lacteal feeds (52.90%) and early weaning practices (73.8%) are significantly associated with occurrence of ARI.

Table 3: Distribution of children according to Malnutrition grading and severity of ARI

Grading of Malnutrition	Classification of ARI			Total
	No ARI	Mild ARI	Moderate/Severe ARI	
No malnutrition	111	9	2	122
	91.00%	7.40%	1.60%	47.70%
Mild Malnutrition	44	17	6	67
	65.70%	25.40%	9.00%	26.20%
Moderate/Severe Malnutrition	24	17	26	67
	35.80%	25.40%	38.80%	26.20%
Total	179	43	34	256
	69.90%	16.80%	13.30%	100.00%
χ^2=72.629 df- 4 p value <0.001				

The percentage of moderate to severe malnourished children having no ARI, mild ARI, and moderate to severe ARI was 35.8%, 25.4% and 38.8% respectively. Similarly, 65% mild malnourished child had no ARI, 25.4% had mild ARI and 9% had moderate to severe ARI episodes. The percentage of well-nourished children having no ARI, mild ARI, and moderate to severe ARI was 91%, 7.4% and 1.6%% respectively. Thus, severity of ARI has statistically significant association with Malnutrition (p value <0.001).

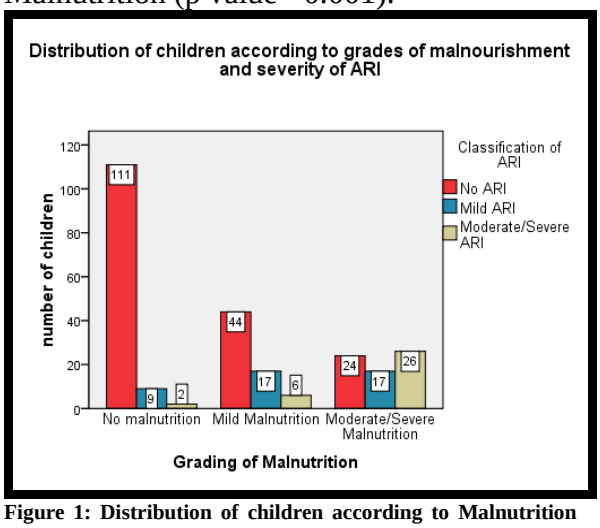

Figure 1: Distribution of children according to Malnutrition grading and severity of ARI

Table 4: Distribution of presenting symptoms of ARI in ARI cases

Presenting symptoms	ARI occurrence in children (n=77)	
	Number	Percentage
Fever	56	72.70%
Cough (with or without expectoration)	40	51.90%
Running Nose	65	84.50%
Fast Breathing	10	13%
Chest in drawing	3	3.90%
Other symptoms	16	20.78%

*More than 1 symptoms were present in ARI cases.

Table 5: Health Seeking Behaviour of Respondents:

Consultation	Number of Respondents (N=256)	
UHTC	Number	Percentage
UHTC	103	40.20 %
Private Medical Practitioner	79	30.90%
Home based Remedies	52	20.30 %
No treatment taken	22	8.60 %
Total	256	100%

Above table showed that 40.2% of the parents consulted UHTC for treatment of disease in children while 30.9% consulted private practitioner. 20.3% parents took home based remedies where 8.6% parents did not take any form of treatment.

DISCUSSION

A total of 256 children were Assessed in the study. The study identified a high prevalence of ARI among under-fives

and pointed out various socio-demographic, nutritional, and environmental as the modifiable risk factors. The overall prevalence of ARI was found to be 30.4%. A study done by Farzana Islam, Ratnasharma et al. [5] (2013) on Profiling ARI among 370 under-five showed prevalence of ARI to be 26.35%. [5] Studies done by Vinod K. Ramani et al., [7] Suguna E, Kumar S G et al. (2015), [8] Duarte DM et al. [9] Botelho C et al [10] showed similar results. There was no significant difference in Age and sex wise distribution of participants and association of ARI. Our findings can be compared with Gupta KB et al. [6] 1980 and Mitra NK et al. [11] 2001Jha AK et al. [12] by Rahman MM et al. [13] The high ARI incidence found in children of 2-3 year age group may be due to their greater exposure to environmental factors. [7]

Socio- demographic variables:

There is high prevalence of ARI in children with birth weight less than 2.5 kg.ARI was present in almost half of children who were partially immunized or not immunized at all (49.3%). ARI was absent in 77% of children who were fully immunized and present in only 23% children with complete immunization. Abhishek Arun et al. [14] showed that direct correlation was found between immunization status of children and occurrence of ARI. It was least in children who were fully immunized (12.5%) as compared to unimmunized children (26%). by Ujunwa and Thecla et al., [15] Abid Ali Mir et al., [16] by Broor S et al. [17] Statistically significant association between mother education and ARI due to lack of proper information about the infection, inadequate knowledge and unawareness, mothers fails to take care of their when the episode is mild. Incidence of ARI was 35.6% in overcrowded houses whereas only 13.8% cases were seen in non-overcrowded houses. It can be stated that in non-overcrowded houses, 86.2% of children had no incidence of ARI which shows that difference was statistically significant. Farzana Islam et al. [5] in her study reflected an association of overcrowding (81.44%) with risk of ARI. Study done by Rahman MM et al., [13] Prajapati.B et al. [18] Abid Ali Mir et al. [16] etc. showed similar findings. Incidence of ARI was higher in families having 3 or more children (43.9%). Also it can be seen that almost 78.5% families have no incidence of ARI where proportion of children was 2 or less. The study done by Ujunwa and Thecla et al. [15] where family size of more than 5 siblings living in a home was shown to affect significantly the prevalence of pneumonia. In our study, a significantly higher risk of ARI was found in children from SES class IV & V. Our results could be compared with Mitra NK, [11] Savitha MR et al., [19] Tupasi Thelma E et al. [20] And Gregory Gardner et al. [21] studies. Study by Biradar et al. [22] showed that 88% of total ARI cases were reported from the families belonging to class IV & class V socioeconomic status

Cultural Factors:

Incidence of ARI was 52.9% in children with administration of pre-lacteal feeds. Only 21.8% children had ARI in whom no pre-lacteal feeds were given. ARI was absent in 69.9% children with no pre-lacteal feeds. Study done by Abhishek Arun et al. [14] who observed significant association between ARI and pre-lacteal feeding. Occurrence of ARI was more in those children who started pre-lacteal feeding (29.3%) as compare to (16.3%) not started pre-lacteal feeding. Similar finding was observed in study carried out by Biswas A et al., [23] Deb SK et al. [24] & M. R. Savitha et al. [19] ARI was present 21.2% children who were exclusively breast feed whereas 52.8% children had ARI who were not exclusively breast feed. Study done by Jha AK et al. [12] showed that prevalence of ARI in non-exclusively breast feed children was higher (28.6%) as compared to exclusively breast feed children (16.1%).

Malnutrition Status:

Malnutrition status of children in our study shows that 52.3% of children had malnourishment among which 26.27% children were having grade I malnutrition.

The percentage of children having grade II, grade III and grade IV malnourishment was found 19.1%, 5.9% and 1.2% respectively. 47.7% children were found to be normal. Study done by AbhishekArun et al. [(14)] nutritional status of child has direct bearing on children's susceptibility to ARI. Prevalence of ARI amongst children who had no malnutrition was lowest (19.3%), while it was more in Grade-I to IV malnutrition which showed a strong correlation between nutritional status and occurrence of ARI observations indicate that nutritional status of child has direct bearing on his susceptibility to ARI. Farzana Islam et al., [(5)] Prajapati.B et al., [(18)] Rahman MM et al., [(13)] Abid Ali Mir et al. [(16)] etc. showed similar results whereas Duarte DM et al. [(9)] 2000 in study from Brazil reported no association between ARI and nutritional status in under-five years children. Similarly, on grading of malnourishment and its association with severity of ARI shows that 91% well-nourished children were not having any incidence of ARI, 38.8% moderate to severe malnourished children were having moderate to severe type of ARI and only 1.6% well-nourished children had moderate to severe ARI episode.

Symptoms of ARI:

Running nose (84.5%) fever (72.7%) and cough (51.9%). Fast breathing was present in (13%) and chest in-drawing was present in (3.9%) indicating moderate to severe cases of ARI. Other symptoms include ear discharge, chest pain, stridor, wheeze, inability to drink water etc. Similar findings were seen in Kumar S G, et al. [(8)] (2014), H.N.Bashour et al. [(25)] (1994) studies. A study done by MuraliMadhav et al. [(26)] (1989) showed that the most commonly occurring symptoms of ARI were running nose (87.4 per 100), cough (55.3 per 100) and fever (32 per 100). Fast breathing (20.7 per 100) contributed to moderate to severe cases. 76.75% of cases were found to be mild and 23.25% of cases were found to be moderate to severe cases.

Health seeking behaviour of respondents:

UHC was the preferred centre for treatment (40.2%) whereas 30.9% visited private practitioner. The percentage of respondents taking home based treatment was 20.3% whereas 8.6% respondents had not given any treatment to their children. Similar to our findings, Study done by V. Kumar et al. [(27)] (1984) showed that 34% utilized services of an allopathic doctor and other preferred local available medical practitioner. In contrast to our findings, in study done by Kapoor Sk. et al [(28)] (1990), 51.9% mothers preferred using home-made remedies. 8.5% responded that no treatment was required 44% preferred taking the advice of a doctor.

CONCLUSION

Overall, incidence of ARI among 256 children surveyed was 30.1%.

Incidence was more in 25-36 months age group. Female children were slightly more affected than male children.

Malnutrition, Inadequate immunization, custom of giving pre-lacteal feeds, low socio-economic status, overcrowding, inadequate ventilation, lack of exclusive breast feeding, number of children in family were significant risk factors for ARI.

Both occurrence of ARI and severity of episodes were significantly more in children with illiterate mothers/ mothers with secondary education, low socioeconomic status and in malnourished children.

Most common symptoms were running nose, fever and cough.

UHTC was the main health care centre for treatment of children during episodes of ARI.

Recommendation

The present study showed that most of the factors that are associated with ARI or increased the risk of ARI are modifiable in nature. The need of the hour is to make the parents well aware about these modifiable risk factors and suggest methods or actions that can be undertaken to prevent exposure to such

factors. Keeping in mind these factors, the following are the recommendations.

Periodic survey to identify new born and existing children in the community should be followed up so that all such children are registered in Under-Five clinic and R-16 register.

Growth and development monitoring of every registered child should be regularly done. This can be starting point for creating awareness among the parents.

Parents should be re-oriented regularly during each routine as well as purposeful visit to health centre in child management and prevention of ARI to especially understand early warning symptoms for referral of ARI.

In view of high ARI prevalence in the community, IMNCI programme strengthening referral system up gradation of nearby peripheral hospitals and apex hospital Involvement local Health workers. Capacity building programmes with reference to ARI should be conducted.

Organize awareness camps for "Fathers Involvement" in child care in the community with focus on the management of respiratory infections which can be crucial in achieving control of ARI.

Communicating social and developmental factors such as inadequate literacy level need for physical sanitation and hygiene, safe water, anti-pollution measures to the local representatives to resolve the issues.

Improvement in outreach services and organising programmes similar to the programmes conducted at Primary health centres in the rural areas.

Myths associated with child care to be addressed during joint orientation of mother-in-laws and daughter-in-laws, regarding child rearing practices during health education using local language of the community.

Improvement in feeding practices, especially during episodes of illness, Adoption of the small-child norms and limiting the number of children to maximum 2 should be promoted.

Limitation:

The study was undertaken in the urban slums of metropolitan city. Due to diversity of slum population in different parts of India and also the living condition, the findings cannot be generalized.

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