ACUTE RESPIRATORY INFECTION AMONG CHILDREN IN AN AIR FORCE COMMUNITY

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Abstract

984 children of 745 families were studied for occurrence of Acute Respiratory Infection (ARI). Incidence of ARI was 3.5 episodes per year among infants and 1.8 episodes per child per year among under-five children. 88.8% episodes of ARI were mild while 11.2% episodes were moderate to severe, which mostly occurred in winter. Parental smoking habit, decline in duration of breast feeding, bedroom smoke pollution and over crowding were found to increase the risk of ARI among children. An effective preventive strategy has been highlighted.

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KEY WORDS: Acute respiratory infection; Environmental tobacco smoke.

Introduction

The continuing massive morbidity and premature mortality from ARI, especially in the developing countries poses a great challenge to the public health planners. ARI is estimated to cause 4 million deaths in under five children every year through out the world [1]. ARI accounts for a morbidity burden of 12.1% prevalence rate and 2.5 episode per child per year in India [2].

Apart from infectious agent, child's genetic and immunological status, certain other factors like malnutrition, parental literacy and household crowding have been identified as ARI risks [3]. Some other inciting factors are smoking habit of parents, indoor smoke pollution, seasonal variation and duration of breast-feeding. The aggregate information indicates that there is an inextricable relation between various medical and social factors in the occurrence of ARI. ARI also merits attention as it causes considerable high morbidity and mortality. Therefore, it was thought prudent to undertake a study to ascertain the role of various factors in precipitating ARI among under ten children of an Air Force Community.

Material & Methods

The present study was conducted at an Air Force station in South Western Air Command having a population of 4300. The station has well organised medical, social and welfare services for the residents. Station Sick Quarters is located well within the domestic area. The station is already under cover of ongoing national health programmes.

An initial house to house visit to all the families staying in the camp was conducted to inform the parents about the objectives of the study and also to ascertain various social and environmental factors like family size, smoking habit of the parents, duration of

breast feeding, housing and allied conditions. A suitably pre-tested questionnaire was used to record the data. At the same time, nutritional assessment of the children was also conducted. 50th percentile of Harvard standard (weight for age) was used as reference [4]. Cut off point used for detecting malnutrition was 80% of standard weight for age.

A total of 984 children in the age group of 0-10 years were kept under surveillance during May 97 to Apr 98. Children falling sick with respiratory illness were classified, investigated and treated according to WHO guidelines [5]. Initially obtained social and environmental data was studied and collated with medical data. Revisits were made to the houses fortnightly. Children seeking inpatient care were admitted to the hospital. The data obtained was tabulated, and statistically analysed.

Results

There were 745 families in the station having 984 children in the age group of 0-10 years. Birth rate during the period was 6.7 per 1000 and average family size was 4.2.

Table 1 shows that out of 984 children, 108 belonged to officers and 876 belonged to airmen and others. Total number of infants were 46. Male-female ratio was 1000:989.

TABLE 1
Age sex distribution of children

Age group	Officers		Other Ranks		Total
	Male	Female	Male	Female	
0-1	05	05	19	17	46 (4.67)
1-5	18	15	60	55	148 (15.04)
5-10	36	29	354	371	790 (80.29)
Total	59 (6.00)	49 (4.98)	433 (44.00)	443 (45.02)	984 (100.00)

Figures in parenthesis indicate percentages.

A total of 744 episodes of respiratory infection among children

were reported (Table-2). 83 children suffered from severe ARI (Bronchopneumonia, Broncheolitis and Laryngitis). There were 161 episodes of ARI among 46 infants, thus comprising an ARI incidence of 3.5 episodes per infant per year. Similarly among under five children ARI incidence was 1.8 episodes per year per child. Total number of cases registered with children OPD for various reasons including ARI was 4656, therefore, ARI contributed nearly 16% of total OPD load. Incidence of measles was 0.7 per 1000 population. Seasonal distribution showed more number of cases occurring during winter. Out of 83 severe ARI cases, 16 (19.3%) were admitted to hospital, however, there was no mortality among the children. Average duration of treatment of ARI cases (managed at OPD) was 4.3 days.

TABLE 2
ARI morbidity according to age and seasonal variation

Age group	Number of ARI episodes in children				Total
	Mild ARI		Severe ARI		
	Summer	Winter	Summer	Winter	
0-1	45	95	05	16	161 (21.64)
1-5	78	150	11	28	267 (35.89)
5-10	95	198	09	14	316 (42.47)
Total	218 (29.30)	443 (59.54)	25 (3.36)	58 (7.80)	744 (100.00)

$\chi^2 = 9.78$, df = 6, $P > 0.05$, NS

Figures in parenthesis indicate percentage.

Nearly 60% children belonged to families where father smoked cigarettes and they were significantly more affected than their counterparts whose fathers were non-smokers. The risk of ARI was 1.38 times higher among children whose fathers smoked. Even occurrence of severe ARI was mostly found in this group (Table 3).

TABLE 3
ARI morbidity and smoking habit of fathers

Children belonging to families where	No. of children affected		Total
	WithARI	WithoutARI	
Father Smoker	312	278	590 (59.96)
Father Non-Smoker	177	217	394 (40.04)
Total	489 (48.90)	495 (50.30)	984 (100.00)

OR = 1.38, $\chi^2 = 6.07$, df = 1, $P < 0.02$

Figures in parenthesis indicate percentages.

A total of 102 children in the age group of 0-2 years were studied. There has been a progressive decrease in the occurrence of ARI among the children with consecutive increase in the duration of breast-feeding. The association is statistically significant (Table-4).

All the 46 infants were hospital born and none of them were low birth weight (2.5 kg). All children were immunised according to national schedule against six preventable diseases. 64 children (33%) in 1-5 year age group were under weight according to their

TABLE 4

ARI morbidity and duration of breast feeding among under-two children

No. of children affected	No. of children according to duration of breast feeding			Total
	Stopped feeding before 6 months	Breastfeeding till 12 months	Breastfeeding even after 18 months	
With ARI	22	19	21	62 (60.78)
Without ARI	07	09	24	40 (39.22)
Total	29 (28.43)	28 (27.45)	45 (44.12)	102 (100.00)

$\chi^2 = 7.22$, df = 2, $P < 0.05$

Figures in parenthesis indicate percentages.

age. These underweight children suffered 1.85 episodes of ARI per child per year when compared to 1.65 episodes per child per year in the normal counterparts. The overall prevalence of underweight was 31%.

Table 5 shows 447 (60%) families used LPG for cooking and 298 (40%) used kerosene as cooking fuel. 149(20%) families staying in the temporary / shared accommodation did not have separate kitchen and therefore, had been cooking in the bed room. 219 children belonging to these families were found to run a risk of respiratory infection, 1.18 times higher than the children belonging to families staying at permanent accommodation. This association is statistically significant.

TABLE 5
ARI morbidity and bed room smoke pollution

No. of families	No. of children affected		Total
	WithARI	WithoutARI	
Cooking in bedroom	102	75	177 (17.99)
Having separate kitchen	387	420	807 (82.01)
Total	489 (49.70)	495 (50.30)	984 (100.00)

OR = 1.47, $\chi^2 = 5.43$ df = 1, $P < 0.02$

Figures in the parenthesis indicate percentage.

The common statistical indicator used for housing was per capita floor space (PCFS) occupancy [6]. For airmen families staying in temporary and permanent accommodation, the PCFS occupancy were 98-116 sq ft and 120-145 sq ft per person respectively. For officers it was 150-320 sq ft per person. However, the same was 52-68 sq ft per person for 76 (10.2%) families sharing accommodation with others. The incidence of ARI among the under five children of these four categories of families were 1.91, 1.69, 1.6 and 2.18 episode per child per year respectively.

Discussion

Various demographic parameters point out that the community studied has low fertility as compared to national standards. The incidence of ARI was 3.5 epi-

sodes per year among infants and 1.8 episodes per year among under fives. The incidence of measles was 0.7 per 1000 population. ARI contributed 16% of total OPD load. Nearly 88.8% episodes were mild and 11.2% episodes were moderate to severe. Number of cases were numerically higher in winter. A study among the under fives at Delhi [2] has documented an ARI prevalence of 12.1%, with an incidence of 2.5 episodes per child per year having a distribution of 87.5% mild, 10.4% moderate and 2.1% severe ARI.

Another study at rural Bangladesh recorded the incidence of ARI as 5.5 episodes per child per year with 100 days prevalence as 35.4 [7]. The estimated incidence of measles in India has been calculated to be 1.7 per 1000 population [8]. The incidence of ARI and measles seemed relatively low when compared to other studies and it appears possible that small family, on going immunisation and MCH programmes together with health awareness might have contributed to achieve this trend.

Parental smoking habit constituted an important risk factor for occurrence of ARI among the children and especially so among the infants. Children belonging to families where father smoked tobacco, suffered significantly higher number of episodes of ARI and the occurrence of severe ARI was mostly among these infants. The findings are similar to those reported from developed countries where it is documented that environmental tobacco smoke makes the children more susceptible to ARI [9]. Other researchers while reviewing literature on the effect of passive smoking on children calculated an increased risk (1.5-2 times) of ARI in children whose parents smoke [10].

A statistically significant progressive decline in the occurrence of ARI was observed among the children aged less than 2 years with consecutive increase in the duration of breast-feeding. Similar findings have also been reported by various other studies. The median relative risk of ARI was about 2-5 times higher in the bottle fed infants [10]. Further it has been estimated that breast feeding will result in 20% reduction in moderate to severe ARI morbidity, 15% reduction in ARI mortality in infants under 6 months of age and 10% reduction in morbidity and mortality between 6-12 months.

33% of the under five children were under weight and they had more number of ARI episodes as compared to their normal counterparts. Ballard and Neumann [3] found a significant association between chronic malnutrition and occurrence of ARI and suggested extended breast feeding, immunisation and nu-

tritional supplements as measures to prevent the same.

Bedroom smoke pollution from cooking fuel was recounted as a distinct factor which played an important role in the occurrence of ARI among children. The under five children who generally spend long hours with their mothers busy in cooking become susceptible to ARI due to exposure to nitrogen dioxide from cooking fuel which affects the child's respiratory defence mechanism [12].

Per capita floor occupancy as revealed in this study was well within the acceptable limits as specified by WHO [6]. Under five children staying at less spacious temporary and shared houses had more episodes of ARI as compared to the children who stayed in permanent accommodation. Authors have documented that overcrowding and high population density increase the risk of ARI among children [3].

ARI contributes a major share in the morbidity and mortality of young children. The disease can be identified and controlled at family level except in certain cases that may have to be referred to OPDs. Basic preventive strategies include immunisation, breast feeding, nutritional supplements, smoke reduction from cigarettes and cooking stoves, elimination of overcrowding, improved personal hygiene and health education of parents.

References

1. Monto AS, Lehmann D. ARI in children : Prospects for prevention, Vaccine, 1998;16(16):1582-8.
2. Chhabra P, Garg S, Mittal SK, Satyanarayan L, Mehra M, Sharma N. Magnitude of ARI in under five. Indian Paediatr 1993; 30 (11):1315-9.
3. Ballard TJ, Neumann CG. The effects of malnutrition, parental literacy and household crowding on ARI in young Kenyan children. J Trop Pediatr 1995;41(1):8-13.
4. ICMR. Growth and physical development of children. 1972; ICMR TRS No.18:1-72.
5. Viral Respiratory Diseases : 1980. WHO TRS No 692:1-62.
6. Statistical Indicator for standard housing and sanitation : 1974; WHO TRS No 642:1-62.
7. Zaman K et al. Acute Respiratory Infection in children : A community based Longitudinal study in rural Bangladesh. J Trop Paediatr. 1997;43(3):133-7.
8. Basu RN. Monitoring and Evaluation of Immunisation activities, NICD New Delhi 1991;1-21.
9. Jedrychowski W, Flake K. Maternal smoking and environmental tobacco smoke as predisposing factors to acute respiratory infections. Environ Health Perspective, 1997; 105(3): 302-6.
10. Singhi S, Singhi P. Prevention of acute respiratory infection. Ind J Paediatr 1987;54:161-70.
11. Pandey MR. A social response to respiratory infection, future 1987;20:18-21.