Mal J Nutr 11(2): 121-132, 2005

Influence of Nutrition and Environment on Morbidity Profile of Indian Preschool Children

Jyothi Lakshmi A, Khyrunnisa Begum, Saraswathi G & Jamuna Prakash

Department of Studies in Food Science and Nutrition, University of Mysore, Manasagangotri, Mysore- 570 006, INDIA

ABSTRACT

The investigation was undertaken to study the morbidity profile of preschool children in relation to the child and maternal factors. A total of 205 children between the ages of 1-5 years from rural areas near Mysore city, a district of southern India, were enrolled for the study. A baseline survey was conducted and background information was elicited in a pre-tested questionnaire. Information on the prevalence, incidence and duration of the illnesses were recorded on fortnightly basis for one year. Nutritional status was assessed using standard methodologies. Morbidity profile was associated with various child and maternal factors using appropriate statistical tests. Results revealed that acute respiratory infections, fever and gastro-intestinal disorders were the common infections prevalent. Prevalence, duration and incidence of infections were marginally lower among female children. Duration and incidence of ARI was significantly lower among children of literate mothers. "Age" among the child factors and "literacy status" and "living conditions" among the environmental factors were found to be critical factors that influenced the health status of preschool children.

INTRODUCTION

Infections have been assigned an important role in conditioning malnutrition. Malnutrition and infections are often co-existent and their association has been shown to result in increased morbidity and mortality among children in poor communities (Scrimshaw, 1970). Infectious diseases like diarrhoea, acute respiratory infections, malaria and whooping cough have been found to be the world's leading cause of morbidity and premature death especially in children in developing countries. According to the World Health Report (WHO, 2004), 6.9% of deaths in children were attributed to respiratory infections, 2.2% to malarial fever and 2.0% to childhood diseases.

Acute respiratory infections (ARI) constitute a group of conditions such as sinusitis, influenza, otitismedia, nasopharyngitis, tonsillitis and bronchiolitis. Of these conditions, acute nasopharyngitis i.e. common cold is widely prevalent and its incidence is high among children below 6 years of age (NFHS, 2000; Prakash, 1996; Chhabra *et al*., 1993; Soman *et al*., 1991). The major etiological factors for ARI are virus, mycoplasma and bacteria. Infections such as cholera, dysentery and vomiting are collectively termed as diarrhoeal

Correspondence author: Dr (Mrs) Jamuna Prakash, email: jampr55@hotmail.com

diseases. The major etiologies of these diseases are bacteria and rotaviruses. These infectious agents are highly contagious and have multiple routes of transmission such as water, food, air and person to person.

The incidence rate of infections reported by several investigators ranged from 1-13 for ARI and 0.4-6 for diarrhoeal diseases in different states of India. Evidences suggest that factors such as higher birth order, younger age, sex, low socio-economic status, poor environmental sanitation, contaminated water and malnutrition were associated with higher incidence and prevalence of infections among younger children (NFHS, 2000; Soman *et al.*, 1991, Dhanalakshmi, 1995; Hao, Hojer & Persson, 1991; Devdas *et al.*, 1991; Awasti & Pandey, 1997). Contrary to these publications, there are several other reports stating that prevalence of infections have no relevance to these factors (Zaman *et al.*, 1997; Walia *et al.*, 1998; Bhaskaram, 1996). Apart from these, factors such as environmental pollution and passive smoking are also known to influence the health status of children.

The observed reasons for varying incidence of infections and their association with various factors may have been due to differences in methodologies adopted, age groups covered, domicile, seasons, and period of follow-up. There are limited studies on the morbidity profile of children undertaken at the national level using standard methodologies with adequate sample size and for reasonable duration. These are important for improving the health and nutritional status of children. Therefore, the present investigation was undertaken with the objective of assessing the morbidity profile of preschool children, residing in rural areas near Mysore city, in relation to the nutritional and environmental factors.

METHODOLOGY

Children between the ages of 1-5 years from rural areas near Mysore city (a district of southern India) were purposively selected for the study. A total of 205 children from 160 households comprising 20% of the population surveyed formed the study subjects. A household survey was conducted and information on demographic profile, living conditions, occupational status and literacy status were recorded by interviewing the mothers of the children using a pre-tested questionnaire.

Assessment of nutritional status

Exact age of the children was assessed by obtaining the date of birth from records maintained by the Anganwadi workers in the Integrated Child Development Service centres (a functional unit of a women and child welfare program). Age was computed in complete months.

Weights of the children were recorded using the portable Krups spring balance (manufactured by Doctor Beliram and Sons, New Delhi, India) with standard techniques to the nearest 0.5kg (calibrated/checked to zero at each recording). The recorded weights of the children were compared with the 50th percentile of National Center for Health Statistics (NCHS) reference standards (NCHS, 1979) and the children were categorised into different grades of malnutrition based on Gomez classification (Gopaldas & Sheshadri, 1987). Haemoglobin status of the children was assessed with the prior consent of their parents. Blood samples were collected by finger prick method, stored on a labeled Whatman No.1 filter paper and analysed in the laboratory by the cyanmethemoglobin method (Demaeyer *et al.*, 1989). The children were categorized into different grades of anaemia as per the WHO standards (WHO, 1972).

Health status

Morbidity profile of the children was recorded by interviewing the mothers of the children once a fortnight using a pre-tested proforma. Information on the duration and incidence of all the illnesses the children had in the preceding fortnight was obtained on recall basis. The morbidity profile of the children was obtained for a period of one year to cover the seasonal variations. Initially the mothers of the children were made aware of the significance of health status of children and requested to observe the illnesses their children suffered from and report on the interview day to the investigator. Prevalence rate (PR) and incidence rates were computed as per the WHO (1993). Duration was taken as sum of period suffered from an illness during the study period of one year.

Considering the prevailing living conditions (including number of living rooms, presence of a separate kitchen and cattle shed) suitable scorings were given, based on the scores obtained the selected families were categorized into three groups as low (1-4), medium (5-8) and high (9-12).

Majority of the families owned small plots of land and were also working as labourers in their free time. Women in some families were working during the harvest season to obtain required food grains that were given as wages. Some families received food grains as gifts from relatives and parents. From the nutritional point of view (and for a near accurate assessment), food expenditure was considered as an index of economic status. Information on the food expenditure of each family was obtained by interviewing the mothers of the children and the expenditure/consumption unit/month was calculated. Based on this finding, children were categorised into three economic groups, namely as 'low', 'medium' and 'high'. Depending upon the number of years the mother had attained education in a formal school, they were categorised into 3 levels as 'level 0' (no schooling), 'level 1' (4-7 years of schooling) and 'level 2' (8-12 years of schooling)

For the purpose of computation, the recorded illnesses were grouped as follows:

a. Acute respiratory infections (ARI) - cold, cough & sore throat
b. Gastro intestinal disorders (GID) - diarrhoea, vomiting & abdominal pain
c. Fever - increased body temperature with or without headache
d. Total morbidity - all illnesses pooled
e. Other infections (skin infections, eye infections and other unidentified infections as reported by respondents)

The influence of different child-related factors on the morbidity profile of children like age, sex and nutritional status, and environmental factors like literacy status of the mother, economic status of the family and living conditions were analysed using appropriate statistical tests. One-way analysis of variance was used for analysing the differences in the incidence and duration of illnesses using the statistical package SPSS version 10.0. The probability level for significance was fixed at $p<0.05$. Pearson Chi-square test was performed using the statistical package MINITAB.

RESULTS AND DISCUSSION

The selected villages were located about 18-40 km from Mysore city and were served by the Integrated Child Development Services (a national agency that works for the welfare of women and children). There were no health care services in the near vicinity of the villages. The primary health centres offering services to these areas were not easily accessible by the residents due to lack of transportation facilities. Bore-well water was the sole source of drinking water. There were no drainage facilities in the villages.

At any point of time in a year, nearly (49%) of the children were found to be sick. Of all the illnesses, acute respiratory infections (ARI) was prevalent to a large extent (44%) followed by fever (11%) and GID (6%). These observations have similarly been reported in other countries (WHO, 2004; Devdas *et al.*, 1991; Awasti & Pandey, 1997; Denny, Clyde & Clyde, 1986; Geetha & Devdas, 1986). In a year, a child was observed to suffer for 90 days (¼th of a year) from cold, 25 days from cough, 4.8 days from fever and 1.6 days from diarrhoea. Similarly, a child was observed to have 4.5 episodes of cold, 2.5 episodes of cough, 1.3 episodes of fever and 0.4 episodes of diarrhoea during the study period. These rates were comparable to those reported from rural areas of Haryana and Delhi (NFHS, 2000; Walia *et al.*, 1998), while those reported from rural areas of Karnataka were higher than the study population rates (NFHS, 2000). No cases of persistent diarrhoea were encountered in the one-year period.

Morbidity profile - age

Prevalence rate (PR) of total morbidity reduced from 55 to 42 as the age of children advanced from 1 to 4 years. The rate of ARI also decreased from 49 to 35 as age increased from 1 to 5 years, while fever rate dropped from 15 to 6 as age rose from 1 to 4 years of age (Table 1). Gastro-intestinal disorders were comparatively higher in the one year group but similar in other groups. Prevalence rate of other infections followed no such trend. Chi square analysis revealed that the differences between the age groups were highly significant ($P<0.01$). Our observations are in line with those reported from other parts of the country (NFHS, 2000). Soman *et al.* (1991) have shown that the prevalence of ARI was higher among infants under six months of age compared to three years old children. The authors attributed this to extremely adverse environment, wherein the protection offered by breast milk is not sufficient and cannot curtail the incidence of infection particularly ARI and gastro intestinal disorders (GID). The mean duration and incidence of the illnesses also showed the same trend, that is, one year old children suffered for longer periods from cold (by 28 days more), cough (by 13 days) and fever (by 6 days) compared to four and five year children. These differences between the age groups were found to be highly significant ($P<0.01$). The incidence of cold was higher by 2.5-3 folds among one year olds than 2-5 year group. The extent of differences was found to be extremely significant ($P<0.001$). The incidence rate of cough and fever showed a linear significant ($P<0.01$) reduction from 1-4 years. One of the reasons for such a profile is the immature immunological system of the younger children, which lowers the susceptibility to infections. As the immunological system develops with age, thus it can be said that 'age' is a crucial factor in determining the health status of children.

Morbidity profile - sex

The prevalence rates of various illnesses were found to be lower by 1-6% among female than their male counterparts but the differences were not statistically significant (Table 1). On average, the durations of cold and cough were lower among female children while those for fever and diarrhoea were either comparable or lower than male children. The incidence rate of cold was higher among females but that of cough was found to be significantly higher among male children. These observations are similar to those of a hospital-based study, which revealed that ARI affected male children more frequently than female children (Narain, 1987). The

Table 1. Percent prevalence rate, duration and incidence of illnesses in relation to age and sex of children - per year

Age (years) /Sex	No. of children	*Prevalence rate (%)*					*Duration (in days)*				*Incidence rate*			
		Total morbidity	*ARI*	*Fever*	*GID*	*Others*	*Cold*	*Cough*	*Fever*	*Diarrhoea*	*Cold*	*Cough*	*Fever*	*Diarrhoea*
1	53	55	49	15	7	5	66.54	26.52	9.41	8.74	13.63	3.13	2.08	0.88
2	50	49	44	13	4	2.5	64.16	19.12	6.39	5.93	5.20	2.78	1.62	0.58
3	55	47	43	8	4	5	57.82	19.17	4.22	9.7	4.91	2.44	1.05	0.47
4	35	42	35	6	4	5	38.42	13.67	3.42	13.29	3.97	1.83	0.75	0.50
5	12	50	35	10	4	9	38.36	24.45	4.18	9.00	4.00	2.27	1.27	0.36
χ^2/ SD$^{(4df)}$			χ^2 = 42.13**				± 4.26	± 19.23	± 7.27	± 10.20	± 7.88	± 1.76	± 1.46	± 0.99
$F^{(4,199df)}$			-				3.46**	2.61**	5.08**	2.61 ^{ns}	12.57***	3.23**	5.6**	1.54 ^{ns}
Male	92	52	47	12	6	2	60.70	21.80	6.00	2.84	5.41	2.99	1.43	0.63
Female	113	47	41	10	5	2	55.82	20.01	6.22	2.50	5.71	2.24	1.43	0.53
χ^2/ SD$^{(1df)}$			χ^2= 0.44 ^{ns}				±42.84	± 19.78	± 7.70	± 5.32	± 2.12	± 1.77	± 1.54	± 0.94
$F^{(1,204df)}$			-				0.63 ^{ns}	0.40 ^{ns}	0.04 ^{ns}	0.19 ^{ns}	0.57 ^{ns}	8.60**	0.00 ^{ns}	0.49 ^{ns}

ns - not significant; ** P<0.01; *** P<0.001

incidence of fever and diarrhoea were almost similar. One of the possible reasons for the high prevalence of infections among male children, despite being preferentially cared for in the study area, could have been the provision of more snacks sold by the road side vendors, such as cut fruits and ice candies, which host a high load of microorganisms. This resulted in the children having increased incidence of GID rather than cough. In contrast several other workers have shown that no sex differences existed among preschool children in the overall prevalence of ARI morbidity (Chhabra, 1993; Walia *et al*., 1988).

Morbidity profile - Care giver's literacy status

Mother's literacy status is often shown to be strongly related to child morbidity. The prevalence rate (PR) of total morbidity was 51 among children of 'level 0' (illiterate), 40 in the 'level 1' and 48 in 'level 2' of literate groups (Table 2). The PR of ARI, fever and GID also followed the same trend. Prevalence rate of all the illnesses of children of illiterate mothers were higher compared to those of literate mothers. Chi square analysis showed no association between the PR of illnesses and the literacy status of mothers ($P>0.05$). Mean duration of cold was higher in the 'level 0' category by 18 and 13 days than 'level 1' and 'level 2' categories respectively. The differences between the illiterate and literate groups were statistically significant. The mean incidence of cold also followed the same trend being significantly higher among children of illiterate mothers than those of literate mothers. Incidence of cough reduced gradually as the literacy levels of the mothers increased but duration was lower by 10 days per year among children of literate mothers (level 2) and the differences in the duration of cough was statistically significant. These observations are similar to those reported from other parts of the country (Devdas, 1991). In contrast to this, the observations of Walia *et al*. (1988) showed no association between ARI morbidity and mother's education levels. Duration of fever was lower among children of literate mothers but the differences were not significant trend. One possible reason for the lack of significance in the duration of fever among the study families was the consideration of fever as a serious illness, and children with fever are normally taken for medical check up by all the families. On the other hand, cold/cough was considered to be an insignificant ailment not requiring any medical attention especially by illiterate mothers. The furation and incidence of diarrhoea were lower in the 'level 1' category but were higher and similar in 'level 0' and 'level 2' groups. The differences between the groups were not statistically significant. Prevalence rates of illnesses did not show an association with literacy levels of mothers. This may be due to the study children being from the same environment and at similar ages, which place them at a higher risk of acquiring infections. Nonetheless, the lower duration and incidence of illnesses among children of literate mothers reflect the differences in care provided by these mothers. A significant lowering of illnesses for mothers with just 4-10 years of maternal schooling shows that maternal literacy status is definitely a factor influencing the health status of children.

Morbidity profile - economic status

In general, it is believed that economic development of a nation leads to improvement in the health services for the community and that of a household improves the health status of family members. Prevalence rate of total morbidity and ARI were similar in all economic groups, but that for fever showed a 1% decline from 'low' to 'medium' and 'high' economic groups (Table 2). Gastro intestinal disorders (GID) and other infections

Table 2. Morbidity profile in relation to environmental factors - per year

Factors	*No. of children*	*Prevalence rate (%)*					*Duration (in days)*				*Incidence rate*			
		Total morbidity	*ARI*	*Fever*	*GID*	*Others*	*Cold*	*Cough*	*Fever*	*Diarrhoea*	*Cold*	*Cough*	*Fever*	*Diarrhoea*
Literacy status of mothers														
Level -0	147	51	46	12	6	6	61.75	21.99	6.14	2.91	5.39	2.68	1.43	0.62
Level -1	31	40	37	10	2	3	42.90	21.48	5.26	1.10	4.16	2.48	1.49	0.35
Level - 2	27	48	42	13	4	7	48.44	11.26	5.89	3.15	4.44	2.15	1.56	0.56
χ^2/ $SD^{(2df)}$			$\chi^2 = 18.30^{ns}$				± 41.78	± 19.29	± 7.59	± 5.29	± 2.82	± 1.80	± 1.53	± 0.94
$F^{(2,204df)}$			-				3.27*	3.57*	0.18^{ns}	2.00^{ns}	3.22*	1.07^{ns}	0.45^{ns}	0.99^{ns}
Economic status														
Low	73	50	44	12	4	4	58.32	21.44	1.57	1.92	5.46	2.69	1.57	1.10
Medium	105	53	44	11	7	0	59.90	20.28	5.99	1.46	4.94	2.58	1.45	1.27
High	27	50	43	10	0	0.1	43.15	18.78	2.78	1.48	4.52	2.30	0.85	1.67
χ^2/ $SD^{(2df)}$			$\chi^2 = 29.22$***				± 42.09	± 19.61	± 5.34	± 3.98	± 2.84	± 1.81	± 1.51	± 3.65
$F^{(2,204df)}$			-				1.74^{ns}	0.91^{ns}	15.30**	0.93^{ns}	1.28^{ns}	0.48^{ns}	2.26^{ns}	1.05^{ns}
Living conditions														
Poor	83	54	49	12	4	4	63.70	23.77	6.12	1.56	5.33	2.85	1.46	1.14
Moderate	95	51	42	12	7	0.01	53.71	18.90	5.56	2.91	4.94	2.39	1.32	0.72
Good	27	45	34	0.1	0.04	0.04	46.96	14.22	7.65	2.39	4.35	2.17	1.65	0.78
χ^2/ $SD^{(2df)}$			$\chi^2 = 20.81$**				± 42.22	± 19.47	± 7.63	± 5.01	± 2.85	± 1.76	± 1.54	± 2.27
$F^{(2,204df)}$							1.95^{ns}	2.65^{ns}	0.71^{ns}	1.58^{ns}	1.14^{ns}	2.08^{ns}	0.50^{ns}	0.77^{ns}

ns - not significant; * P<0.05; ** P<0.01; *** P<0.001

were not observed in the high economic groups. Though an improvement in the prevalence rate (PR) of illnesses did not parallel the economic levels, a low PR of some infections for the higher economic categories, suggests that small differences in economic status might contribute to improved health status. While the duration of cold was 58-60days/year in the 'low' and 'medium' economic groups, it was significantly lowered by 15days/ year in the 'high' economic group. The incidence rate of cough also showed a decline with increasing economic levels. Duration and incidence of cough decreased with increasing economic levels but not to a significant extent. These observations are in line with reports that showed children with poor food security suffered from more episodes of ARI for longer durations than their counterparts with better food security (Hao *et al*., 1997). Contrary to this, reports from other rural areas have shown no correlation between parental income and ARI morbidity (Zaman *et al*., 1997; Walia *et al*., 1988). Incidence of fever showed a gradual reduction as the economic status improved but its duration did not follow a similar trend but was higher in the 'high' economic group. Individual variations existed as reflected in a high standard deviation for this result. Duration of diarrhoea showed a declining trend, and incidence, an increasing trend with the increase in the economic levels but the association was found to be non-significant as per analysis of variance. These findings infer that in areas of adverse environmental conditions and in areas where water sources are contaminated, the role of economic status in influencing the incidence/prevalence of infections of the vulnerable children under five years old become limited.

Morbidity profile - living conditions

The quality of physical environment, that is housing conditions, adequacy of space in the house and placement of livestock in the vicinity of the houses, apart from offering protection, is also known to influence the physical health of young children. Prevalence rate of total morbidity (Table 2) and ARI showed a linear reduction with improvement in living conditions (from poor to good). Fever was equally prevalent in 'poor' and 'moderate' groups, but none was found in children residing in 'good' living conditions. GID and other infections were not observed in the 'good' group. A dramatic decline in the prevalence of infections with an improvement in the living conditions was evident. This shows that the characteristic vulnerability of the preschoolers, due to immature immunologic systems, was minimized as living conditions improved. The differences in the prevalence of infections between the children in different living conditions were found to be statistically significant. While the mean duration of cold was 63.7days/year among children living in 'low' housing conditions, it reduced by 10 and 16 days in those residing in the 'medium' and 'high' housing conditions respectively. Incidence of cold also decreased as the housing conditions improved. The average duration of cough was 23.8 days/year in children residing in 'low' housing conditions, and it lowered by around 5 and 9 days in those residing in 'moderate' and 'high' category houses, but the extent of reduction was found to be not significant. Duration and incidence of fever/diarrhoea did not show any significant association between health status and living conditions. These findings are supported by the observations of Walia *et al*. (1988). Contrary to this, other investigators have shown that living conditions have a positive association with the incidence rate of infections (Soman *et al*., 1991; Dhanalakshmi & Murthy, 1993; Santhanakrishnan & Ramalingam, 1987). The studies that have shown a positive association between health status and living conditions were based on comparison between huts and houses or urban and rural areas, but in the present study the comparison was between rural population with almost similar environment outside the houses, although differences in living conditions were seen inside the houses. Differences in the morbidity profile existed between the groups indicating that the hygiene, availability of space, placement of livestock etc. influenced the health status of children to a large extent.

Morbidity profile - nutritional status (weight /age)

Synergistic action between malnutrition and morbidity is well recognized. Prevalence rate of total morbidity and ARI were higher by 4-6% among children of various grades of malnutrition compared to normal children. Prevalence rates of fever and GID were higher by 1-2% but other infections were prevalent to a large extent in undernourished children (Table 3). The extent of differences in the PR of illnesses between normal and undernourished children was found to be highly significant. Average duration of cold was found to be 58 days/year among normal children; it was higher in moderate (by 5days/year) and severely (by 24 days/year) malnourished children. Incidence of cold showed a reverse trend i.e. it is lower among well nourished children compared to the undernourished category, but the extent of decrease was non-significant. Duration and incidence of cough was either comparable or marginally higher among malnourished children. This is in line with the observations of a study from the urban slums of Delhi, which reported that although the incidence of ARI was not associated with nutritional status, the average duration was higher among moderate and severely malnourished children. In contrast to this, other workers have reported the incidence of ARI to be higher among undernourished children (Dhanalakshmi, 1995). Duration of fever increased as the nutritional status deteriorated and it was found to be two times higher in severely undernourished children. Incidence of fever also showed a similar trend, but no statistical association was evident. Duration and incidence of diarrhoea did not follow any trend in well nourished and various degrees of undernourished groups. Our findings are in agreement with earlier findings of Chen, HuQ & Huffman (1981), who showed that incidence or duration of diarrhoea were not influenced by nutritional status. Factors such as heavy contamination in the environment, poor personnel hygiene in the developing countries, especially in rural areas and urban slums, might lead to increased prevalence of diarrhoea irrespective of their somatic status.

Morbidity profile - Nutritional status (haemoglobin levels)

Among the study subjects, only 1% of the children had normal hemoglobin levels, and 99% of them were suffering from moderate and severe degrees of anemia. Hence the comparison was made between moderate and severely anemic groups. As evident from Table 3, prevalence rate of all the illnesses were comparable between the groups and the differences were non-significant. The duration of all the illnesses was higher in the severely anaemic group except for diarrhoea, which was comparable. Severely anaemic group had significantly longer duration of cough than its moderately anemic counterpart. Though the incidence rate of cough, fever and diarrhoea was higher in the severely anemic group the differences were non-significant. Contrary to this finding, several other investigators have reported that the level of hemoglobin did not influence duration and incidence rate of illnesses. However our results cannot be considered conclusive as analysis is based on the severity of anemia and not between anemic and non-anemic groups.

Table 3. Percent prevalence rate, duration and incidence of illnesses in relation to nutritional status of children - per year

Status	*No. of children*	*Prevalence rate (%)*					*Duration (in days)*				*Incidence rate*			
		Total morbidity	*ARI*	*Fever*	*GID*	*Others*	*Cold*	*Cough*	*Fever*	*Diarrhoea*	*Cold*	*Cough*	*Fever*	*Diarrhoea*
Nutritional grades														
Normal	16	44	39	10	4	2	57.50	18.06	4.67	1.44	5.33	2.22	1.39	1.44
Mild	81	48	44	10	5	40	52.86	22.77	6.00	2.32	5.18	2.85	1.45	2.32
Moderate	72	54	44	11	5	62	62.59	18.56	5.69	2.53	4.93	2.31	1.27	2.53
Severe	32	48	44	12	3	9	81.17	21.25	9.83	1.33	4.73	3.08	2.17	1.33
χ^2/ $SD^{(3df)}$			$\chi^2 = 22.95$**				±45.15	± 19.57	± 7.55	± 5.01	± 5.35	± 1.79	± 1.52	± 5.01
$F^{(3,200df)}$			-				1.69^{ns}	0.78^{ns}	1.27^{ns}	0.39^{ns}	2.15^{ns}	1.87^{ns}	1.27^{ns}	0.59^{ns}
Grades of anemia														
Moderate	132	49	44	11	6	7	55.13	18.43	5.47	2.86	5.07	2.40	1.32	0.53
Severe	54	48	44	12	5	3	61.24	25.50	6.94	2.74	5.06	2.94	1.59	0.74
χ^2/ $SD^{(1df)}$			$\chi^2 = 11.57^{ns}$				±41.71	± 19.66	± 7.67	± 5.46	± 2.84	± 1.84	± 1.55	± 0.96
$F^{(1,185df)}$							0.83^{ns}	4.97*	1.43^{ns}	0.02^{ns}	0.00	3.51^{ns}	1.23^{ns}	1.77^{ns}

ns - not significant; *- P<0.05; **- P<0.01; *** - P<0.001

CONCLUSION

A study of the morbidity profile of the subjects revealed that ARI, fever and GID were the illnesses commonly prevalent among preschool children. Prevalence rate of all illnesses, duration and incidence of cold, cough and fever showed a decline from 1-4 years, which shows that resistance power against infections, may parallel age. Prevalence, duration and incidence of infections were marginally lower among female children. Duration and incidence of ARI was significantly lower among children of literate mothers. Except diarrhoea, duration and incidence of other infections declined with increasing economic levels but the association was non-significant. Prevalence rate of the infections was known to be significantly influenced by living conditions. Duration and incidence of cold and cough also reduced linearly with a shift in the living conditions from 'poor' to 'good'. Prevalence, incidence and duration of all infections were comparatively higher in undernourished children compared to normal children but the association was not significant. Of the child factors, age was found to be the crucial factor and among the maternal factors, literacy status and living conditions proved to be the determinants of morbidity profile of preschoolers. However, the effect of economic status or nutritional status cannot be overlooked. Hence the health status of the preschool children who are at a vulnerable age due to high growth rate and solely dependent on the caregiver is influenced by both child and the maternal factors.

ACKNOWLEDGEMENTS

Financial support from 'Rajiv Gandhi National Drinking Water Mission' Ministry of Rural Development, New Delhi, India, for this work is gratefully acknowledged.

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