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ORIGINAL ARTICLE / RESEARCH

Malnutrition among Under-Six Children in Chandigarh: Scarcity in Plenty

BHATIA V, PURI S, SWAMI H M, GUPTA M, SINGH G

ABSTRACT

India has shown remarkable progress and a number of nutrition intervention programmes have been implemented, but malnutrition remains highly prevalent in poor states of the country. Chandigarh is one of the most literate among union territories/states of India, having highest per capita income.

Objective: The present study was conducted in one of the largest slums, with the objective to find out the prevalence of protein energy malnutrition (PEM) and some of the associated factors among children under the age of 6 years (under-six children).

Methodology: This community-based cross-sectional study is a representative of 26 slums, with 1.5-2 lakh population living in the slum areas of a modern city. Three hundred and thirteen under-six children were selected by systematic sampling technique.

Results: The overall prevalence of PEM was observed as 62.62%, which was higher among boys (65.87%) as compared to girls (58.90%). The peak prevalence was found in the age group of 6-12 months. A significant association between acute ailments (diarrhoea, ARI, and fever with rash) and PEM was observed ($p < 0.001$). Prevalence of worm infestation on the basis of history was recorded as 35.67%. Over half (58.4%) of the children were anaemic.

Conclusion: Prevalence of malnutrition along with worm infestation, anaemia, and common ailments in an urban slum of India's modern city highlights the significance of developing integrated child illness management programmes for urban poor and strengthening nutrition intervention programmes.

Keywords: Malnutrition, children, anaemia, worm infestation, slum

Introduction

Malnutrition is still a major public health problem of staggering dimensions in developing countries including India. According to WHO, there are about 10.8 million child deaths a year globally. This number is attributed to iron, vitamin A, and zinc deficiencies. Iron deficiency affects 2 billion people, is responsible for one-fifth of early neonatal mortality, and kills 80,000 people/day [1],[2]. Micronutrient deficiencies

damage one-third of world population, resulting in 2 billion people living below their physical and mental potential [3]. In South Asian region, nearly 5 million children are dying every year,

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and up to 3 million of these deaths are directly or indirectly associated with malnutrition [4].

In spite of a large number of national programmes related to nutrition such as ICDS, mid-day meal, etc., about 6600 under-five children die everyday, accounting to 46% child deaths due to protein energy malnutrition (PEM). As per the recent nationwide studies, majority of children are of mild-to-moderate grade, and those of severe grade are only 2.5% [5]. Gradually India is observing urbanisation, resulting in development of slums with poor infrastructure leading to poverty and deprivation. The present study was conducted in one of the largest slums in Chandigarh, with the objective to find out the prevalence of PEM and assess its association with some of the factors among under-six underprivileged children.

Methodology

Union territory of Chandigarh is having a population of about 1 million, with nearly 50% population staying in urban developed sectors, 10% in rural areas, and 40% in slums and resettled colonies. The city has an excellent educational and health infrastructure, with one of the highest literacy rates of 81.6% among Indian cities having been reported in the recent census [6]. However, as a result of rapid immigration from Uttar Pradesh and Bihar,

unauthorised growth of slums has taken place where the infrastructure is poor.

The present study was conducted in one of the largest slums in Chandigarh, having a population of 15,000–20,000. This study covered under-six children living in the slum. A team of trained doctors from our department and AWWs (Anganwari workers of that slum) inquired about under-six children. Sample was selected by systematic sampling technique. Every 10th child was selected for the study population. Out of approximate 3000–3500 under-six children, 313 were selected for the study.

Information was collected on predesigned, pretested performa by interviewing the mothers. Information included history of acute illness in the past 6 months regarding diarrhoea (having passed three stools in a day), ARI (child with cough and fever), and fever with rash. Anaemia was assessed by clinical assessment of pallor; malnutrition was assessed on the basis of IAP classification. Child was considered to be suffering from worm infestation if there was history of passing worms or pica along with abdominal pain. Height and weight of each child were assessed by using standard anthropometric methods. These factors were assessed by age and sex and analysed accordingly.

[Table/Fig 1] Sex- and age-wise prevalence of PEM (as per IAP classification)

Sex-wise prevalence						
Sex	Normal subjects (no PEM)	PEM				Combined (I–IV)
		Grade I	Grade II	Grade III	Grade IV	
Male (n = 167)	60 (35.93%)	63 (37.72%)	35 (20.96%)	7 (4.19%)	2 (1.19%)	107 (64.07%)
Female (n = 146)	57 (39.04%)	48 (32.88%)	27 (18.49%)	10 (6.85%)	4 (2.74%)	89 (60.96%)
Total (n = 313)	117 (37.38%)	111 (35.46%)	62 (19.80%)	17 (5.43%)	6 (1.92%)	196 (62.62%)

Results

The present study included 167 males (53.35%) and 146 females (64.65%). [Table/Fig 1] reveals that only 117 (37.38%) children were having normal weight and remaining 196 (62.62%) were suffering from various grades of PEM. It was observed that the prevalence of malnutrition was higher in males (65.87%) in comparison to females (58.9%), though severe grades of

malnutrition (Grades III and IV) were higher among females (9.59%) than among males (5.38%). Overall, 36.42%, 18.85%, 5.43%, and 1.92% under-six children were in different grades of I, II, III, and IV, respectively. It can be seen in [Table/Fig 2] that a statistically significant relationship between acute ailments (diarrhoea, ARI, and rash with fever) with malnutrition was observed where 73.08%

children were suffering from malnutrition in comparison with 42.08% children when no acute ailment had occurred ($p < 0.001$). Pallor was

found to be the same in both boys and girls – 58.1% and 58.9%, respectively ([Table/Fig 3]).

[Table/Fig 2] Prevalence of PEM among children having acute ailment (diarrhoea, rash, and ARI)

Ailment	Normal	PEM				Combined (I–IV)
		Grade I	Grade II	Grade III	Grade IV	
Present (<i>n</i> = 182)	49 (26.92%)	80 (70.17%)	39 (66.10%)	9 (52.94%)	5 (83.33%)	133 (73.08%)
Absent (<i>n</i> = 131)	68 (5.12%)	34 (29.82%)	20 (33.89%)	8 (47.05%)	1 (16.67%)	63 (48.09%)
Total (<i>n</i> = 313)	117 (37.38%)	114 (36.42%)	59 (18.85%)	17 (5.43%)	6 (1.92%)	196 (62.62%)

$\chi^2 = 20.31$, $df = 1$, $p < 0.001$.

According to operational definition of worm infestation in the present study, prevalence of worm infestation was 35.67%. On interviewing the mothers, it was observed that among these children, 20.45% children were passing worms in stools in the last 6 months and 25.24% gave history of pica with or without abdominal pain. Some children were having both the problems (worms in stools and pica). The prevalence of anaemia was 41.45% with equal distribution in both sexes.

[Table/Fig 3] Prevalence of pallor among under-six children

Sex	Present	Absent
Male (<i>n</i> = 167)	97 (58.1%)	70 (41.9%)
Female (<i>n</i> = 146)	86 (58.9%)	60 (41%)
Total (<i>n</i> = 313)	183 (58.4%)	130 (41.5%)

Further, 284 (90.72%) children were suffering from less height for their age, according to NCHS standards recommended by National Institute of Nutrition, Hyderabad. More females (93.15%) were stunted in comparison to males (88.62%). No significant difference in stunting in different age groups was observed except in the children up to the age of 2 years (88.33%).

Discussion

A high prevalence of PEM to the extent of 62.62% is indicative of the poverty and poor living conditions existing in slums. In south-east Asian region, prevalence of malnutrition is 51% [4]. The study area has eight Aanganwadi centres under ICDS programme, which are catering to grossly inadequate population of nearly 3500–4000 under-six children. The national-level survey has reported an overall prevalence of 47% underweight and 18% wasted children under the age of 3 years [7]. The prosperous states of Punjab and Haryana, with Chandigarh being their capital, have ample production of wheat, and therefore the population is not deprived of food. Nevertheless, the fact that nearly 90% under-six children have stunting in Chandigarh slums reflects the chronicity of malnutrition. This population living in the slums has migrated from Uttar Pradesh and Bihar, which are known to have high prevalence of malnutrition and poverty. A higher prevalence of PEM in present study was seen among boys, which is in accordance with similar trend observed in another city of Uttar Pradesh [7].

Presence of severe PEM among 7% of children reflects the fact that supplementary nutrition programme has not yielded desired results. Source of drinking water is still unsafe, with unhealthy living conditions causing acute ailments and infections such as diarrhoea, acute respiratory infections, etc. The present study has also observed that there is a strong correlation between acute ailments and PEM. It is well

documented that these infections lead to malnutrition, which further lowers the immunity, putting the children at risk of infections [8],[9]. Vicious cycle between malnutrition and infection and low immunity is very well documented [4],[10].

A number of studies have reported a high prevalence of worm infestation among children in different parts of the country. The study carried out in Kanpur on ankylostomiasis among children depicted a prevalence of 27% in boys and 16% in girls [11]. Present study also showed the prevalence of worm infestation around 35.68%. The similar trend has been observed in different studies that showed 41% prevalence of hookworms and 56% prevalence of protozoa, in comparison to 35% in the present study. Although prevalence of worm infestation is confirmed either by history of passing worms or by examination of stool, present study covered history of passing worms and pica with or without abdominal pain as criteria for worm infestation. Universal deworming of children has been recommended because of its high prevalence. Deworming in preschool children in slums of Lucknow resulted in weight and height gain among children who had a history of round worm passage [12],[13]. Thus, we also emphasised on clinical grounds to highlight problem and encourage deworming. Deworming programmes are still not operational at mass level, leading to malnutrition among children.

Around two-third of children were suffering from anaemia with equal distribution in both sexes. This corroborates to the finding of various studies carried out in Delhi, which showed a high prevalence of anaemia in children [13],[14]. Nutritional deprivation and worm infestation are the major causes of anaemia [15].

Presence of PEM among two-third under-six children, over half suffering from anaemia, one-third from worm infestation, and over two-third from acute ailments, requires to develop integrated child illness management programme. In a modern city like Chandigarh, which has one of the highest literacy rates among Indian cities (82%), we have observed that such health problems are enormous in the urban slums. There is need to strengthen ICDS programme in order to reach to the underprivileged children who are not beneficiaries of the programme, check the growth of slums, and develop good health infrastructure, especially for mother and

child health. Government of India has recently initiated a newer programme involving ICDS workers under Prime Minister's initiative to reduce malnutrition among underweight adolescents and pregnant women. Until we have an effective programme for underprivileged section of population, Vision of India 2020 to make it a developed nation will remain a distant dream.

Conclusion

A high prevalence of malnutrition, anaemia, and worm infestation among under-six children in urban slums of a modern city with a high socioeconomic status highlights the fact that such problem needs attention of policy makers at national level and some systems need to be developed to reduce the problems.

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