Assessment of the status of malnutrition and immunization coverage in under-five children attending Anganwadis

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ABSTRACT

Background: Malnutrition affects people worldwide. Immunization is the most cost-effective and accessible health investment which if taken efficiently can prevent a vast spectrum of diseases in children. Aim: The focus of this study is to assess the nutrition status and immunization coverage of children attending various Anganwadis. **Materials and Methods:** A study of immunization and nutrition status was held among 252 children under the age of 5, attending 30 Anganwadis in Western India. **Results:** This study showed that 27.12% of female and 38.94% of male children fell under malnutrition status, including both moderate and severe category. About 72% of children completed their vaccination schedule, as compared to 14% of children with incomplete immunization. The remaining 14% lacked complete records. **Conclusion:** Our study showed a smaller proportion of children under severe and moderate acute malnutrition compared to other settings. A few dietary modifications and counseling can give us a better future scenario.

Key words: *Anganwadis, Immunization coverage, Malnutrition, Nutrition, Under-five children*

An estimated 159 million children under the age of 5 years are stunted and 50 million are wasted. According to the World Health Organization (WHO), malnutrition refers to the deficiency, excess, or imbalance in a person's intake of energy and/or nutrients. Malnutrition covers two broad groups of conditions, undernutrition and conditions such as overweight and obesity [1].

Reports of the National Health and Family Survey, United Nations International Children's Emergency Fund, and WHO have highlighted that rates of malnutrition among children are alarmingly high in India. The factors for malnutrition include poor nutrition, poor lactational habits, lack of education, and unhealthy sanitary habits. Malnutrition in children leads to stunting, severe wasting, frequent childhood illness, an inability to recover from illnesses, and retarded growth with developmental delays [2].

It is estimated that malnutrition is a contributing factor in about one-third of all deaths of children under the age of 5. Various government initiatives have been launched over the years which seek to improve the nutrition status in the country. These include the Integrated Child Development Services (ICDS), the National Health Mission, the Mid-Day Meal Scheme, and the National Food Security Mission, among others [3]. India has been in an age-old battle with malnutrition, the constant need to bring down the percentage of children affected still remains. Hence, we conducted this study for further assessment of the malnutrition status and immunization coverage of under-five children attending Anganwadis.

MATERIALS AND METHODS

This is a community-based cross-sectional study, covering a sample size of 252 children under the age of 5 years, in 30 Anganwadis included in the urban health center field practice area of a private medical college in Western India. The study was conducted during April–September 2018 by the undergraduate medical students. The students were trained in taking height, weight, and mid-arm circumference (MAC) to avoid interpersonal variations. The permission was obtained from the Institutional Ethics Committee, district child development project officer, supervisor of Anganwadi, and Anganwadi workers.

After obtaining verbal consent from mother, data were recorded using a pre-designed questionnaire. Information about nutrition and immunization including age, birth order, sex, height, weight, and MAC were obtained. Height and MAC were measured with the help of a narrow and non-stretchable measuring tape. A correctly calibrated mechanical stand-on weighing machine was used to record the weight of the child. The inclusion criteria were to cover all under-five children who were present in the Anganwadi on the day of the visit. The children below the age of 5 without parental present and children not present on the day of visit were excluded from the study.

To grade the children with respect to the WHO, a Z-score or standard deviation was calculated individually for each child using the basic understanding that Z-score (or SD score) = (Observed

value - median value of the reference population)/standard deviation value of reference population, and the results obtained were tabulated under moderate acute and severe acute, at risk or normal using the same criteria. To calculate the mid upper arm circumference (MUAC), the circumference of the left upper arm was measured at the mid-point between the tip of the shoulder and the tip of the elbow (olecranon process and the acromion) [4] using a non-stretchable, narrow measuring tape. Moderate acute malnutrition (MAM) was defined as weight-for-height Z-score between −2 and −3 or MUAC between 115 and 125 mm. Severe acute malnutrition (SAM) was diagnosed when the child had any one of the following criteria: Weight-for-height (WFH) Z-score <−3SD or MUAC <115 mm [5].

Table 1: Sociodemographic characteristics of under-five children

Characteristics	Children (%)
Gender	
Male	130 (51.6)
Female	122 (48.4)
Total	252
Birth order	
1	55 (21.8)
2	90 (35.7)
3	82 (32.5)
4	22 (8.8)
5	3 (1.2)
Total	252
Age distribution	
0–1	Males – 19 Females – 11
1–2	Males – 27 Females – 21
2–3	Males – 27 Females – 24
3–4	Males – 33 Females – 39
4–5	Males – 26 Females – 25

Immunization coverage was studied with the help of vaccination records of children maintained in the cards under the Rashtriya Bal Swasthya Karyakram (RBSK) scheme at Anganwadis. Full immunization coverage was defined as a child who had received the Bacillus Calmette–Guérin; three doses of Diphtheria, Pertussis, and Tetanus; at least three doses of polio vaccine; and one dose of measles vaccine [6]. Partial immunization coverage was considered in children who had received vaccine doses between complete and non-immunization. Non-immunization was failure of an infant of 12–23 months old to receive a single dose of the vaccines listed.

RESULTS

The study was carried out for 252 under-five children attending Anganwadis whose sociodemographic details are given in (Table 1). A total of 14 children were excluded due to lack of complete data, hence, 238 children were included in the study.

The WHO standards of weight for height [7] for female and male children, up to 5 years of age, were used to assess the status of malnutrition after calculating the Z-score and tabulating the results. Overall, 49.78% were adequately nourished, 17.31% were at risk, 16.45% of children fell under MAM, and 16.45% of children were categorized under SAM (Table 2).

When the prevalence of malnutrition with respect to MUAC was assessed, 1.86% fell under the category of MAM and only 2.79% were under SAM.

Immunization highlights an important aspect of vaccine preventable diseases, which have higher incidence in malnourished children. Complete immunization (as per their age) status was 72%, partially immunized was 14%, and the rest 14% of children under this study did not have a record.

DISCUSSION

The WHO estimates that 52 million children under 5 years of age are wasted, 17 million are severely wasted, and 155 million are stunted. About one-third of the world's malnourished children

Table 2: WHO WFH Z-score according to gender for 0–5 age groups

Age (year)/Z-score	Gender	Normal	At Risk	MAM	SAM	SAM	p-value
Standard deviation		Median	−1 SD	−2 SD	−3 SD	−4 SD	
0–1 year	Males	10 (62.5)	3 (18.7)	0 (0)	1 (6.3)	2 (12.5)	0.008
	Females	5 (50.0)	0 (0.0)	5 (50.0)	0 (0.0)	0 (0.0)	
1–2 years	Males	14 (56.0)	5 (20.0)	3 (12.0)	2 (8.0)	1 (4.0)	0.489
	Females	8 (44.5)	2 (11.1)	5 (27.8)	3 (16.6)	0 (0.00)	
2–3 years	Males	11 (47.8)	4 (17.4)	4 (17.4)	3 (13.0)	1 (4.4)	0.940
	Females	9 (37.5)	2 (8.3)	6 (25.0)	3 (12.5)	4 (16.7)	
3–4 years	Males	18 (58.0)	3 (9.7)	4 (12.9)	4 (12.9)	2 (6.5)	0.346
	Females	19 (52.8)	9 (25.0)	4 (11.1)	4 (11.1)	0 (0.0)	
4–5 years	Males	9 (39.1)	9 (39.1)	2 (8.7)	3 (13.1)	0 (0.0)	0.010
	Females	12 (48.0)	3 (12.0)	5 (20.0)	0 (0.0)	5 (20.0)	

MAM: Moderate acute malnutrition, SAM: Severe acute malnutrition

Table 3: Grading of malnutrition using MUAC

Age	Gender	Well nourished (%)	MAM (%)	SAM (%)
1–2 years	Male	24 (88.9)	1 (3.7)	2 (7.4)
	Female	18 (94.7)	1 (5.3)	0 (0.0)
2–3 years	Male	27 (100)	0 (0.0)	0 (0.0)
	Female	22 (100.0)	0 (0.0)	0 (0.0)
3–4 years	Male	31 (93.9)	1 (3.03)	1 (3.03)
	Female	37 (97.4)	0 (0.0)	1 (2.63)
4–5 years	Male	23 (95.83)	1 (4.17)	0 (0.0)
	Female	23 (92.0)	0 (0.0)	2 (8.0)

MUAC: Mid upper arm circumference, MAM: Moderate acute malnutrition, SAM: Severe acute malnutrition

live in India [8]. A study by Sahu *et al*. reported that under-five underweight children ranged from 39 to 75%, MAM from 15.4 to 74%, and SAM from 10.6 to 42.3% in different parts of the country [9]. The present study showed that 11.53% of children aged 0–1 years were suffering from SAM, for age 1–2 years 13.95%, for age 2–3 years 23.4%, for age 3–4 years 14.9%, and for age 4–5 years 16.67% were suffering from SAM.

According to the National Family Health Survey-4, 36.3% of children around 0–1 years were suffering from SAM, for 1–2 years of age 44.1% of children, for 2–3 years 6.8% of children, for 3–4 years of age 5.7% of children, and for 4–5 years of age 5.3% were suffering for SAM [10].

In our study, the highest incidence of malnutrition was found in children of age group 2–3 years which points toward poor weaning practices prevalent in the society; on the contrary, lowest figures were observed in the age group of 0–1 years because of their complete dependency on breast feeding. A study by Ramachandran *et al*. showed that during the first 3 months, there was no increase in underweight and stunting rates [11]. Increase in number of underweight children between 3 and 5 months appears to be associated with introduction of animal milk and increase in morbidity due to infections. The further rise in underweight and stunting rates between 6 and 11 months could be due to late introduction, inadequate quantity, low-calorie density of complementary feeds, and increased morbidity due to infections. The increase between 12 and 23 months could be the result of inadequate energy intake when children shift to household diet.

According to Rapid Survey on Children 2014, about 29.4% of children were underweight, 38.7% were stunted, and 15.1% were wasted [12]. Another survey conducted in North India reported that the prevalence of SAM (WFH *Z*-score<−3SD) in under-five children was found as 2.2%. It was found that 2527 (13.7%) children were suffering from MAM (WFH Z-scores <−3–−2 SD). A total of 7160 (38.8%) children had WFH <−2–−1SD and 8376 (45.3%) children had WFH Z-score <−1SD [13].

With reference to MUAC (Table 3), we found that only 2.79% of the children were suffering from SAM and 1.86% of children fell under MAM. We chose to further our findings of malnutrition with MUAC because this is a viable, low cost, and low burden alternative for community level nutritional status assessment [14].

In a cross-sectional study in West Bengal, India, a total of 2028 children (935 boys and 1093 girls) from 66 ICDS centers were enrolled, and the age-combined rates of overall (moderate and severe) undernutrition among boys (38.49%) were higher than among girls (32.22%). The age-combined rates of moderate undernutrition were 36.34% and 31.03% among boys and girls, respectively [15]. However, in the present study, the MAM in boys was higher at 16.03% and in girls, it was 13.95%.

According to the WHO, inadequacy in immunization contributes to approximately 2–3 million deaths/year. Immunization is the most cost-effective and accessible health investment which if taken efficiently can prevent a vast spectrum of diseases in children. According to a study by the National Center for Biotechnology Information, only 63% of the children in India were completely vaccinated, and the remaining were either partially or not vaccinated at all [16]. Our results showed a promising picture as 72% of children had received complete immunization for their age.

A study by Vaidya *et al*. also showed that lack of awareness and doubts in immunization were important reasons for not giving it [17]. Radhamani *et al*. in their study on nutritional status of Anganwadi children highlighted that the causes of malnutrition in children were multifactorial, and improvement in one aspect did not necessarily serve the purpose. There was a need for an integrated approach [18]. The planning and integration of the work of Anganwadi workers under ICDS, Accredited Social Health Activists under National Rural Health Mission, and active community participation would result in better delivery of services to target groups. RBSK is an ambitious project with vision to improve child health screening and early intervention services, focusing on the approach of early identification and link to care, support, and treat. Anganwadi is a part of the Indian public health-care system which comprises basic health-care facilities such as contraceptive counseling and supply, nutrition education, and supplementation, as well as pre-school activities [19]. However, it was evident from our field visits that attendance of children in Anganwadis was low; hence, utilization of government provided health services was poor.

The study had a few limitations. Only a small population of children present in 30 Anganwadis could be covered. The geographical location of the research was also majorly limited to our urban field practice area. The constraints of time and cost in the present study restricted our approach to general examination and anthropometric measurements.

CONCLUSION

Our incidence of SAM ranged between 11 and 17% for age groups between 0 and 5, which shows a considerable proportion of children at risk. A small fraction of these children requires dietary modifications, and status of the rest can be improved by counseling the community and guiding the parents to adopt a healthier lifestyle.

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