Doi: 10.32677/IJCH.2017.v04.i03.017

Original Article

A study on nutritional status of Anganwadi children in a rural area of North Kerala

K V Radhamani[1], S V Rajeev[2]

From Departments of Pediatrics, [1]Academy of Medical Sciences, Pariyaram, Kannur, [2]Sree Gokulam Medical College, Thiruvananthapuram, Kerala, India

Correspondence to: K V Radhamani, Department of Pediatrics, Academy of Medical Sciences, Pariyaram, Kannur, Kerala, India. E-mail: drkvrmani@yahoo.com

Received – 26 March 2017 Initial Review – 06 April 2017 Published Online – 16 June 2017

ABSTRACT

Background: Malnutrition being the biggest contributor to child mortality and morbidity is highly prevalent among preschool children in India. The state of Kerala which tops the list in most of the health indicators in India is no exception to wide prevalence of malnutrition in children. **Objective:** To assess the nutritional status of Anganwadi children aged 2-5 years in a rural area of North Kerala. **Materials and Methods:** A cross-sectional study was done among Anganwadi children between 2 and 5 years of age from January 2013 to March 2013 at Cheruthazham, Kannur district of Kerala. Cluster sampling method was used for the study. Height and weight of the children were measured using the standard anthropometric equipment, and body mass index was calculated. Data were analyzed by SPSS version 17, Microsoft Excel 2007. **Results:** In accordance with the WHO criteria, 14.6% of children were underweight; 10.6% stunted and 16.6% were wasted. Underweight, stunting, and wasting were most prevalent in 2-3-year-old children and minimum among 3-4-year-old children. Underweight and wasting were more prevalent among female children than their male counterparts. Stunting was more in male children. **Conclusion:** Results of the present study showed that the nutritional status of the children in studied population was good comparing with other studies. Nutrition, health education and good access, and utilization of healthcare can be very effective interventions which could result in substantial reduction in undernutrition in children.

Key words: *Anganwadi, Malnutrition, Nutrition, Stunting, Underweight, Wasting*

Malnutrition is a condition that results from taking an unbalanced diet in which certain nutrients are lacking, in excess (high intake), or in wrong proportions. According to the WHO, malnutrition is the biggest contributor to child mortality. Malnutrition is clearly linked to inappropriate feeding practices rather than food availability or household food security. A proper diet is essential from early stages of life for growth and development [1]. The prevalence of underweight children in India is among the highest in the world and is nearly double of Sub-Saharan Africa. Children between 1 and 6 years of age in India constitute 15% of the total population [2]. According to the WHO report, nearly two of three preschool children in India are malnourished [3].

Nutrition of children between 1 and 5 years of age is of prime importance as they are most vulnerable to deficiencies or malnutrition [4]. Nutritional problems among children cause major morbidity and mortality in India. Despite the increase in food production and many interventions in recent years, the problem of chronic malnutrition continues to exist extensively among children [5]. Nutritional deficiencies commonly seen in preschool children are protein-energy malnutrition (PEM), deficiency of vitamin A, vitamin B complex, and vitamin D, iron and fluorine deficiency. PEM is a spectrum having different clinical manifestations. Nutritional status can be determined by symptoms of nutritional deficiencies, dietary intake, clinical examination, and anthropometry.

According to the WHO, India contributes to about 21% of the global burden of child deaths. Malnutrition is the underlying cause up to 50% under five deaths. Kerala accounts for 21% of the stunted, 16% of wasted, and 29% of underweight children [6]. The children below five years are the most vulnerable to undernutrition and its adverse effects [7]. Their nutritional requirement is relatively higher for body weight than older children and adults. Several previous studies concluded with large disparities in district-wise analysis of child nutritional status in Kerala. Only a few studies are available for nutritional status of Anganwadi children, especially in rural areas. Hence, the present study was undertaken with an aim to assess the nutritional status of children enrolled in Anganwadi centers in Cheruthazham area. Cheruthazham area was chosen because no such study was conducted from this area and its proximity to Pariyaram Medical College.

MATERIALS AND METHODS

This cross-sectional study has been conducted during January 2013-March 2013. The study was approved by the Institutional Review Board and permission to carry out the study was

sought from the concerned Integrated Child Development Scheme officer. All children of both genders and age group 2-5 years enrolled in Anganwadi centers of Cheruthazham panchayat, Kerala, India were enrolled in the study after obtaining written informed consents from parents/guardians. Those children who were <2 years or more than 5 years were not included in the study. Children whose parents did not give consent for study was also excluded from the study.

Cluster sampling method was used in the present study. Each Anganwadi was considered as a single cluster. Based on the past studies, the prevalence of undernutrition in Kerala was found out to be 22.9 (reference NFHS 3 report: Nutrition and anemia 2005-06) and sample size estimated was approximately 144, which was rounded to 150. Considering each Anganwadi has 15-20 children, of the 32 Anganwadi centers, 10 Anganwadi centers were selected randomly using a computer generated algorithm, to get a sample size of 150. All children from the selected 10 centers were included in the study after applying inclusion and exclusion criteria.

A cross-sectional study was carried out for 3 months, 2 days in a week, between 1 pm and 3 pm. All the Anganwadi workers were informed about the study. The aims and objectives and procedure were explained to all of them and relevant data were entered in the pro forma. Anthropometry of all the recruited children was recorded to evaluate the nutritional status. Height (up to nearest 1 mm) and weight (up to nearest 100 g) of the children were measured using standard anthropometric equipment.

Body mass index (BMI) was calculated using equation as weight in kg divided by square of height in meters. Nutritional status was evaluated using the age and sex specific cutoff BMI as described by Cole et al. [8] and the cutoff points for thinness Grades I, II, and III for 3-5 years children are summarized in Table 1. Although this table is almost comparable with the BMI Z-score table developed by the WHO this table is not the same, there is subtle difference [8]. A recent study by Cole et al. reveals that undernutrition is better assessed as thinness (low BMI for age) than as wasting (low weight for height). They have suggested that these new cutoff points should encourage direct comparison of trends in child and adolescent thinness worldwide.

The nutritional status of children was also assessed according to the Z-score or standard deviation (SD) classification to grade undernutrition using the WHO growth standards (2006) [9]. This system allows us to measure all the three indices and express the results in terms of Z-scores or SD units from the median of the international reference population. Children who are >2 SD below the reference median (i.e. a Z-score of <−2) were considered to be undernourished, i.e., to be stunted, wasted, or to be underweight. Children with measurements below 3 SD (a Z-score of <−3) were considered to be severely undernourished. Collected data were analyzed by SPSS version 17, Microsoft Excel 2007. The confidence limit for significance was fixed at 95% with $p<0.05$.

RESULTS

Of total 150 children, 67 (44.7%) were boys and 83 (55.3%) were girls. The majority of the children (n=87, 58%) were belonging to age group 3-4 years. These results are summarized in Table 2.

In our study, among the boys, 94% had normal built and among the female children 89.15% were with normal built. We observed that more female children (10.84%) were thin built than male children (5.9%), but this was not statistically significant ($p>0.05$) (Table 3).

In the present study, no child was seen with severe malnutrition in any age group. Among children aged 2-3 years, 25% were underweight, wasted, and stunted. Among children aged 3-4 years, 9.1% underweight, 8% stunted, and 11.5% wasted. Among children of 4-5 years, 21.8% were underweight, 12.7% stunted, and 23.6% were wasted. The prevalence of underweight, wasting, and stunting was maximum in 2-3-year-old children and minimum among 3-4-year-old children. In accordance with the WHO criteria, 14.6% of the cases were underweight, 10.6% were stunted, and 16.6% were wasted. Underweight and wasting were more in female children (Table 4).

DISCUSSION

In our study, 44.7% of the children were males and 55.3% were females and the majority (58%) of the children belonged to 3-4 year age group. In a study by Mandal et al. [10], 49.20% of the children were boys and 50.79% were girls and study conducted by Deshmukh et al. in under six children showed 52% male and 48% females [11]. The majority (87%) of our children were Hindu, followed by Muslim 8%, and Christians 5%. Harishankar et al. in his study of under 6 children reported 97.9% belonged

Table 1: Cole et al. reference table

Age years	Boys			Girls		
	Grade I	Grade II	Grade III	Grade I	Grade II	Grade III
3	14.74	13.79	13.09	14.47	13.60	12.98
4	14.43	13.52	12.86	14.19	13.34	12.73
5	14.21	13.31	12.66	13.94	13.09	12.50

Table 2: Distribution of Anganwadi children based on age and gender

Age (years)	n (%)		
	Males	Females	Total
2-3	3 (2)	5 (3.3)	8 (5.3)
3-4	45 (30)	42 (27.63)	87 (58)
4-5	19 (12.6)	36 (24)	55 (36.7)
Total	67 (44.7)	83 (55.3)	150 (100)

Table 3: Distribution of Anganwadi children according to BMI

BMI	n (%)		
	Males	Females	Total
Normal built	63 (94)	74 (89.15)	137 (91.3)
Thin built	4 (5.9)	9 (10.84)	13 (8.67)
Intragroup difference	χ^2=0.37, p=0.544		

Table 4: The WHO criteria (standard deviation – classification) of malnutrition

Variables	Number of children	Underweight			Stunting			Wasting		
		N	−2SD	−3SD	N	−2SD	−3SD	N	−2SD	−3SD
Age in years										
2-3	8	6 (75)	2 (25)	0	6 (75)	2 (25)	0	6 (75)	2 (25)	0
3-4	87	79 (90)	8 (9.1)	0	80 (91.9)	7 (8)	0	77 (88.5)	10 (11.5)	0
4-5	55	43 (78.1)	12 (21.8)	0	48 (87.2)	7 (12.7)	0	42 (76.3)	13 (23.6)	0
Total	150	128 (85.3)	22 (14.6)	0	134 (89.3	16 (10.6)	0	125 (83.3)	25 (16.6)	0
Sex										
Boys	67 (44.6)	58 (86.5)	9 (13.4)	0	57 (85.1)	10 (10)		57 (85)	10 (14.9)	0
Girls	83 (55.3)	70 (88)	13 (15.7)	0	77 (92.7)	6 (7.2)		68 (81.9)	15 (18.0)	0

to Hindu and 2.04% to Muslims [4]. According to the study by Mandal et al., the prevalence of thinness among boys was 84.8% and among girls was 85.6%. In this study, more (10.84%) of the female children were thin built than males (5.9%), ($p>0.05$). In a study by Jood et al., 50% of the preschool children were thin built and 50% of them normal built [12].

According to NFHS-2 survey, the prevalence of malnutrition in India was 43% [13] and according to NFHS-3 (2005-06), 42.5% of children under 5 years of age were underweight, 19.8% were wasted and 48% were stunted [14]. The NFHS-3 survey results showed a prevalence of 22.9% of underweight, 24.5% of stunting and 15.1% of wasting in Kerala. In this study, based on the WHO criteria 14.6% of children were underweight, 10.6% were stunted, and 16.6% were wasted. The prevalence of underweight and wasting was highest in the age group of 4-5 years. Stunting was found maximum in age group 2-3 years and minimum in age group 3-4 years. Under weight and wasting were more in females compared to males. Stunting was more in males compared to females.

During the current decade, poor infant and young child feeding, and poor utilization of healthcare are emerging as important determinants of undernutrition in children. Nutrition, health education, and good access and utilization of healthcare can be very effective interventions which could result in substantial reduction in undernutrition in children over the next decade. Children with growth faltering and undernutrition should be identified, counseled, and provided with supplements regularly and monitored for improvement. Children with severe acute malnutrition should be referred to primary health care for care and counseling. From the observations made during the study and considering the results, there is a need to educate the parents to provide energy-rich, locally available, and nutritionally balanced food items.

As the causes of malnutrition in children are multifactorial, improvement in one aspect does not reflect the desired change. The need of the hour is an integrated approach by all the concerned departments and people for the improvement of nutritional status of the children. The nutritional status of children is often the result of many interrelated factors. The assessment of nutritional status involves various techniques such as clinical examination, anthropometric measurements, biochemical evaluation, functional assessment, assessment of dietary intake, vital statistics, and assessment of ecological factors. However, due to constraints such as time, cost, and facility, the present study was restricted to clinical examination and anthropometric measurements which were the main limitation of our study.

CONCLUSION

In our study, 14.6% of the children were underweight, 10.6% stunted, and 16.6% were wasted according to the WHO criteria. The prevalence of underweight, wasting, and stunting was maximum in the age group 3 years. Underweight and wasting were more in females and stunting was more observed in males. These results showed that the nutritional status of children in the studied population is good compared with other studies. Among malnourished children, the majority was mildly malnourished and only a small percentage of children require nutritional modifications.

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Funding: None; Conflict of Interest: None Stated.

How to cite this article: Radhamani KV, Rajeev SV. A study on nutritional status of Anganwadi children in a rural area of North Kerala. Indian J Child Health. 2017; 4(3):348-351.