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DETECTION OF UNDERNUTRITION AMONG PRESCHOOL CHILDREN

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ABSTRACT: BACKGROUND: Undernutrition among Indian preschool children is very much prevalent and is the predisposing factor for various types of morbidity and mortality. **OBJECTIVES:** To detect prevalence of under nutrition among preschool children and to find out sensitive tool for detection of under nutrition. **Study design:** A cross sectional study. **Study subjects:** Children of age group below 6 years attending anganwadi. **Sample size:** Total 108 children attending anganwadi were included in the study. **Data collection:** Data was recorded in prestructured proforma, consisting information regarding personal data and anthropometric measurements like height, weight, head circumference, mid arm circumference etc. **RESULTS:** The overall prevalence of undernutrition according to weight for height, body mass index, weight for age by IAP classification and by Kanawati and Mc Laren index was 36.11%, 41.67%, 42.59% and 66.67%, respectively. Most sensitive tool observed was Kanawati and Mc Laren index to detect true positive undernutrition cases. **CONCLUSION:** Maximum number of undernutrition cases were detected by Kanawati and Mc Laren index, whose ability of detecting true undernutrition cases is very much high in comparison with other indices, even though the sensitivity to detect normal children and predictive ability is less. So the Kanawati and Mc Laren index is considered superior to detect undernutrition in the community.
KEY WORDS: Anthropometric criteria, ICDS, preschool children, undernutrition

INTRODUCTION: A number of National programs are existing for improvement of nutritional status of children, but undernutrition among Indian children is still prevalent to a large extent. Under 5 children are most vulnerable group for undernutrition and undernutrition is predisposing factor for morbidity like infectious diseases and mortality due to the same. Preschool children constitute about 14% of total population of India. One out of every ten infant does not reach his 1st birthday, 15 out of 100 children die before they complete five years of age.[1]

Under ICDS, anganwadi worker plays very important role in delivering various services to different beneficiaries. Also she will be engaged in maintaining various registers and paying visits to community may affect the quality of services given by her. If easiest method of detection of malnutrition is available for anganwadi workers, which will be sensitive, it can be utilized in community even at remote places.

Thus to know magnitude of undernutrition among preschool children and to find out sensitive tool for detection of undernutrition this study was conducted among slum children under 5 years of age attending anganwadi.

MATERIAL AND METHOD: This cross sectional study was carried out from Feb 2008 to March 2008 among the children attending anganwadi under ICDS scheme of rural Malkapur area which is field practice area of Krishna Institute of Medical Sciences Karad, Maharashtra. Sample size of 99 (98.56)

was determined by using formula $n=4pq/L^2$, considering the prevalence of undernutrition among rural preschool children 56%[2] with allowable error 10%. For convenience three anganwadis that totaling minimum sample size (after deducting dropouts) were involved in the study. Out of 14 anganwadis, 3 anganwadis were selected by lottery method. Thus sample of 108 was studied from the selected anganwadis as per Table no. 1.

Anthropometric measurements in the form of height and weight were taken using standard techniques[3]. Height was measured against a meter rod. Body weight was measured using a lever-actuated balance in kilograms with an accuracy of 100 grams with minimum clothing. Mid arm circumference was measured on a tape placed gently but firmly around the freely hanging left arm at the midpoint. Head circumference was measured by placing one end of tape on the glabella and placing it around the head over the opisthocranion point and again meeting at glabella. The ages of children were obtained by contacting mothers of respective children. Prestructured proforma was used to record information regarding personal data and anthropometric measurements. Various anthropometric criteria like Body mass index, Kanawati and Mc Laren Index, weight for age according to IAP classification[4] and weight for height according to Shakir's classification were used to define nutritional status[5]. The definition of undernutrition considered as underweight for age, stunted and wasted according to UNICEF[4,6 -9].

Statistical analysis: χ^2 test applied to study agreement between study indices; body mass index, Kanawati and Mc Laren index, weight for age by IAP and standard method; weight for height. In addition to this, sensitivity, specificity and predictive ability of body mass index, Kanawati and Mc Laren Index, weight for age by IAP against weight for height was assessed.

RESULTS: In the current study, total 108 children (41.67% boys and 58.33% girls) attending anganwadi were interviewed and examined. Maximum children belonged to age group of 5 to 6 years (40.74%); more than half of children (52.78%) belonged to joint family and with family size of 5 to 6 in 42.58% of children. Majority of children (85.19%) were of birth order ≤2. Illiteracy of mother was observed in 13.85% children. More than 1/3rd children (36.11%) belonged to 5th class of modified B.J. Prasad's socioeconomic classification.

Undernutrition with Kanawati and Mc Laren index was 66.67%. Whereas proportion of undernourished children according to weight for age, body mass index and weight for height criteria 42.59%, 41.67% and 36.11% respectively (Table II). It was observed that all the indices significantly detected undernutrition (weight for age p=0.007, Kanawati and Mc Laren index p=0.04, Body mass index p= 0.01). The varying prevalence of undernutrition by various criteria was found high sensitivity i.e. ability of identification of undernutrition in comparison to standard technique; weight for height was observed by criteria Kanawati and Mc Laren followed by weight for age and body mass index (Table III).

DISCUSSION: By weight for age criteria other study[10] found very higher proportion of children (61.6%) were under weight and by weight for height almost similar proportion of wasting (32.9%) among preschool children in comparison with the present study. Similar to present study in other study[11] also Kanawati and Mc Laren Index gave high rate of undernutrition than the other criteria studied (p=0.04). Amongst normal preschool children by weight for height criteria, the proportion

detected as undernourished by Kanawati and Mc Laren index was 30.56%. While amongst normal preschool children by weight for age it was 24.08%.

Weight for age is used quiet often for the assessment of nutritional status, but the accurate age of the children may not be known in the field, which leads to limit the use of this index for survey purpose[4]. Weight for height is an age independent index, which reflects acute and present malnutrition. But to know acute on chronic undernutrition weight for height is to be compared with height for age[12]. The body mass index is age independent in preschool children and is significantly co-related with weight, skin fold thickness, arm and calf circumference. Since weight for height indicates current nutritional status, it was taken as an indicator to detect true undernutrition in the community to compare the sensitivity, specificity and predictive value of other criteria (Table: III). Though weight for age had high sensitivity, specificity and predictive value i.e. it was able to diagnose 64.1% of malnourished and 69.57% of normal children in the community, it was observed that Kanawati and Mc Laren index has very high ability to detect true undernourished children sensitivity 87.18% even though the specificity is lowest than weight for age and body mass index and predictive ability also less than weight for age.

CONCLUSION: From current study it is seen that by using Kanawati and Mc Laren index maximum number of undernourished cases were detected. Also the ability of detecting true undernutrition cases was found very much high with Kanawati and Mc Laren index than other indices, even though the sensitivity to detect normal children and predictive ability is less. Therefore Kanawati and Mc Laren index is considered to be a superior index to detect undernutrition in the community.

RECOMMENDATIONS: Kanawati and Mc Laren index is easy to calculate and constant throughout the preschool age. The anthropometric measurements are easy to record and the instrument which is required to record the data i.e. measuring tape is easy to carry for field survey even at remote places. So the tool, Kanawati and Mc Laren index is recommended for the use by the health workers, anganwadi workers and any other investigators in rapid assessment of nutritional status of preschool children in the community or at remote areas.

Anganwadi	Subjects involved	Drop outs	Total strength of anganwadi
Section I	35	15	50
Section II	30	09	39
Section III	43	05	48
Total	108	29	137
Table 1: Selection of anganwadi to fulfill study sample			

Criterion	Normal (%)	Mild (%)	Moderate (%)	Severe (%)
Weight for height	69 (63.89)	35 (32.41)	04 (3.7)	0 (0.0)
Weight for age (IAP)	62 (57.41)	36 (33.33)	08 (7.41)	2 (1.85)
Kanawati and Mac Leren index	36 (33.33)	60 (55.56)	09 (8.33)	3 (2.78)
Body mass index	63 (58.33)	45 (41.67)		
Table 2: Distribution of children according to various criteria				

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Method under experiment		Weight for height		Sensitivity (%)	Specificity (%)	Predictive value of test (%)	χ^2value
		Normal	Under Weight				
Weight for age	Normal	25	21	64.1	69.57	54.35	11.55*
	Under Weight	14	48				
Kanawati and Mc Leren index	Normal	34	48	87.18	30.43	41.46	4.23**
	Under Weight	05	21				
Body mass index	Normal	11	36	27.5	47.06	23.4	6.63***
	Under Weight	29	32				

Table 3: Sensitivity, Specificity and predictive values of various nutritional criteria.

p =0.0007*, p=0.04**, p =0.01***

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