Brief Reports

Prevalence of Underweight, Stunting and Wasting

Nandini Saxena
Deepika Nayar
Umesh Kapil

Preschool children constitute the most vulnerable segment of any community. Their nutritional status is a sensitive indicator of community health and nutrition(l). Recently, the World Health Organization (WHO) has recommended the utilization of standard deviation or z-scores for assessing the nutritional status of preschool children^). The z-score classification provides data on qualitative distribution of undernutrition, *i.e.,* underweight, stunted and wasted children in a community. This method allows for extrapolation below the lowest percentile by presenting the deviation of anthropometric measurements from the reference median, in terms of standard deviation or 'z-scores'(2).

Scarce data is available on the prevalence of undernutrition among preschool children in Delhi using the z-score classification. The present study was thus conducted with an objective to assess the nutritional status and prevalence of underweight, stunting and wasting amongst preschool children residing in two urban slums of Delhi, utilizing this classification system.

From the Department of Human Nutrition, All India Institute of Medical Sciences, Ansari Nagar, New Delhi 110 029.

Reprint requests: Dr. Umesh Kapil, Additional Professor, Department of Human Nutrition, All India Institute of Medical Sciences, Ansari Nagar, Neiv Delhi 110 029.

Manuscript received: September 3,1996;
Initial review completed: October 28,1996;
Revision accepted: December 31,1996

Subjects and Methods

The study was conducted in two urban slums of National Capital Territory (NCT) of Delhi. A total of 7000 individuals constituted the study population. All families with children below six years of age living in the selected urban slum areas were enlisted and every alternate family was covered for the study. A total of 630 under six children thus constituted the sample size.

A pretested semistructured interview schedule was administered to the mothers of the children to elicit information on socioeconomic status of the families. The correct age of the children was determined by scrutiny of available birth records or by using local event calendar. Most of the mothers were able to recall the date of birth of the child while for some, estimates were made to the nearest one week.

Anthropometric measurements namely height/length and weight were recorded for each child by the same investigator us ing standard techniques(3). The height of the children was recorded to the nearest 0.1 cm using anthropometric height rod. For children below 24 months of age, length was measured using infantometer. The weight measurements were recorded to the nearest 100 g using SECA electronic weigh ing scale. Repeated measurements were made for 20 children to periodically correct for the intraobserver error.

The z-scores for three indices, i.e., weight-for-age, height-for-age, and weight-

for-height were calculated using computer software. The median values of the National Center for Health Statistics (NCHS) reference data were us^d as standards.

Data regarding dietary intake of a subsample of children (n=225) was obtained by trained nutritionists utilizing the twenty four hour recall method. The raw amounts of food used for cooking for the family, the total volume of food cooked for the family, and the volume of food consumed by the indexed child was enquired by demostrating standardized utensils. Raw equivalents of cooked food consumed by the child were calculated from the above procedure(4). The nutrient intake was calculated by using a database derived from Indian food composition tables(5).

Results

In the present study, a total of six hundred and thirty under six year old children were studied (299 males and 331 females). The mean per capita income of the families was Rs. 488 ± 363 per month. Nearly 54% families belonged to the lower-upper income group *JLS* per the modified Kuppuswamy scale(6).

The z-score distribution of the three indices amongst the children, *i.e.,* weight-forage, height-for-age an weight-for-height are depicted in *Fig. 1.* According to the weight-for-age criteria, 57.6% of the children were suffering from undernutrition (z-scores < -2) with 20.3% children falling under Grade II of z-scores scale, *i.e.,* z-score <-3 *(Table I)*. The height-for-age data showed that 53.0% of the children were stunted. Similarly, 22.5% of children were wasted, (weight-for-height z-score <-2) *(Table I).* The agewise distribution of the z-scores revealed that highest prevalence of stunting occurred in the age group of 48-59 months. The prevalence of underweight was found to be highest in the age group of 24-35 months whereas the highest prevalence of wasting was observed in the second year *(Fig. 2).*

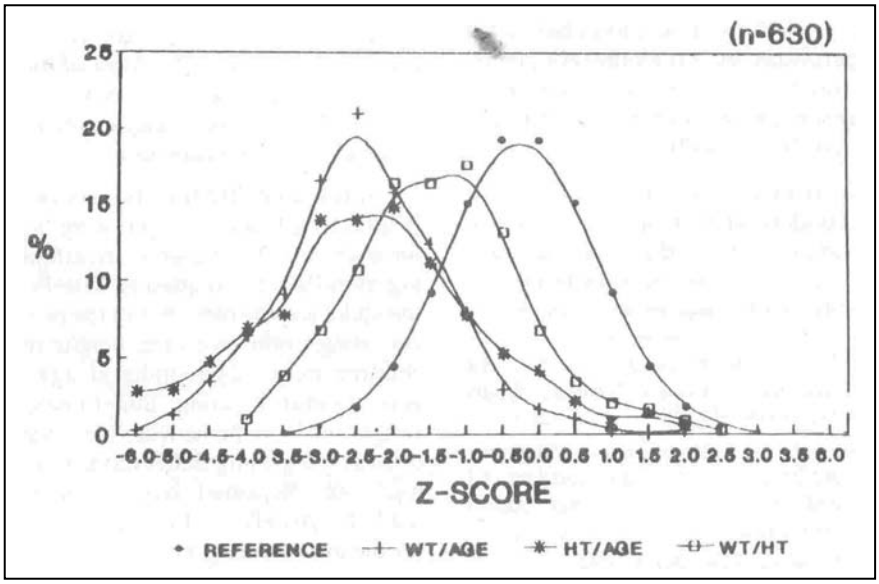

Fig. 1. Z score distribution for the three indices.

TABLE I -*Nutritional Status of the Subjects According to the Three Basic Indices.*

Index	Number of subjects (%)		
	Normal	Grade I	Grade II
Weight-for-age	267 (42.4)	235 (37.3)	128 (20.3)
Height-for-age	296 (46.9)	171 (27.1)	163 (25.9)
Weight-for-height	488 (77.5)	105 (16.7)	37 (5.8)

Grade I = Z-score < -2 to -3; Grade II = Z-score < -3.

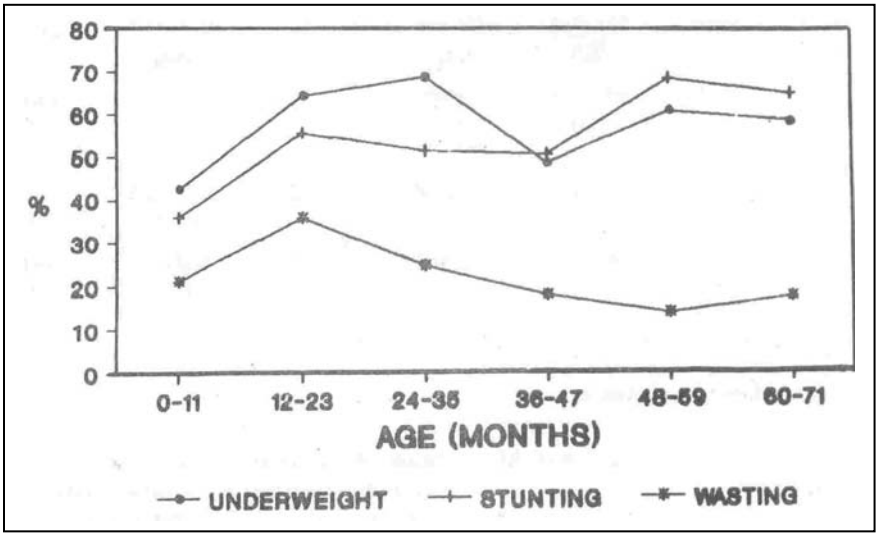

Fig. 2. Prevalence of malnutrition in different age groups.

The nutrient intake of the normal and undernourished children is presented in *Table II*. The underweight, wasted and stunted children had significantly lower ($p<0.05$) energy and protein intake as compared to normal children.

Discussion

In developing countries, anthropometry, despite its inherent limitations, still remains the most practical tool for assesing the nutritional status of the children(2). The z-score classification has been recommended for establishing the profile of malnutrition in a population as it reflects the reference distribution and is also comparable across ages and across indicators(7).

The routinely used classifications of nutntional status, for example, the IAP classification provide information on only one of me three indices while the z-score classification provides complete profile of undernutrition which includes underweight, stunting and wasting. In the present study, the z-score classification was used to determine the prevalence of undernutrition amongst urban slum preschool children in Delhi. All the three basic indices, *i.e.,*

TABLE II—*Nutrient Intakeof Normal and Undernourished Children*

Index	Energy (Mean±SD) Kcal			Protein (Mean±SD) g		
	RDA	Normal	Malnourished	RDA	Normal	Malnourished
Weight-for-age						
1-3 yrs	1240	872±442 (63)	681±379* (93)	22	25.9±12.2 (63)	18.9±10.2* (93)
4-6 yrs	1690	983+372 (25)	770±395* (44)	30	28.6±8.2 (25)	22.9±9.8* (44)
Height-for-age						
1-3 yrs	1240	761±385 (82)	755±449 (74)	22	22.4±11.8 (82)	21.0+11.3 (74)
4-6 yrs	1690	990+416 (22)	780±375* (47)	30	28.5±10.1 (22)	23.4±9.3* (47)
Weight-for-height						
1-3 yrs	1240	802±444 (117)	628±279* (39)	22	22.5+11.9 (117)	19.3±10.4 (39)
4-6 yrs	1690	842+386 (58)	872±467 (11)	30	25.3±9.9 (58)	23.6+9.2 (11)

Figures in parentheses denote number or children in each category *Difference significant at $p<0.05$
RDA-Recommended dietary allowance.

weight-for-age, height-for-age and weight-for height were used.

Weight-for-age identified the maximum number (58%) of undernourished children. The recent National Family Health Survey (NFHS) conducted in Delhi reported that the prevalence of underweight amongst 1-4 years old children was 41.6%(8). Stunting, *i.e.,* low height-for-age was observed in more than half of the subjects. Wasting (low weight-for-height) was observed in 22% children. The prevalence of stunting and wasting as reported by another recent survey conducted in Delhi(8) were 43.2% and 11.9%, respectively.

A lower energy and protein intake was found amongst the undernourished children when compared to that of the normal children. Possibly, this was the primary cause of undernutrition observed in the present investigation. Stunting, which is an indicator of chronic undernutrition, was highest in the 4-6 years age group. The current nutrient intake of stunted children in this age group was also found to be significantly lower than normal children pointing to a chronic deficit in the dietaries of the undernourished children.

Thus, in the present study a high prevalence of undernutrition and a poor dietary intake was documented amongst the under six children living in urban slums of Delhi.

REFERENCES

1. Sachdev HPS. Assessing child malnutrition: Some basic issues. Bull NFI 1995; 16(4): 1-5.
2. WHO Working Group. Use and interpretation of anthropometric indicators of

nutritional status. Bull WHO 1986; 64: 929-941.

3. Jelliffee DB, Jelliffee EP. Community Nutritional Assessment. Oxford, Oxford University Press, 1990.
4. Thimmayamma BVS. A Handbook of Schedules and Guidelines in Socio-economic and Diet Surveys. Hyderabad, National Institute of Nutrition, Indian Council of Medical Research, 1990.
5. Gopalan C, Ramasastry BV, Balasubramanian SC. Nutritive Value of Indian Foods. Hyderabad, National Institute of Nutrition, Indian Council of Medical Research, 1990.
6. Kuppuswamy B. Manual of Socioeconomie scale (rural). New Delhi, Manasayan, 1981.
7. National Nutrition Monitoring Bureau: Report of Repeat Surveys (1980-90). Hyderabad, National Institute of Nutrition, 1991.
8. National Family Health Survey (MCH and Family Planning). Delhi, Population Research Center, Institute of Economic Growth, 1995; pp 137-147.

Clinical Profile of Persistent Diarrhea in a DTTU

Seema Alam
S.H. Ahmad
I.M.S. Lamba*

Three to twenty per cent of all acute diarrheal episodes continue to become persistent diarrhea (PD) and contribute to 30-50% of all diarrhea related mortality(l). This work was undertaken to find the prevalence of persistent diarrhea in our Diarrhea Treatment and Training Unit (DTTU) and to identify the clinical risk factors, for this condition.

From the Department of Pediatrics, J.N. Medical College, Aligarh Muslim University, Aligarh 202 001 and institute of Research in Medical Statistics, Indian Council of Medical Research, New Delhi 110 029.

Reprint requests: Dr. Seema Alam, Department of Pediatrics, J.N. Medical College, Aligarh Muslim University, Aligarh 202 001.

Manuscript received: May 1,1996;
Initial review completed: June 6,1996;
Revision accepted: January 3,1997

Subjects and Methods

Of the 1995 children who attended the DTTU between June 1992 to November 1993, 64 had persistent diarrhea (duration >14 days). Eleven of these were admitted with a diagnosis of acute diarrhea which got prolonged into PD during the hospital stay. Sixty four age and sex matched children with acute diarrhea (duration <7 days) served as controls. Detailed history including maternal literacy, pre-admission drug use, feeding pattern, previous history of PD and type and frequency of stools was recorded. Anthropometric measurements, presence and persistence of dehydration beyond 24 hours, malnutrition as per IAP classification, in hospital weight loss and evidence of systemic infection were especially looked for. Routine stool examination was carried out for all patients. Other investigations were asked for whenever indicated. The entire data was entered in a pretested proforma. SPSS PC+ was used to calculate the crude odds ratio (OR) and 95% confidence interval (CI) by univariate analysis. Adjusted OR and 95% CI were computed by logistic regression analysis to