

Original article:

WHO classification detecting more severe malnutrition: A comparative study with IAP classification

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Abstract:

Introduction: According to NFHS-3; In India , 65% i.e. nearly 80 million children under five year of age suffer from varying degree of undernutrition(according to WHO classification). Various classifications are being used to know the nutritional status of children , latest one being WHO classification for undernutrition given in 2006. Here we aim to compare WHO classification with Indian Academy of Pediatrics(IAP) classification for malnutrition in children.

Material Methods: This was a cross sectional study conducted in Vadodara District of Gujarat during 2009 till 2011. 1000 children between 6 months till 60 months of age were included. Their height/ length and weight were recorder and classified according to WHO and IAP classification and these were compared statistically.

Results: WHO classification classified 90% of children undernourished whereas IAP classification classified 80% of children as undernourished. According to WHO criteria 32% and in IAP criteria only 10% children were severely undernourished. When compared, there was statistically significant ($p=0.000$) difference in classification by these classifications.

Conclusion: WHO classification detects more children with undernutrition but has drawback of classifying more of them in severe category as compared to IAP classification.

Key words: WHO classification, IAP classification, Undernutrition

Introduction:

According to the United Nations declaration :“the child shall enjoy special protection and shall be given opportunities and facilities by law and order and by means to enable him to develop physically and mentally in a healthy and normal manner and in a condition of freedom and dignity. ” But still Under nutrition continues be a primary cause of ill-health and premature mortality among children in developing countries(1). In NFHS-3 it has been estimated that in India , 65% i.e. nearly 80 million children under five year of age suffer from varying degree of undernutrition(according to WHO

classification), 46% are moderately to severely underweight (thin for age) , 38% are moderately to severely stunted (short for age), and approximately 19% are moderately to severely wasted (thin for height)(2). India ranked 96 out of 119 countries in the global hunger index (GHI) developed by the international food policy and research institute(IFPRI) in 2006, and where child undernutrition is concerned, it stood 117 among 119 countries(3). Estimates from the most recent Nationallyrepresentative survey indicate that 6.4% of childrenbelow 60 months of age have weight for heightbelow -3 SD i.e. Severe Acute

Malnutrition(SAM)(2).In the current Indian population of 1100 million, there would be about 132 million under five children (~12% of population), of which 6.4% or roughly 8 million can be assumed to be suffering from SAM.(2,4)

WHO classification for malnutrition considers standard deviation or Z scores for classifying children in moderate (between -2 to -3 SD) and severe (<-3SD) categories, whereas IAP Classification considers 0 SD or 50th percentile as 100 percent of expected weight for age and then grade I (70-80% of expected), grade II (60-70% of expected), grade III (50-60% of expected) and grade IV (<50% of expected) PEM (protein energy malnutrition) are classified. In these grade I and II are considered moderate while grade III and IV are considered severe malnutrition(1).

In our study we aimed to compare WHO versus IAP classification for malnutrition in children below 5 years of age.

Material and methods:

This cross-sectional study was conducted from July 2009 to July 2011. Children under 5 year of age attending Anganwadi centers in and around Vadodara city in Gujarat were selected by simple random sampling. The study was approved by the Institutional ethical committee and informed consent was taken from respected authorities as well as from parents or caretakers of children. Any child with obvious skeletal or neurological problem

hindering evaluation of physical growth was excluded from the study. Age was obtained from the anganwadi records. Weight of the child was recorded in kilograms with minimal clothing using Salter weighing scale provided by UNICEF (model 235 6S) with accuracy of 100 g and maximum reading of 25 kg. Length was measured in children less than 2 years using Infantometer with an accuracy of 0.5 cm. Height was measured in children more than 2 years of age with accuracy of 0.5 cm. Height in centimeters was marked on the wall with the help of measuring tape. Children were made to stand bare feet with heels, back and occiput against the wall with Frankfurt plane being parallel to the ground. A scale was brought to the topmost point of head and reading was taken avoiding parallax. Two readings were averaged for analysis. Weight and height of all children were recorded and plotted on WHO growth charts. Anthropometric data were plotted separately on both WHO and IAP charts. Socioeconomic status was determined by modified Kuppaswamy's classification [7]. A minimum sample size calculation of 1000 was done assuming a population of 10 lakhs with 30% children and 5% prevalence of severe underweight (with worst acceptable result of 3.5%) and a 0.05 significance level. All statistical methods were carried out through SPSS for windows (version 16.0). Chi square test was employed to get an association between WHO and IAP charts. P value < 0.05 was taken as statistically significant.

Results:

Table No.1. Distribution of children according to Age and Sex:(n = 1000)

SN	AGE	MALE (NO.)	MALE (%)	FEMALE (NO.)	FEMALE (%)	TOTAL (NO.)	TOTAL (%)
1.	6 mth-1yr	32	64.2	24	35.7	56	5
2.	1yr-3yr	272	43.2	312	56.8	584	58.4
3.	3yr-5yr	208	57.7	152	42.2	360	36
TOTAL		512	51.2	488	48.8	1000	100
Chi-square value – 3.006, p-value – 0.222. NS							

Table No.2. Distribution of Children according to W.H.O Classification (n=1000)

INDICES	NORMAL	MODERATELY UNDERNOURISHED	SEVERLY UNDERNOURISHED
	No. (%)	No. %	No. %
HT FOR AGE	320 (32%)	528 (52.8%)	152 (15.2%)
WT FOR HT	332 (33.2)	472 (47.2%)	196 (19.6%)
EDEMA	1000 (100%)	0 (0%)	0 (0%)
TOTAL	60(6%)	616 (61.6%)	324 (32.4%)

According to the WHO recommended classification the prevalence of stunting (low height for age) and wasting (low weight for height) was 528 (52.8%), 472 (47.2%) respectively.

Severe degree of stunting and wasting observed were 152 (15.2%) and 196 (19.6%) respectively. No children were observed with oedema, overweight or obesity in the present study.

Table No. 3: Distribution of Children according to IAP Classification (n=1000)

GRADE	NO.	%
0	204	20.4
I	428	42.8
II	268	26.8
III	96	9.6
IV	4	0.4
TOTAL	1000	100

According to IAP classification 204(20%) children had normal weight for age, 428(42.8%) had grade I PEM, 268 (26.8%) grade II PEM, 96 (9.6%) grade III PEM and 4 (0.4%) child had grade IV PEM.

Table No. 4: IAP Classification V/s WHO Classification (n=1000)

IAP grades	IAP	WHO		
	TOTAL	Normal	Moderate(-2TO-3SD)	Sever(<-3SD)
Normal GRADE-0	204(100%)	40(19.6%)	144(70.58%)	20(9.8%)
GRADE-I & II	696(100%)	20(2.8%)	452(64.94%)	224(32.1%)
GRADE-III& IV	100(100%)	0(0%)	20(20%)	80(80%)
Total	1000(100%)	60(6%)	616(61.6%)	324(32.4%)
Chi-square value= 149.87 p-value = 0.000 S				

When we compared IAP classification with WHO classification there was statistically significant difference in severity of undernutrition (p=0.000)

In IAP classification normal category there were 204 children, of which 144 children had moderate and 20 had severe undernutrition according to WHO classification. Similarly in IAP classification grade I and II there were 696 children; out of them according to WHO classification 20 were normal, 452 were moderately and 224 were severely undernourished. In IAP classification grade III and IV there were 100 children; out of which according to WHO classification 20 were moderately and 80 were severely undernourished. From these data we can draw following conclusions :

- Over all undernutrition was diagnosed more

by WHO classification (total 95%) than IAP classification (total 80%)

- IAP classification diagnosed more children in grade I & II PEM (moderate undernutrition) and WHO classification detected more number of severe undernutrition

Discussion:

According to the WHO recommended classification the prevalence of stunting (low height for age) and wasting (low weight for height) was 132(52.8%), 118 (47.2%) respectively in our study. Severe degree of stunting and wasting observed were 38(15.2%) and 49(19.6%) respectively. No children were observed with oedema, overweight or obesity in the present study.

In a study conducted in an urban slum of Delhi, it was observed that prevalence of stunting and severe stunting was 27.1% and 25.9% respectively, while that of wasting and severe wasting was 16.7% and 5.8%.¹³ The prevalence of wasting in this study was less than our study while that of stunting was higher in this study compared to our study⁽⁵⁾. According to NFHS 1998-99 the total prevalence of stunting and wasting in Gujarat is found to be 43.5% and 16.2%.⁽⁶⁾ In another study conducted in tribal area near Jabalpur, revealed that underweight was present in 33.9% of children, stunting in 21.5% and wasting in 26.4% children while ever degree of underweight stunting and wasting was present in 27.7%, 30.1% and 6.5% children respectively⁽⁷⁾. The prevalence of stunting and wasting was found to be high in this study, being a tribal area in comparison to our study. According to NNMB report 2006 The overall prevalence of stunting (Height for age <Median -2SD) was observed to be 45%, while that of severe stunting (Height for age <Median -3SD) was 20%. The overall prevalence of wasting (Weight for Height <Median -2SD) was observed to be 20%, while that of severe wasting (Weight for Height <Median -3SD) was 7%.⁽⁸⁾

In our study 80% children came under PEM grade I-IV according to IAP classification by weight for age criteria. 42.8% were in grade I, 26.8% were in grade II, 9.6% in grade III and 0.4% were in grade IV PEM. In national nutrition monitoring bureau 2006 report The overall prevalence of grade III & IV undernutrition among 6-60 months children was about 4%. It ranged from as low as 1.3% in the State of Kerala, through 2-3% in Andhra Pradesh, Tamil Nadu, Maharashtra and West Bengal to a high 8% in Gujarat. The prevalence of undernutrition tended to

increase steeply from 40% in 6-12 months age group to 59% in 12-24 months age group. It remained same up to 48 months and then increased to 61% in 48-60 months age group.⁽⁸⁾ According to a study done in Loni, Maharashtra total 50.46% children were undernourished using IAP classification.⁽⁹⁾ According to a study done in slum children in Patiala 26.76 had grade I PEM, 7.47% grade II, 3.32% grade III and 0.83% had grade IV PEM.⁽¹⁰⁾ According to a study in Vadodara, Gujarat in 1998 40.5% children had grade I, 20.1% had grade II, 2.3% grade III and no children had grade IV PEM.⁽¹¹⁾

There was significant difference when we compared IAP classification with WHO classification. The overall number of undernourished children (95% by WHO and 80% by IAP classification) as well as number of severely undernourished children (32.4% by WHO and 10% by IAP classification) were higher by WHO classification and number of moderately undernourished (grade I & II) was higher with IAP classification (61.6% by WHO and 70% by IAP classification). According to a study done by Shankar Prinjaatali, The prevalence of underweight in the first 6 months of life was nearly 1.6 times higher when calculated with WHO Child Growth Standards compared with IAP growth curves. For children of all ages combined, the prevalence of underweight was 1.4 times higher when IAP standards rather than the new WHO standards were used, with the absolute difference being 14.5% ($P < 0.001$). This was not similar to our study but in the same study it was found that overall estimates for severe malnutrition were 3.8 times higher using the new WHO standards rather than IAP standards ($P < 0.001$). This pattern was repeated within each age stratum and for both sexes, which is comparable to our study.⁽¹²⁾

According to a study by N Seetharamanatal, Only 31.4% of the children studied were normal; 68.6% were undernourished. 48.4% were stunted (20.3% severely) and 20.2% were wasted (6.9% severely). Whereas, as per IAP criteria, 51.4% were undernourished and 3.2% were severely undernourished. Using Underweight (low weight-for-age) as the only criterion for identifying undernourished children (as done in the Integrated Child Development Services currently) may underestimate the true prevalence of undernutrition,

by as much as 21.9%. these results were similar to our study.(13)

Conclusion:

Over all undernutrition is diagnosed more by WHO classification (total 95%) than IAP classification (total 80%). IAP classification diagnosed more children in grade I & II PEM and WHO classification detected more number of severe undernutrition. This indicates that WHO classification is more sensitive in detecting undernutrition but it has drawback of classifying more children in severe undernutrition.

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