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Composite Index of Anthropometric Failure among Anganwadi Children in Rural Field Practice Area of Vydehi Institute of Medical Sciences and Research Centre

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Abstract

Background*: Malnutrition among under five children is still a major problem in the 21st century in developing countries. The exsisting method of quantification of the same i.e. using weight for age underestimated the actual prevalence . Therefore Composite Index of Anthropometric Failure (CIAF), proposed by Svedberg was used to quantify malnutrition.*

Objectives*: a) To assess the prevalence of malnutrition according to CIAF and to compare the prevalence to traditionally used indices and b) To use three new indices to relatively quantify the contribution of each of the components to CIAF*
(Stunting index SI ,Wasting index WI and Underweight index UI).

Materials and methods*: A cross-sectional study was conducted on 81 anganwadi children in two villages in the field practice area of Vydehi Institute of Medical Sciences and Research Centre. Anthropometric measurements were compiled and children falling below -2 SD values for weight for age, height for age, weight for height were respectively classified as underweight, stunting, wasting respectively and the data was analysed using percentages and tests of proportion.*

Results: *CIAF revealed that 51.8% of under five children were malnourished though underweight showed only 37.03%. The relative contribution of Stunting Index, Wasting Index and Underweight Index to CIAF was 78.57%, 28.57% and 71.43% respectively.*

Conclusion: *CIAF is a better indicator of nutritional status as compared to the traditional measures of stunting, underweight and wasting. The three indices Stunting Index , Wasting Index and Underweight Index provide additional information on the prevalence of different forms of undernutrition relative to the overall level of undernutrition in a particular population. Maternal knowledge and practices need to be improved to tackle the problem of malnutrition through Information, Education and Communication in the community.*

Keywords *: CIAF , Stunting index , Wasting index , Underweight index*

I. Introduction

Children are the future pillars of the nation. Child health care is the most crucial factor to determine growth of a child especially in the first two years of life. The child population of the world is growing at the rate of 2 million a month. Shaping of tomorrow's India, by investing in children today is the best possible development strategy of the country. The government of India is committed to child development as a policy priority. [1]

Almost half of children under five years of age, 48 %, are stunted and 43 % are underweight[2]. The proportion of children who are severely undernourished (more than three standard deviations below the median of the reference population) is also notable, 24%, according to height-for- age and 16 percent according to weight- for-age. Wasting is also quite a serious problem in India, affecting 20 percent of children under five years of age.

Childhood undernutrition can be evaluated anthropometrically. The three most commonly used internationally recommended anthropometric indicators are stunting (low height-for- age), underweight (low weight for-age) and wasting (low weight-for- height) . While stunting reflects a failure to reach linear growth potential due to sub-optimal health and/or nutritional conditions, underweight reveals low body mass relative to chronological age, which is influenced by both, a child's height and weight. Stunting is an indicator of chronic undernutrition, the result of prolonged food deprivation and/or disease or illness. Underweight thus cannot distinguish between a child that is small in weight relative to his/her height and a

child that is low in height relative to his/her age, but who may be normal in weight-for-height. On the other hand, wasting is an indicator of acute undernutrition, the result of more recent food deprivation or illness; Underweight is used as a composite indicator to reflect both acute and chronic undernutrition, although it cannot distinguish between them. [3] However, because they overlap, none is able to provide a comprehensive estimate of the number of undernourished children in a population; some children who are stunted will also have wasting and/or be underweight; some children who are underweight will also have wasting and/or be stunted; and some children who have wasting will also be stunted and/or underweight. Svedberg (2000), a development economist, argued that conventional indices are not sufficient for measuring the overall prevalence of undernutrition among young children. He suggested that if children with wasting, stunting or who are underweight are all considered as undernourished, or to be in a state of anthropometric failure, a new aggregate indicator is needed, one that incorporates all undernourished children, whether wasting and/or stunting and/or underweight and proposed the construction of a *Composite Index of Anthropometric Failure* (CIAF). [4] Based on Svedberg's model, Nandy et al. (2005) had utilized the CIAF on Indian data and recommended its use in preference to the three conventional measures (stunting, underweight and wasting) of under nutrition. Nandy & Miranda (2008) have further supported and validated the use of CIAF in a more recent paper. [5]

However, a recent report has highlighted some shortcomings of CIAF.[6] Moreover, although CIAF is a useful composite measure, it fails to highlight the individual contribution and importance of stunting, underweight and wasting relative to the overall prevalence of undernutriton. In other words, if we want to know what are the rates of stunting, underweight and wasting relative to the overall prevalence of undernutrition, we require three new indices. These new indices can also give us information on the relative significance and severity of these three measures with respect to the total prevalence of undernutrition. Kaushik Bose & Gopal Chandra Mandal proposed the use of three new indices of childhood undernutrition Stunting Index (SI) = Stunting/ CIAF Undeweight Index(UI)= Underweight /CIAF Wasting Index (WI) = Wasting/CIAF.[7]

The use of CIAF may have profound implications on prevalence reporting, nutrition programming and outcomes. Reporting of accurate prevalence data and targeting highest risk populations for appropriate interventions using CIAF may help to improve the quality and outcomes of global nutrition efforts. Mahgoub (2009) is of the opinion that the use of CIAF methods more clearly identified risk levels with mutually exclusive categories to identify both prevalence and higher nutritional risk with multiple anthropometric failures.

Conventional indicators of undernutrition each provide important information on different aspects of undernutrition (e.g. chronic versus acute). This information is valuable in itself, especially for clinicians and fieldworkers, who need to respond differently to different forms of undernutrition. At present, the CIAF is the only indicator able to do this. The CIAF takes the differences between the three conventional indicators into account, and so is more able to provide an indication of changes in undernutrition. The CIAF can be used to examine the synergistic impact on health and mortality of different combinations of stunting, wasting and underweight. Children with multiple anthropometric failures are more likely to be ill, and to come from poorer households[4], with those experiencing a triple failure carrying the greatest morbidity (and potentially mortality) risk. Clinicians can use the CIAF to explore the interaction between disease, mortality and different combinations of anthropometric failure.

The following study was done with the **Objectives** : a) To assess the prevalence of malnutrition according to CIAF and to compare the prevalence to traditionally used indices. b) To use the Three indices to quantify the contribution of each of the components to CIAF Stunting Index (SI) = Stunting (CategoryD+E+F) / CIAF ,Underweight Index(UI) = Underweight (CategoryC+D+E+Y) /CIAF ,Wasting Index (WI) = Wasting (CategoryB+C+D) / CIAF

II. Material And Methods

A cross sectional study was conducted among Anganwadi children in two villages in the Rural Health Training Centre of Vydehi Institute of Medical Sciences and Research Centre, during May-June 2013 on 81 Anganwadi children. The study was undertaken after the clearance from the ethical committee of Vydehi Institute of Medical Sciences and Research Centre Bangalore . Anthropometric data including height and weight of children whose parents were permanent residents of the study area were measured in the respective Anganwadis using standard procedure under the guidance of the faculty members of Community Medicine and their nutritional status was expressed in weight-for-age, height for age,

and weight-for-height as per latest WHO international growth standards[8]. Age of the child was recorded in completed months and ascertained from documentary evidences like immunization cards, Anganwadi records or by interviewing the mother with the help of a local events calendar, in the same order of preference. Children falling below -2 SD values for weight for age, height for age, weight for height were respectively classified as underweight, stunting, wasting respectively. Data was compiled and statistically analysed using SPSS version 21.

Results

Table-1- Age and Category wise CIAF prevalence

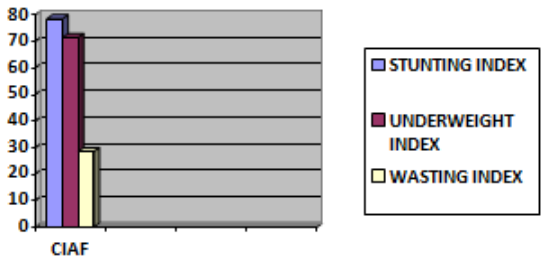
Age (Months)	A	B	C	D	E	F	Y	Total	Underweight (C+D+E+Y)	CIAF (B-Y)
24-36	9	2	0	1	9	3	0	24	10 (41.6%)	15 (62.5%)
37-48	15	0	2	2	6	2	2	29	12 (41.3%)	14 (48.2%)
49-60	15	2	1	2	5	3	0	28	8 (28.5%)	13 (46.4%)
Total	39	4	3	5	20	8	2	81	30 (37.03%)	42 (51.8%)

KEY:Category A-Normal, Category B-Only Wasting, Category C-Wasting and Underweight ,Category D-Wasting, underweight and stunting, Category E-Stunting and underweight, Category F-Only Stunting, Category Y- Only Underweight

Table-2-Comparison of SI, UI and WI of different studies

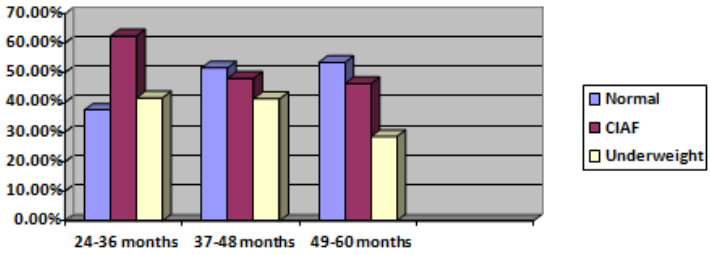
REFERENCES	*SAMPLE SIZE*	*SI*	*UI*	*WI*
Nandy *et al.* (2005)	n= 24,396	0.756	0.788	0.266
Seetharaman *et al.* (2007)	n= 405	0.723	0.681	0.294
The Present Study	n= 81	0.786	0.714	0.286

Fig-1- Relative contribution of different Indices to CIAF



STUNTING INDEX=78.57% UNDERWEIGHT INDEX= 71.43% WASTING INDEX= 28.57%

Fig-2- Age wise distribution of prevalence



III. Discussion

The prevalence of underweight was 37.03%, whereas using CIAF it was 51.8%. CIAF gave a near complete estimation of undernutrition unlike underweight alone. CIAF prevalence was found to be more in the age group of 2-3 years. CIAF category E (stunting and underweight) showed the highest prevalence with 25%. The present study showed a lower prevalence of 51.8% by CIAF than the study done by Nandy et al which showed a CIAF prevalence of 59.8%[5] Another study, by Savanur MS et al in the slums of Mumbai city showed a CIAF prevalence of 47.8%[9]**.** In a similar study by Agarwal D et al showed a CIAF prevalence of 60.08%[10].Similarly many other studies showed a CIAF prevalence of 60.4% to 80.3%[11-15].

Most importantly, it must be noted here that, the present study as well as that of Nandy and Seetharaman have reported higher rates of CIAF compared to the other three more conventional measures of undernutrition such as [stunting, underweight and wasting]. This implies that these other three measures may actually underestimate the problem of overall undernutrition in a population. The distinct advantage of the CIAF may be that it can highlight the seriousness and severity of overall undernutrition in a population better than these three conventional measures, especially among rural children in developing countries like India. Using this approach the burden of malnutrition which was overlooked has been magnified so that the policy makers can prioritize malnutrition in making policies and raising funds.

In this study,we have attempted to construct three indices of undernutrition, relative to the CIAF. These three indices are: Stunting Index (SI) = Stunting / CIAF Underweight Index (UI) = Underweight /CIAF and Wasting Index (WI) = Wasting / CIAF. Furthermore, we have calculated and compared these indices using our dataset as well as other existing datasets.

The sex-combined values of SI, UI and WI in the present study were 0.786, 0.714 and0.286, respectively. The corresponding values when applied to the all India dataset, the values of SI, UI and WI were 0.756, 0.788 and 0.266, respectively[5]. Similar values (SI= 0.723, UI = 0.681, WI = 0.294) were observed in a study by Seetharam et al[16]. From the above results we have also been able to infer that stunting and underweight represented by SI and UI respectively highlight that the problem of malnutrition is more chronic which implies improper practices of child rearing, low socioeconomic status etc than wasting which signifies acute malnutrition which forms a smaller percentage.

IV. Conclusion

CIAF is a better indicator of nutritional status as compared to the traditional measures of stunting, underweight and wasting. The indices were computed namely stunting index, wasting index, underweight index which can be used clinically. These three indices provide additional information on the prevalence of different forms of undernutrition relative to the total level of undernutrition in a particular population. The problem of malnutrition has to be tackled at the grass root level by strengthening maternal knowledge and practices of child rearing .

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Contribution of Authors : Dr Vishakh C Keri , Dr Sumukh S J concieved the study , compiled the anthropometric data of Anganwadi children, analysed the data and interpreted the results of the study; Dr.Karthik BV, Dr.Gautham B, Dr. Santhosh B collected anthropometric data, were involved in data entry and provided technical support; Dr.Mangala Subramanian is responsible for the design of the research, edited and revised the manuscript. All authors read and approved the final manuscript.

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