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Original Article

ESTIMATION OF STUNTED, WASTED, WASTED AND STUNTED CHILDREN AT TOWN DHADGAON, DISTRICT-NANDURBAR OF MAHARASHTRA STATE, INDIA

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ABSTRACT

Objective: The aim of present study was to estimate the percentage of all three classes of malnutrition such as i) Stunted ii) wasted iii) wasted and stunted at study site, so that these findings could help to formulate specially design therapeutic food product as well as implementation of need base Nutritional Rehabilitation Policies for category of highest percentage at this area.

Methods: This was Open label prospective parallel group active comparator interventional study.105 test and 100 control SAM (Severe Acute Malnutrition) children without infection, of 1 to 5 years of age and either sex were randomly enrolled and their anthropometric parameters weight, height, age, weight for height % , height for age % were measured as per WHO guidelines.

Results: The P values for weight, height, age, weight for height % , height for age % , were noted as P = 0.441, 0.975, 0.481, 0.06, 0.07 respectively and were found to be insignificant, suggestive of similar baseline characteristics at the time of enrollment. In study group wasted 2.9 % stunted 0 % and wated and stunted 97 % were found . Whereas in control group 9 % Wasted , 0 % stunted and 91 % wasted and stunted were noted.

Conclusion: We conclude that the highest percentage of wasted and stunted category malnourished children were found at the study site, followed by wasted and stunted. Failure to the adoptive mechanism could be the main reason attributed for it.

Keywords: Malnutrition, Prevalence, Stunting.

INTRODUCTION

Protein–Energy Malnutrition [PEM] is defined by measurements that fall below [2] Standard Deviations under the normal weight for age (Under weight), height for age (Stunting) and weight for height (Wasting). [1] Globally 165 million children under-five years of age were stunted and an 52 million children were wasted. More than 90% of the world's stunted children live in Africa and Asia.[10, 2]Almost 30 percent of neonatal deaths occur in India [2]. It was found that due to the high prevalence of malnutrition, PEM has became a serious health problem at the study site which is a remote, hilly and forest areas of the Satpuda Ranges.

Therefore it was a genuine necessity to find out the specific percentage of all three classes of malnutrition such as wasted and stunted, wasted, stunted.

So that these findings could help to design Nutritional Rehabilitation Policies (NRP). It was reported by various previous workers that there was a variation in the metabolic changes in each category of malnutrition.

Therefore these findings were also expected to help for the designing of specific therapeutic nutritional interventions, as per requirement of each category by considering their age, for their speedy recovery. In the first stage, present study has focused on finding the prevalence of all categories of malnutrition and depending on these results in the second stage have also tried to feed specially design therapeutic nutritional intervention to these enrolled malnourished children and monitored its efficacy. Presenting here the results of first stage, while the results of the second stage will be presented in near future.

MATERIALS AND METHODS

Enrollment of subjects

After getting Institutional ethics committee permission, and permission from Directorate of Health, Mumbai.,the enrollment of all subjects has been conducted at the four good conditioned PHC centers of town Dhadgaon, District Nandurbar, Maharashtra State, India, This was Open label prospective parallel group active comparator interventional study. 105 test and 100 control SAM children without infection, of 1 to 5 years of age and either sex were randomly enrolled. Their diagnosis as a PEM was done by PHC medical officers. Their Anthropometric parameters were measured. Patient Information Sheet was provided to the parents of subjects. Consent forms and Case Record forms were filled up at the time of enrollment for all subjects.

Anthropometric measurements

The age and oedema of each subject was specially noted at the time of enrollment. The weight and height of each subjects were measured as per WHO guidelines. Weight was measured on infant and regular weighing scales (Manasi Instruments, Ahmedabad). While Standing height of subjects above two years was taken by stadiometer (Scorpia India Medicare Pvt. Ltd., Ghaziabad) and length of subjects below two years was taken by infantometer (Jullundur Enterprises, Delhi). The observed weight and height were plotted on WHO growth standard charts for weight and height against the subject's age. Their age and gender's 50th centile was taken as a normal expected weight and height, the data of these anthropometric measurements were recorded.

However, weight for height %, height for age %, was determined by using standard formula.

Finally all enrolled malnourished subjects were classified into wasted and stunted, wasted, stunted [3].

Statistical analysis

Data was subjected to analysis by using SPSS S/W version -16 for variance, and differences were identified by Mean, S. D., S. E., 95 % C. I. P-value was obtained, $P < 0.05$ considered Significant difference, $p < 0.000$ considered Highly Significant difference.

RESULTS

- **Weight:** At the time of admission all the enrolled SAM children of both test and control groups have shown reduced weight (Table-1)

and P value was noted as P = 0.441 (Table-2) which is insignificant suggestive of similar baseline weight characteristics at the time of enrollment.

- **Height:** At the time of admission all the enrolled SAM children of both test and control groups have shown reduced Height (Table-1) and P value was noted as P = 0.975 (Table-2) which is insignificant (P<0.05 is considered as significant) suggestive of similar baseline Height characteristics at the time of enrollment.

- **Age:** All the enrolled SAM children of both test and control groups have shown average 3 years age group at the time of admission (Table-1) and P value was noted as P= 0.481(Table-2) which is insignificant suggestive of similar baseline age characteristics at the time of enrollment. Similarly fig. 1 also shows maximum malnourished children were from age group 2.1 to 3 years of age.

- **Weight for height %:** At the time of admission all the enrolled SAM children of both test and control groups have shown reduced weight for height % (Table-1) and P value was noted as

P = 0.06 (Table-2) which is insignificant suggestive of similar baseline Weight for height % characteristics at the time of enrollment.

- **Height for age %:** At the time of admission all the enrolled SAM children of both test and control groups have shown reduced Height for age % (Table-1) and P value was noted as P = 0.07 (Table-2) which is insignificant suggestive of similar baseline Height for age % characteristics at the time of enrollment.

DISCUSSION

There is a high prevalence of stunting, wasting and underweight in South-Asia. It is estimated that one in every two pre-school children is stunted in this region.[3] On the other hand, reports from Latin and Central America showed moderate to high prevalence of stunting and wasting. A study done in Mexico revealed 54% stunting 2.9% wasting and 20% underweight respectively.

[4] Studies from South-Asian countries like Nepal showed high prevalence of underweight (53%) and stunting (36.6%) [5]. Another study from Bangladesh revealed that 45% children under five were stunted [6]. A recent study done in slums of Karachi indicate 78% under weight, 44% severe stunting and 6% severe wasting [7], indicating a significant association between severe malnutrition and severe stunting.

In most malnourished children deficiencies of more than one micronutrient are observed simultaneously, and is considered as one of the responsible factor for stunting and wasting [8]. Nearly 11% of all children under five years of age die due to four micronutrient deficiencies, vitamin A, iron, zinc and iodine. Malnutrition is frequently observed between 3 to 24 months of age. A study done in Kenya showed that most of the malnourished children were between 18-23 months of age, 44% were stunted and 34% were under weight [9].

Present study data have shown similar findings with increasing percentage of malnutrition occurring between 2 to 3 years of age. These results are in accordance with the previous studies[3,9] Similarly Present study have shown highest prevalence of wasted and stunted children 97.1% in study group and 91 % in control group, followed stunted 2.9% in study group and 9 % in control group and wasted children were appeared to be 0 %. Failure to the adoptive mechanism could be the main reason attributed for the high prevalence rate of wasted and stunted. However all the enrolled subjects were clinically found to be anemic at the time of admission. The study site is a hilly area, tribal people living on "Sahiyadri" mountain ranges".

Many previous workers have attributed various facts and causes for the development of Wasted and Stunted, wasted only and stunted only all of them are discussed below.

It is noted that usually energy requirements are given separately for male and female children, while nutrient recommendations are given combine for both the sexes by WHO[10]. Energy requirements are set at the mean intake necessary for a certain age or physiological category to maintain energy balance and for normal growth in children; also there is an assumed Gaussian variation of individual requirements around this mean energy requirement. Growth assessment is a sensitive indicator of health and nutritional status of children under five years Stunting in children is usually taken as mild chronic malnutrition, however it can rapidly worsen due to inter current infections like diarrhea, measles and respiratory tract infections. A severely wasted child can also have severe stunting and may require in patient management [11]. The malnourished child (wasted or wasted and stunted) has a lower proportion of body weight as fat and muscle and a higher proportion as viscera and brain.

Table 1: Descriptive statistics of baseline characteristics for Anthropometric measurements at the time of admission in study and control groups

Before treatment		N	Mean	Std. dev.	Std. error
Weight	Study group	105	8.662	1.58	0.15
	Control group	100	8.34	1.62	0.16
Height	Study group	105	84.95	8.63	0.84
	Control group	100	84.92	8.43	0.84
Weight for Ht (%)	Study group	105	64.87	2.021	0.197
	Control group	100	62.782	3.860	0.386
Age(months)	Study group	105	36.02	13.5	1.3
	Control group	100	36.14	13.2	1.3
Height for Age (%)	Study group	105	83.04	1.20	0.12
	Control group	100	82.31	2.09	0.21

* Equal variances assumed

Table 2: Independent sample test for Anthropometric measurements at the time of admission

	Unpaired t-test for equality of means					95% C I of the difference	
Baseline chararcteristics	Mean difference	Std. error difference	t test value	df	p value	Lower	Upper
Weight (kg)	-0.172	0.223	-0.772	203	0.441(NS)	-0.612	0.268
Height (cm)	0.037	1.192	0.031	203	0.975(NS)	-2.314	2.387
Weight for height %	2.082	0.427	4.872	203	0.06(NS)	1.239	2.925
Age (months)	-0.111	0.158	-0.706	203	0.481(NS)	-0.422	0.200
Height for Age %	0.734	0.236	3.108	203	0.07(NS)	0.268	1.200

*P < 0.05 considered Significant difference, **p < 0.000 considered Highly Significant difference ***NS- Not Significant difference.

Table 3: Estimation of Stunted,wasted and Wasted and stunted children in study and control groups

Before treatment	Study group		Control group	
Classes of malnutrition	N	%	N	%
Wasted	3	2.9%	9	9%
Stunted	0	0%	0	0%
Wasted and stunted	102	97.1%	91	91%
Total	105	100%	100	100%

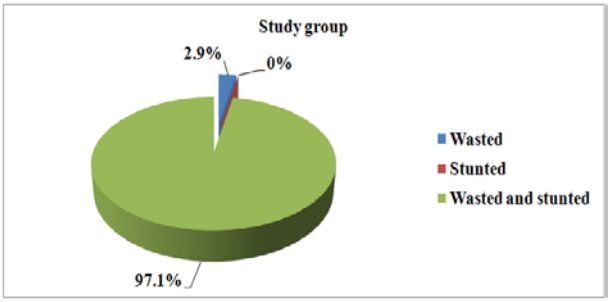

Fig. 1: Pie chart showing proportion of parameters in study group (N=105)

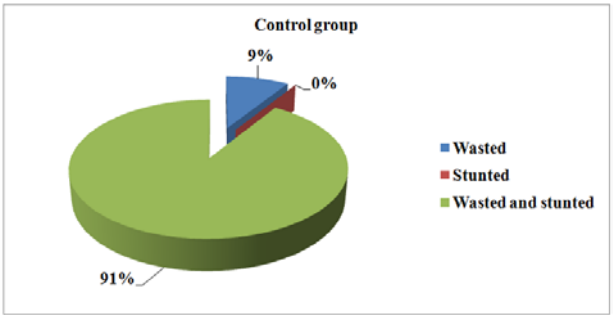

Fig. 2: Pie chart showing proportion of parameters in control group (N=100)

Thus, the malnourished child would require more energy and nutrients per kilogram of body weight if there were no metabolic adaptation. This is sometimes found in stunted children[12] despite presumed metabolic adaptation[13]. Thus the wasting and stunting is also associated with deficiency of energy dense nutrients in the diet. Stunting is associated with micronutrient deficiencies cause permanent loss of growth in children and most of them never regain the appropriate weight, leading to long term deficits in mental capacity, low birth weight babies are prone to become stunted especially if the mother herself is stunted and has poor nutritional status. Therefore, there is a need for policy making and adequate nutritional interventional strategies for management of stunting and supplementation of vitamin A, zinc and iron [14]. After accounting of such scenario and different factors responsible for this, it is suggested that, co-existing nutritional interventions can prevent stunting by 36% and DALYS (disability-adjusted life years) associated with stunting, severe wasting, IUGR and micro nutrient deficiencies by about 25% [15].

CONCLUSION

Depending on the results revealed by the present study we conclude that the highest prevalence of wasted and stunted 97.1 % in study group and 91% in control group was noticed, followed by wasted 2.9 % in study group and 9 % in control group, while stunted only children were not observed at the study site-Town Dhadgaon, District-Nandurbar, Maharashtrta, India.

Failure to the adoptive mechanism could be the main reason attributed for the high prevalence rate of wasted and stunted.

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