A STUDY ON NUTRITIONAL STATUS OF CHILDREN (6M-5YEARS) ATTENDING PEDIATRIC OUTPATIENT DEPARTMENT, TERTIARY CARE CENTRE

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ABSTRACT
Background: India is home to the largest number of under five children in the world, significantly larger than the number in china. India has almost one-third of all the world's stunted children (46.6 million out of 149 million) and half the world's wasted children (25.5 million out of 51 million). An important public health indicator throughout the world for monitoring nutritional status and health in a population is the child growth and health. SAM is the most important killer of young children of pre school age. Mortality rates in children with severe wasting (weight for length / height z –score <-3SD taken from WHO standards.) is nine times higher when compared to well nourished children. **Objective:** To study the nutritional status of children (6 months -5 years).
• To study the Prevalence of wasting and stunting in the study population.
• To study the Prevalence of Anaemia and Vitamin-A deficiency in the study population at attending Outpatient department, Department of Paediatrics, Government General Hospital, Kakinada.
Results: In the present study by active screening of 437 children, 325 (74.37%) children between the age group of 6 months to 5 years were found to have malnutrition. The prevalence of wasting in the present study was 74.37% which includes moderate wasting of 63.39% and severe wasting of 10.98%. The prevalence of stunting in the present study was 59.95%. The anemia prevalence in the present study was 48.5%. the prevalence of vitamin –A deficiency in the study population of 6 months to 60 months was 10.75%. **1. Conclusion:** The prevalence and severity of wasting was higher in girls when compared to boys, there was no significant difference of prevalence of stunting in boys and girls. But the severity of stunting was higher in boys when compared to girls. The prevalence of vitamin -A deficiency was higher in boys (12.7%) when compared to girls (8.84%). There was strong association between socio-demographic factors.

KEYWORDS :

INTRODUCTION
Severe acute malnutrition- severe wasting and/ or Mid-upper arm circumference < 11.5cm and / or bilateral pitting pedal oedema is the most important killer of young children of preschool age. Mortality rates in children with severe wasting (weight for length / height z –score <-3SD taken from WHO standards) is nine times higher when compared to well-nourished children1. Child malnutrition is a chronic problem and a difficult challenge for the public administration of India 2. The risk of death and the risk of mortality is approximately 5-20 folds more when compared to well-nourished children in SAM children [3].

GLOBAL BURDEN:
Globally 45.4 million under five children were affected by severe wasting in the year 2020, according to UNICEF and WHO reports 2021. It will be 15% more in children in 2021 due to impact of COVID 19. Globally there are 149.2 million under five stunted children in 2020. All these numbers may increase due to difficulties in accessing nutritional diets and essential nutritional services during the COVID 19 Pandemic [4] The percentage of stunted, wasted, underweight and anemic children in India was 36%, 19%, 32%, and 67% respectively, according to NFHS-5 data [5].

Community based management of acute malnutrition (CMAM) is a potential and ideal platform for the management of uncomplicated SAM through the decentralised structure of ICDS and the proximity of Anganwadi centers6. Early and timely detection of SAM without complications in the community and also in children who are attending out patient department in various institutions and Primary health care centres, and community based approach for the management of these children by providing treatment in the form of RUFT (Ready to use therapeutic foods) or other nutrient dense foods at home could prevent the deaths of hundreds and thousands of children7. This prospective cross-sectional study was conducted in the outpatient department to determine the status of nutrition in children between 6months–60 months who attended the Out-patient department, Government General Hospital, Kakinada.

MATERIALS AND METHODS
DESIGN OF THE STUDY:
Hospital based cross sectional study.

STUDY PERIOD:
One and half year from 1st January 2020 to 30th June 2021.

STUDY POPULATION:
Sample size was calculated based on the formula $n=4pq/l^2$ where prevalence (p) was taken as 40% (from NFHS-4 data) q= 100-p, l was allowable error taken as 5%. Based on this formula, sample taken in the present study was 437.
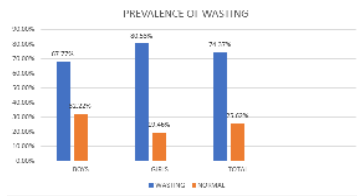
Out of 5464 children between the age group of 6 months to 5 years who attended outpatient department, Department of Paediatrics, Government General Hospital, Kakinada, 437 Children were included in the study.

METHODOLOGY:
Out of 5464 children between the age of 6 months to 5 years who attended the out-patient department of Paediatrics, Government General Hospital, Kakinada, 437 children were enrolled in the study. Informed consent was obtained from the mothers of all these children. Socio demographic data of the children enrolled in the study was collected by using a predesigned and pretested structured Proforma by interview technique. Anthropometric measurements were taken using standard techniques. Weight of children was taken by using Pediatric digital scale (with error of 10 grams). Length of the children was measured by using infantometer in 6 months to 2 years age and height of children above 2 years was measured by using Stadiometer. Classification of malnutrition (wasting and stunting) was based on World Health Organization (WHO) reference standards. Prevalence of anemia and Vitamin – A deficiency was also determined in this study by clinical assessment of children.

The study was approved by the INSTITUTION ETHICS COMMITTEE. The results obtained were tabulated and statistically analysed using SPSS-21 trial version.

## OBSERVATIONS AND RESULTS
FIGURE:1

Out of 437 children studied, 211 (48.28%) were boys and 226 (51.71%) were girls. Out of 211 boys, 143 (67.77%) were wasted. Out of 226 girls, 182 (80.53%) were wasted. Total 325 (74.37%) children between the age group of 6-60 months were wasted. (chi square =9.319 and p value=0.00226, p value <0.05). This difference is statistically significant with p value < 0.05.

FIGURE:2
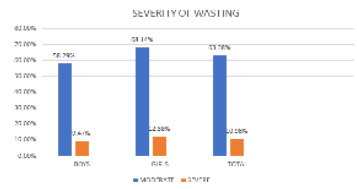
Out of 211 boys, 123 (58.29%) were moderately wasted and 20 (9.47%) were severely wasted. Out of 226 girls, 154 (68.14%) were moderately wasted and 28 (12.38%) were severely wasted. Out of total 437 children, 277 (63.38%) were moderately wasted and 48 (10.98%) were severely wasted. (chi square=9.44 and p value= 0.0089 , p value<0.05). This difference is statistically significant with p value <0.05.

PREVALENCE OF STUNTING IN STUDY POPULATION. FIGURE:3
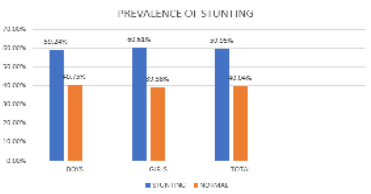
(chi square= 0.0863 p value =0.7689)

Out of 211 boys, 125 (59.24%) were stunted. Out of 226 girls, 137 (60.61%) were stunted. Total 262 (59.95%) out of 437 children between 6-60 months were stunted. (Chi square=0.0863 and p value= 0.7689, p value>0.05) This difference is statistically not significant

SEVERITY OF STUNTING IN STUDIED CHILDREN: FIGURE:4
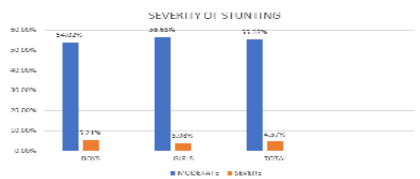
(chi square=0.5471 p value=0.7606).

Out of 211 boys, 114 (54.02%) were moderately stunted and 11 (5.21%) were severely stunted. Out of 226 girls, 128 (56.63%) were moderately stunted and 9 (3.98%) were severely stunted. Out of total 437 children, 242 (55.37%) children were moderately stunted and 20 (4.57%) children were severely stunted. (Chi square=0.5471 and p value=0.7606, p value>0.05) This difference is statistically not significant.

TABLE 5: PREVALENCE OF WASTING ACCORDING TO VARIOUS SOCIO DEMOGRAPHIC FACTORS AMONG THE STUDY POPULATION (n =437)

VARIABLES		TOTAL NUMBER OF CHILDREN	WASTING (%)	P value
MATERNAL EDUCATION	ILLITERATE	197	176 (89.34)	0.00001
	LITERATE	240	149 (62.08)	
TYPE OF FAMILY	NUCLEAR	206	143 (69.41)	0.0251
	JOINT	231	182 (78.78)	
BIRTH ORDER	</= 2	235	139 (68.81)	0.00001
	>2	202	186 (79.14)	
EXCLUSIVEY BREASTFED FOR 6 MONTHS	YES	252	163 (64.68)	0.00001
	NO	185	162 (87.56)	

TABLE 6: PREVALENCE OF STUNTING ACCORDING TO VARIOUS SOCIO DEMOGRAPHIC FACTORS AMONG THE STUDY POPULATION

VARIABLES		TOTAL NUMBER OF CHILDREN	STUNTING (%)	P value
MATERNAL EDUCATION	ILLITERATE	197	138 (70.05)	0.000095
	LITERATE	240	124 (51.66)	
TYPE OF FAMILY	NUCLEAR	206	107 (51.94)	0.00124
	JOINT	231	155 (67.09)	
BIRTH ORDER	</= 2	235	121 (59.90)	0.000098
	>2	202	141 (60)	
EXCLUSIVEY BREASTFED FOR 6 MONTHS	YES	252	124 (49.20)	0.00001
	NO	185	138 (74.59)	

89.34% children of illiterate mothers were wasted where as 62.08% of children of literate mothers were wasted. (chi-square = 42.17 and p value = 0.00001, p value <0.05). This difference is statistically significant. 70.05% children of illiterate mothers were stunted where as 51.66% children of literate mothers were stunted. (chi -square= 15.23 and p value = 0.000095, p value < 0.05). This difference is statistically significant.

Out of 437 children, 206 children were from nuclear type of family, and 231 children were from joint family. 69.41% children from nuclear family were wasted where as 78.78% children from joint family were wasted. (chi square = 5.016 and p value = 0.0251, p value<0.05). This difference is statistically significant. 51.94% children having nuclear family were stunted where as 67.09% children having joint family were stunted. (chi-square= 10.42 and p value=0.00124, p value<0.05). This difference is statistically significant.

Out of 437 children, 235 children belong to <=2 birth order and 202 children belong to birth order >2. 68.81% children of birth order</=2 were wasted where as 79.14% children of birth order >2 were wasted. (chi-square= 61.8 and p value=0.00001 , p value <0.05). This difference is statistically significant. 59.9% children of birth order</=2 were stunted where as 60% children of birth order >2 were stunted. (chi-square= 15.17 and p value = 0.000098, p value<0.05). This difference is statistically significant.

Out 437 children, 252 children were exclusively breast fed up to 6 months of age and 185 children were not exclusively breast fed. 64.68% children who were exclusively breast fed were wasted where as 87.56% children who were not exclusively breast fed were wasted. (chi square= 29.312 and p value = 0.00001, p value<0.05). This difference is statistically significant. 49.2% children who were exclusively breast fed were stunted where as 74.59% children who were not exclusively breast fed were stunted. (chi-square=28.64 and p

value= 0.00001, p value<0.05). This difference is statistically significant.

PREVALENCE OF ANAEMIA IN STUDY POPULATION FIGURE:7
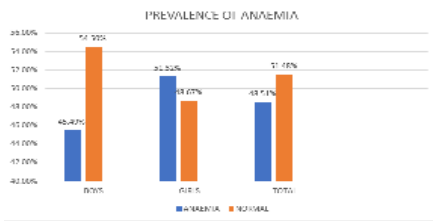
(chi square= 1.4848 p value =0.2230)

Out of 211 boys, 96 (45.49%) boys had anaemia. Out of 226 girls, 116 (51.32%) girls had anaemia. Total 212 (48.51%) out of 437 children between 6-60 months had anaemia based on the clinical assessment of children. (Chi square=1.4848 and p value= 0.2230). This difference is statistically not significant.

FIGURE 8: PREVALENCE OF VITAMIN –A DEFICIENCY IN STUDY POPULATION
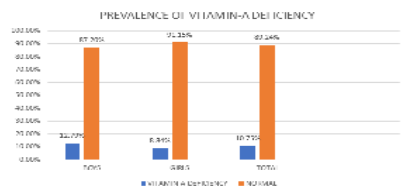
(chi-square= 1.7708 p value = 0.18328)

Out of 211 boys, 27 (12.79%) boys had vitamin –A deficiency. Out of 226 girls, 20 (8.84%) girls had vitamin-A deficiency. Total 47 (10.75%) out of 437 children between 6-60 months had vitamin –A deficiency based on the clinical assessment of children. (Chi square= 1.7708 and p value=0.18328, p value>0.05). This difference is statistically not significant.

DISCUSSION

In India, undernutrition is a major public health problem. The present study titled "A study of nutritional status in children (6months to 5 years) attending paediatric out patient department, Tertiary care centre." was conducted in the Paediatrics department, Government General Hospital, Kakinada, Kakinada District, Andhra Pradesh. The present study aims at assessing the status of nutrition in children (6months -5 years) attending OPD, Government General Hospital, Kakinada and to know the prevalence of wasting, stunting and specific nutritional deficiencies in children studied.

In the present study by active screening of 437 children, 325 (74.37%) children between the age group of 6 months to 5 years were found to have malnutrition, who attended the outpatient department of Paediatrics, Government General Hospital, Kakinada.

PREVALENCE OF WASTING:

The criteria used for the estimation of prevalence of wasting in the present study was Z –score for the Anthropometric indicator Weight for Height. Many other studies conducted by Sujata Murarkar et al8, Sethy G et al [9], Renuka Manjunath et al [10], etc also estimated the prevalence of wasting based on Z –scores for weight for Height. The prevalence of wasting in the present study was 74.37% which includes moderate wasting of 63.39% and severe wasting of 10.98%. The results are similar to study done by Sethy et al which showed 75% prevalence of wasting. The prevalence of wasting in the present study was more when compared to the prevalence in other studies conducted by Reddy et al [11] (18%), Sujata Murarkar et al8 (17.1%), and Renuka manjunath et al10 (43%). The prevalence of wasting in the present study was also more when compared to NFHS -5 data in India (19.3%) and also more when compared to prevalence of wasting in Andhra Pradesh (16%) according to NFHS-5 data[5].

TABLE -15: PREVALANCE OF WASTING IN VARIOUS STUDIES

AUTHOR	YEAR	STANDARD	WASTED (%)
Sethy G et al	2017	WHO growth standards	75%
Renuka Manjunath et al	2014	WHO growth standards	43%
Sujata Murarkar et al	2020	WHO growth standards	45.9%
Reddy et al	2016	WHO growth standards	18.3%
NFHS -5	2019-21	WHO growth standards	19.3%(India) 16%(Andhra Pradesh)
Present study	2019-21	WHO growth standards	74.37%

In the present study, out of 437 children between the age group of 6 -60 months, 277 (63.39%) were moderately wasted and 48 (10.98%) were severely wasted. According to NFHS -5 data, 19.3% were wasted and 7.7% were severely wasted.

In the present study, the prevalence of wasting was higher in girls (80.53% in girls vs 67.77% in boys). This difference is statistically significant. Malnutrition is a significant factor for under-five mortality, especially for girls in India, according to NFHS-5 survey. It remains 8.3 percent higher in girls when compared to boys. Girls and women are particularly vulnerable because of the prevailing inequalities, socio-cultural norms, and discrimination, right from their birth. Preference for a boy child over a girl child in India has enabled people to carry out sex-selective abortions, and even female infanticide. In households, where girls are born, studies have shown that they are breastfed for a shorter duration when compared to boys, and hence they consume less mother milk. Especially for families where preferences of boy child exist, girls are weaned earlier as parents keep trying for a boy child, thus compromising early on the nutritional needs of a girl child. Undernourished girls are likely to become undernourished mothers and, as a result, they give birth to low-birth weight babies, giving rise to an intergenerational cycle. Government of India launched POSHAN Abhiyaan and Anaemia mukt-bharat programs to improve the nutritional status of children, pregnant and lactating women. It is important to review and address the gender-based strategies to bring about some targeted and measurable outcomes to improve the girl child's nutritional status.

The prevalence of wasting was also higher in girls when compared to boys in other studies such as Sachin Singh Yadav et al[12] (girls 42.9% vs boys 40%), and Sanjib et al[13] (girls 63.3% vs boys 57.1%). But in one study done by Renuka Manjunath et al[10], the prevalence of wasting was higher in boys (49%) when compared to girls (36.7%).

PREVALENCE OF STUNTING:

The criteria used for the estimation of prevalence of stunting in the present study was Z –score for the Anthropometric indicator Height for age. The prevalence of stunting in the present study was 59.95%. The prevalence of stunting in the present study was more when compared to other studies done by Das et al[14] and Sethy et al[9]. The prevalence of stunting in the studies done by Murarkar et al[8], Das et al[14], Sethy et al[9] and Reddy et al[11] was 45.9%, 45.52%, 42% and 38.3% respectively. The prevalence of stunting according to NFHS – 5 data was 35.5%[5].

TABLE 18: PREVALENCE OF STUNTING IN VARIOUS STUDIES

Das et al	2020	WHO growth standard	45.52%
Sethy et al	2017	WHO growth standard	42%
Reddy et al	2016	WHO growth standard	38.3%
Murarkar et al	2020	WHO growth standard	45.9%
NFHS -5	2019-21	WHO growth standard	35.5%

In the present study, the prevalence of stunting was slightly higher in girls (60.61%) when compared to boys (59.24%). This difference is statistically not significant. When compared to other studies, In Sethy et al[9] study, the prevalence of stunting was higher in boys (23.5%)

when compared to girls (21.5%). In Renuka Manjunath et al[10] study, the prevalence of stunting was higher in boys (57.7%) when compared to girls (53.1%) but in a study done by Reddy et al[47], the prevalence was similar to the present study and prevalence of stunting was more in girls (43.9%) when compared to boys (43.4%).

PREVALENCE OF ANEMIA:

In the present study, the anemia prevalence was 48.51%. The prevalence of anemia in 6-60 months age group children was less when compared to other studies such as Santos RF et al[15], Ewusie et al[16], and NFHS -5 data[5]. The anemia prevalence was 56.6% in Santos RF et al study, 78.4% in Ewusie et al study. According to NFHS-5 data, the anemia prevalence was 67.1 % which showed increasing trend when compared to NFHS -4 data (58.6%). In the present study, anemia was assessed clinically hence mild cases of anemia may not be recognised where as in other studies, anaemia was assessed by haemoglobin estimation. This may be the reason for lower prevalence of anaemia in the present study. The anemia prevalence in the present study was 48.5% which was less when compared to study done by Angesom et al[17] (41.1%).

Anemia Mukt Bharat was started by Government of India under POSHAN Abhiyaan and national nutrition strategy set by NITI Aayog in March 2018. The main strategy of this program was to reduce prevalence of anemia by 3 percentage points per year among children, adolescents and women in the reproductive age group(15–49 years), between the year 2018-22. The target for Intensified National Iron Plus Initiative Program was to accelerate the annual rate to decline from one to three percentage points of anemia by 6x6x6 strategy with 6 Beneficiaries, 6 interventions and 6 Institutional mechanisms. The National target for the prevalence of anemia by the year 2022 is 40%[18]. Inspite of all the programs, the prevalence of anemia increased to 67.1% according to NFHS-5 when compared to NFHS-4(58%). The impact of Covid 19 was also one of the most important factors for this high prevalence. Initiatives and interventions are required to implement these programs properly.

TABLE 21: PREVALENCE OF ANEMIA IN VARIOUS STUDIES

AUTHOR	YEAR	PREVALENCE OF ANEMIA (%)
Angesom et al	2019	41.1%
Santos RF et al	2011	56.6%
Ewusie et al	2014	78.4%
NFHS -5	2019-21	67.1%
Present study	2019-21	48.51%

In the present study, the anemia prevalence was more in females (51.32%) when compared to males (45.49%). This difference is statistically not significant. This was similar to other studies done by Angesom et al[17] and Singh Set al[19] where the anaemia prevalence was more in females when compared to males. In Angesom et al study, the anemia prevalence in girls was 42.3% when compared to boys (39.6%). In Singh S et al, the anaemia prevalence in girls was 53.33% when compared to boys (46.67%). The prevalence of anemia was more in boys when compared to girls in studies done by Santos RF et al and Ewusie et al. The prevalence of anemia in Santos RF et al study was 58.8% in boys vs 55.4% in girls and in Ewusie et al study was 81.4% in boys vs 78.8% in girls.

In the present study, the prevalence of anemia was more in 6- 12 months age group when compared to other age groups. This result was similar to other studies. In Angesom et al study, the anemia prevalence was higher in children of 6-11 months and 12-23 months age (57%). In Santos RF et al study, the prevalence of anemia was higher in 6-12 months age group (70.91%). In Ewusie et al study, the prevalence of anemia was higher in < 2 years age group (87.1%). But in Singh S et al study, the prevalence of anemia was higher in 2-5 years age group (55.83%). Higher prevalence of anemia in 6-12 months age group, could be due to high iron demands associated with rapid growth and erythropoiesis in late infancy. A full-term and normal birth weight healthy infants have sufficient stores of iron to cover their needs during the first 4–6 months of life. After the age of 6 months, infants' iron reserves are slowly depleted and the child becomes dependent on dietary iron. As the daily iron requirements during late infancy and early childhood are higher than during any other period of life and many young children do not consume large quantities of iron-rich

foods such as red meat and green leafy vegetables, these young children are especially at risk of iron deficiency anemia.

PREVALENCE OF VITAMIN-A DEFICIENCY:

In the present study, the prevalence of vitamin –A deficiency in the study population of 6 months to 60 months was 10.75%. This prevalence of vitamin -A deficiency was less when compared to other studies done by Bhanuprakash Reddy et al[20], S Kundu et al[21], Halimaton Alaofe et al[22] and Liangming line et al[23]. In all these studies, the prevalence of vitamin-A deficiency was assessed based on serum retinol levels but in the present study, the prevalence of vitamin -A deficiency was based on clinical assessment of the study population. This may be the reason for lower prevalence of vitamin-A deficiency in the present study. The prevalence of vitamin-A deficiency in studies done by Bhanuprakash Reddy et al , S Kundu et al , Halimaton Alaofe et al, Liangming line et al was 15.7%,17.54%,33.6% and 11.7% respectively.

The intake of Vitamin A is significantly lower than the recommended daily allowance in young children, adolescent girls and pregnant women according to diet surveys. In India, the prevalence of clinical and sub clinical vitamin A deficiency is highest in the world. National prophylaxis programme against Nutritional Blindness was initiated in 1970 as a centrally sponsored scheme. All children between one to three years age are administered 200,000 IU of Vitamin A orally once in six months under this scheme. To improve the coverage, the first two doses of vitamin-A supplementation was linked to the ongoing immunization programme during the Eighth Plan period. Children of eligible age group was broadened to include children between 6 months and 5 years after reconsidering recommendations of WHO, UNICEF and Ministry of Women and Child Development in 2006[24].

TABLE 23: PREVALENCE OF VITAMIN -A DEFIECIENCY IN VARIOUS STUDIES

AUTHOR	PREVALENCE OF VITAMIN-A DEFIECIENCY (%)
Bhanuprakash Reddy et al	15.7%
S kundu et al	17.54%
Halimaton Alaofe et al	33.6%
Liang ming line et al	11.7%
Present study	10.75%

In the present study, the prevalence of vitamin-A deficiency was 12.79% in boys and 8.84% in girls. There was no significant difference in the prevalence of vitamin-A deficiency between boys and girls. This result was similar to other studies such as Muliyil et al25 (boys (8.1%) vs girls (14.3%) and S Kundu et al21 (boys (17.81%) vs girls (17.23%).

In the present study, the prevalence of vitamin-A deficiency was higher in 49-60 months age group (30%) and children between 6-12 months were not effected. This result was similar to the study done by S Kundu et al, where the prevalence of vitamin-A deficiency was higher in 36-47 months age group and lowest in 18-23 months age group. In the present study most of the studied children were exclusively breast fed up to the age of 6 months and breast milk is a rich source of vitamin -A. This may be the reason for absence of vitamin-A deficiency cases in 6-12 months age group.

In the present study, the prevalence of wasting and stunting was more when compared to NFHS-5 data reports. This high prevalence could be due to Covid 19 pandemic as Anganwadi centres all over the India were closed during this pandemic. and most of the malnourished children were missed for referral to NRCs. Nutritional Rehabilitation Centre (NRC) will provide facility-based care for children with Severe Acute Malnutrition (SAM) and with medical complications. NRCs offer appropriate feeding of children, careful height and weight monitoring, and counselling to mothers and caregivers on age-appropriate care, nutrition and growth monitoring. Children with Severe Acute Malnutrition along with medical complications are referred from villages by frontline workers, such as Accredited Social Health Activist (ASHA), and Anganwadi workers, and are admitted to NRCs as per the defined admission criteria. So, the frontline Health care workers should screen under five children by active screening and refer those children with SAM with complications to appropriate referral centres on time. Follow up of children with mild, moderate malnutrition and SAM without complications regularly in the community will greatly reduce the burden of malnutrition in the community.

CONCLUSIONS AND SUMMARY

The prevalence of wasting in the present study was 74.37% including moderate wasting of 63.38% and severe wasting of 10.98%.

1. The prevalence of wasting was higher in girls (80.53%) when compared to boys (67.77%). And the severity of wasting was also higher in girls (12.38%) when compared to boys (9.47%).
2. The prevalence of stunting in the present study was 59.95% including moderate stunting (55.37%) and severe stunting (4.57%).
3. There was no significant difference of prevalence of stunting in boys (59.2%) and girls (60.6%). But the severity of stunting was higher in boys (5.2%) when compared to girls (3.9%).
4. The prevalence of anaemia in the present study was 48.51%.
5. The prevalence of vitamin-A deficiency in the present study was 10.75%. The prevalence of vitamin -A deficiency was higher in boys (12.7%) when compared to girls (8.84%).
6. There was strong association between socio-demographic factors (maternal educational status, type of family, birth order, exclusive breast feeding up to 6 months of age) and the prevalence of malnutrition (wasting and stunting) in the present study.

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