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Original Research Article

PREVALENCE OF MALNUTRITION AND FACTORS DETERMINING IT AMONG UNDER-FIVE CHILDREN ATTENDING A TERTIARY CARE CENTRE, TUMKURU- A CROSS-SECTIONAL STUDY

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Abstract:

Background: Malnutrition in children is widely prevalent in developing countries including India [1]. It is estimated that in India 65% (approx. 80 million) children under five years of age suffer from varying degrees of malnutrition[2]. More than 33% of deaths in 0-5years are associated with malnutrition[1]. The current study was carried out in a tertiary level teaching hospital in Tumkur District of Karnataka to determine the nutritional status of children under 5 years of age

Materials and Methods:A cross-sectional study was conducted among 256 under five children visiting a tertiary care centre, Tumakuru from month May 2023 to July 2023. Convenient sampling method was incorporated. Pre-tested semi-structured questionnaire was used to collect the data. The data was analyzed using Epi-Info TM version 7.2.1.

Results: In the present study, 104 (40.62%) were stunted, 137(53.52%) were of normal height and 15(5.86%) were tall for their age. Approximately, 156 (60.94%) were underweight, 98(38.28) were of normal weight and 2(0.78) were obese. Nearly, 158(61.72%) were wasted, 97(37.89%) were of normal weight for length and 4(1.56) were overweight/ obese. Age of child (length for age, weight for age and BMI for age), gender (length for age, weight for age, weight for height), mothers education (BMI for age, weight for height) and socioeconomic status (weight for age, weight for height) were significantly associated with mean z-scores as mentioned in the bracket (p-value<0.05). However, there was no association

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between parents age, birth order, fathers education and type of family with nutritional status of under-five children.
Conclusion: The prevalence of malnutrition was high among the under five children. Age of child, gender, mothers education and socioeconomic status were found to be significantly associated with nutritional status of the children.

Key words: Malnutrition, under-five children.

1. BACKGROUND

Malnutrition in children is widely prevalent in developing countries including India [1]. It is estimated that in India 65% (approx. 80 million) children under five years of age suffer from varying degrees of malnutrition[2]. Malnutrition puts children at increased risk of morbidity and mortality. It is serious barrier in child growth, development and survival. More than 33% of deaths in 0-5years are associated with malnutrition[1].

Prevalence of under nutrition among under five children according to the National family health survey 5 (NFHS 5) in India shows that 32.1% under five children were underweight, 35.5% were stunted, 19.3% were wasted and 7.7% were severely wasted. Prevalence of over nutrition among under five children according to the NFHS 5 in India shows that 3.4% were overweight. From National family health survey 1 to National family health survey 4, the prevalence of under nutrition has not declined as desired. It is observed that the burden of under nutrition is more than over nutrition [3]

The government of India has strongly committed to achieving the 2030 Sustainable Development Goals (SDGs). End hunger, achieve food security, and improved nutrition and promote sustainable agriculture, all these nutrition-related factors are included in sustainable development goals (SDGs) [4]. If under nutrition is not effectively reduced, the country will not meet its SDG target of child mortality reduction[5]

Undernourished children are more prone for infections and they usually suffer from diarrhea, lower respiratory tract infections, malaria and many other infectious diseases. [2]
The nutritional status of the children in developing countries depends on age of the mother, educational status of the mother, socio-economic status of the family, type of family, order of birth of the child.[6]

Despite the growth in Indian economy, mortality due to under nutrition is still high, making assessment of nutritional status among children critical in framing health policies. [7]
The current study was carried out in a tertiary level teaching hospital in Tumkur District of Karnataka to determine the nutritional status of children under 5 years of age.

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Aims & objectives:

- To assess the nutritional status of children under five years of age
- To determine the socio-demographic factors associated with the nutritional status of under-fives

Methods

A cross-sectional study was conducted among 256 under five children visiting a tertiary care centre, Tumkur from month May 2023 to July 2023. Convenient sampling method was incorporated.

This study was approved by the ethics committee of the institute. Informed parental consent was obtained.

Inclusion criteria

1. Children less than 5 years of age presenting to tertiary care teaching hospital, Tumkur
2. Children whose parents gave informed consent.

Exclusion criteria:

1. Children with known heart, lung or liver disease.
2. Syndromic children
3. Children with chronic disorders
4. Children whose parents don't give consent.

2. METHODOLOGY

Pre-tested semi-structured questionnaire was used to collect the data.

Length/height and weight of the children enrolled in the study were measured using infantometer/stadiometer and appropriate weighing scale respectively.

Mid upper arm circumference of children between 6months to 5 years was measured using Shakir's tape.

BMI was calculated using the formula Weight(KG)/Height (m^2)

The parameters were interpreted using WHO growth charts

Statistical analysis: The data were entered in excel sheet, coded and analysed using Epi-Info TM version 7.2.1. p-value of <0.05 was taken as significant

Definitions used in the present study:

Birth Order It was taken as told by the mother/ father/ guardian.

Educational status of parents: A person who could not read and write was labeled as illiterate. [8]

Type of family: Nuclear family consists of husband, wife and unmarried children. Joint family consisted all other families

Socio economic status: Classified based on education, occupation and educational status of the father / head of the family according to modified Kuppuswamy classification 2018

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Wasting :According to WHO standards child with weight for height z -score below − 2 Standard Deviations (SD) of the median of a reference standard [9].
Stunting : According to WHO standards child with length/height for age z -score below − 2 Standard Deviations (SD) of the median of a reference standard [9].
Underweight children: According to WHO standards child with weight for age z -score below − 2 Standard Deviations (SD) of the median of a reference standard [9].

3. RESULTS

Primary outcome- Nutritional status of children presenting to tertiary care center in Tumkur
Secondary outcome- Association between various factors and nutritional status of the child

Assessment of nutritional status in children and its association with various factors:

Age: years	<-3SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	>3 SD	P value
Length/Height for age						
0-1	8 (18.60 %)	8 (18.60%)	19 (44.19%)	2 (4.65%)	6 (13.95%)	**0.0002**
1-2	35 (39.33%)	8 (8.99%)	40(44.94%)	2(2.25%)	4(4.49%)	
2-3	12(25.53%)	7(14.89%)	27(57.45%)	0(0%)	1(2.13%)	
3-4	5(10.87%)	5(10.87%)	36(78.26%)	0(0%)	0(0%)	
4-5	7(22.58%)	9(29.03%)	15(48.39%)	0(0%)	0(0%)	
Weight for age						
0-1	19	11	11	0	2	**0.034**
	44.19%	25.58%	25.58%	0%	4.65%	
1-2	45	13	31	0	0	
	50.56%	14.61%	34.83%	0%	0%	
2-3	19	8	20	0	0	
	40.43%	17.02%	42.55%	0%	0%	

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3-4	14	7	25	0	0	
	30.43%	15.22%	54.35%	0%	0%	
4-5	17	3	11	0	0	
	54.84%	9.68%	35.48%	0%	0%	
weight for length						
0-1 years	16	16	10	0	1	
	37.21 %	37.21 %	23.26 %	0	2.33 %	
1-2 years	35	27	25	2	0	
	39.33 %	30.34%	28.09 %	2.25 %	0	
2-3 years	14	9	24	0	0	**0.104**
	29.79 %	19.15 %	51.06 %	0	0	
3-4	11	10	24	1	0	
	23.91 %	21.74 %	52.17 %	2.17 %	0	
4-5	12	8	11	0	0	
	38.71 %	25.81 %	35.48 %	0	0	
BMI for age						
0-1	18	16	8	0	1	
	41.86 %	37.21%	18.60 %	0	2.33 %	
1-2	32	25	30	2	0	
	35.96 %	28.09 %	33.71%	2.25 %	0	
2-3	9	13	25	0	0	**0.042**
	19.15 %	27..66 %	53.19 %	0	0	
3-4	11	9	25	1	0	
	23.19%	19.57 %	54.35 %	2.17 %	0	
4-5	7	11	13	0	0	
	22.58%	35.48 %	41.94 %	0	0	

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1.Gender

Weight for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 to 3 SD	> 3 SD	P-value
Male	69 53.49%	23 17.83%	37 28.68%	0 0.00%	0 0.00%	0.003
Female	45 35.43%	19 14.96%	61 48.03%	0 0.00%	2 1.57%	

Weight for length/ height	< -3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3SD	>3SD	P value
Male	53 41.09%	38 29.46%	37 28.68%	1 0.78%	0 0.00%	**0.0223**
Female	35 27.56%	32 25.20%	57 44.88%	2 1.57%	1 0.79%	

Length/Height for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P value
Male	44 34.11%	14 10.85%	67 51.94%	0 0.00%	4 3.10%	**0.007**
Female	23 18.11%	23 18.11%	70 55.12%	4 3.15%	7 5.51%	

BMI for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P value
Male	41 31.78%	42 32.56%	45 34.88%	1 0.78%	0 0.00%	**0.3645**
Female	36 28.35%	32 25.20%	56 44.09%	2 1.57%	1 0.79%	

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2. Birth order

Length/Height for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	p-value
1	28 23.33%	16 13.33%	68 56.67%	1 0.83%	7 5.83%	**0.7415**
2	29 29.29%	16 16.16%	48 48.48%	2 2.02%	4 4.04%	
>=3	10 27.03%	5 13.51%	21 56.76%	1 2.70%	0 0.00%	

Weight for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	> 3 SD	P value
1	48 40.00%	15 12.50%	56 46.67%	1 0.83%	0.13
2	49 49.49%	21 21.21%	28 28.28%	1 1.01%	
>=3	17 45.95%	6 16.22%	14 37.84%	0 0.00%	

Weight for length/height	< -3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3SD	>3SD	P value
1	40 33.33%	28 23.33%	50 41.67%	1 0.83%	1 0.83%	**0.68**
2	36 36.36%	31 31.31%	30 30.30%	2 2.02%	0 0.00%	
>=3	12 32.43%	11 29.73%	14 37.84%	0 0.00%	0 0.00%	

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BMI for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P value
1	37 30.83%	27 22.50%	54 45.00%	1 0.83%	1 0.83%	**0.352**
2	31 31.31%	34 34.34%	32 32.32%	2 2.02%	0 0.00%	
>=3	9 24.32%	13 35.14%	15 40.54%	0 0.00%	0 0.00%	

3. Father's age:

Weight for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	> 3 SD	P value=
<30 years	23 37.70%	12 19.67%	26 42.62%	0 0.00%	**0.222**
30-39 years	79 45.93%	25 14.53%	67 38.95%	1 0.58%	
>=40 years	12 52.17%	5 21.74%	5 21.74%	1 4.35%	

Weight for length/height	< -3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3SD	>3SD	P value:
<30 years	20 32.79%	16 26.23%	24 39.34%	1 1.64%	0 0.00%	**0.33**
30-39 years	60 34.88%	45 26.16%	65 37.79%	2 1.16%	0 0.00%	
>=40 years	8 34.78%	9 39.13%	5 21.74%	0 0.00%	1 4.35%	

Length/Height for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P value
<30 years	12 19.67%	8 13.11%	38 62.30%	0 0.00%	3 4.92%	**0.702**
30-39 years	48 27.91%	24 13.95%	88 51.16%	4 2.33%	8 4.65%	

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>=**40** years	7 30.43%	5 21.74%	11 47.83%	0 0.00%	0 0.00%	

BMI for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**p- value**
<30 years	20 32.79%	15 24.59%	25 40.98%	1 1.64%	0 0.00%	**0.4851**
30-39 years	50 29.07%	51 29.65%	69 40.12%	2 1.16%	0 0.00%	
>=**40** years	7 30.43%	8 34.78%	7 30.43%	0 0.00%	1 4.35%	

Father's education:

Weight for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**> 3 SD**	**P-value**
Illiterate	3 60.00%	0 0.00%	2 40.00%	0 0.00%	**0.854**
Literate	111 44.22%	42 16.73%	96 38.25%	2 0.80%	

Weight for length	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**P-value**
Illiterate	0 0.00%	3 60.00%	2 40.00%	0 0.00%	0 0.00%	**0.12**
Literate	67 26.69%	34 13.55%	135 53.78%	4 1.59%	11 4.38%	

Length/Height for age	**< -3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3SD**	**>3SD**	**P-value**
Illiterate	1 20.00%	2 40.00%	2 40.00%	0 0.00%	0 0.00%	**0.87**
Literate	87 34.66%	68 27.09%	92 36.65%	3 1.20%	1 0.40%	

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BMI for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P-value
Illiterate	1 20.00%	2 40.00%	2 40.00%	0 0.00%	0 0.00%	**0.88**
Literate	76 30.28%	72 28.69%	99 39.44%	3 1.20%	1 0.40%	

5.Mother's age

Weight for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 to 3 SD	> 3 SD	P-value
<25 years	44(41.90%)	21(20%)	40(38.10%)	0(0)	0(0)	0.6518
25-34 years	65(45.45%)	20(13.99%)	56(39.16%)	0(0)	2(1.40%)	
>=35 years	5(62.50%)	1(12.50%)	2(25%)	0(0)	0(0)	

Weight for length/ height	< -3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3SD	>3SD	P value
<25 years	38 36.19%	26 24.76%	39 37.14%	2 1.90%	0 0.00%	**p-0.906**
25-34 years	47 32.87%	41 28.67%	53 37.06%	1 0.70%	1 0.70%	
>=35 years	3 37.50%	3 37.50%	2 25.00%	0 0.00%	0 0.00%	

Length/Height for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P-value
<25 years	28 26.67%	11 10.48%	60 57.14%	2 1.90%	4 3.81%	**p-0.648**
25-34 years	37 25.87%	23 16.08%	74 51.75%	2 1.40%	7 4.90%	
>=35 years	2	3	3	0	0	

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	25.00%	37.50%	37.50%	0.00%	0.00%	

BMI for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**P-value**
<25 years	35 33.33%	28 26.67%	40 38.10%	2 1.90%	0 0.00%	**p-0.8022**
25-34 years	39 27.27%	43 30.07%	59 41.26%	1 0.70%	1 0.70%	
>=35 years	3 37.50%	3 37.50%	2 25.00%	0 0.00%	0 0.00%	

Mother's education:

Weight for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 to 3 SD**	**> 3 SD**	P-value
Illiterate	4(50%)	1(12.50%)	2(25%)	0(0%)	1(12.50%)	0.0967
Literate	110(44.53%)	41(16.41%)	96(38.71%)	0(0%)	1(0.40%)	

Length/Height for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	P-value
Illiterate	0 0.00%	2 25.00%	6 75.00%	0 0.00%	0 0.00%	**0.3092**
Literate	67 27.02%	35 14.11%	131 52.82%	4 1.61%	11 4.44%	

Weight for length/ height	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 to 3 SD**	**> 3 SD**	**P-value**
Illiterate	4(50%)	1(12.50%)	2(25%)	0(0%)	1(12.50%)	0.039
Literate	84(33.87%)	69(27.82%)	92(37.10%)	3(1.21%)	0(0%)	

BMI for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**P-value**
Illiterate	4 50.00%	1 12.50%	2 25.00%	0 0.00%	1 12.50%	**-0.0271**

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Literate	73 29.44%	73 29.44%	99 39.92%	3 1.21%	0 0.00%	

Religion:

Weight for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**> 3 SD**	**P-VALUE**
Hindu	87 46.77%	28 15.05%	70 37.63%	1 0.54%	**0.4313**
Non-Hindu	27 38.57%	14 20.00%	28 40.00%	1 1.43%	

Length/Height for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**P-VALUE**
Hindu	52 27.96%	27 14.52%	98 52.69%	2 1.08%	7 3.76%	**p-0.5933**
Non-Hindu	15 21.43%	10 14.29%	39 55.71%	2 2.86%	4 5.71%	

Weight for length/ height	**< -3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3SD**	**>3SD**	**p-value**
Hindu	64 34.41%	53 28.49%	66 35.48%	2 1.08%	1 0.54%	
Non-Hindu	24 34.29%	17 24.29%	28 40.00%	1 1.43%	0 0.00%	**0.8805**

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BMI for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P-VALUE
Hindu	55 29.57%	54 29.03%	74 39.78%	2 1.08%	1 0.54%	**0.9897**
Non-Hindu	22 31.43%	20 28.57%	27 38.57%	1 1.43%	0 0.00%	

Socio-economic status:

Weight for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	> 3 SD	p-value
Lower	80 42.55%	25 13.30%	82 43.62%	1 0.53%	**0.0123**
Lower middle	16 57.14%	4 14.29%	7 25.00%	1 3.57%	
Upper lower	17 43.59%	13 33.33%	9 23.08%	0 0.00%	
Upper middle	1 100.00%	0 0.00%	0 0.00%	0 0.00%	

Length/ height for age	<-3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3 SD	> 3 SD	P-VALUE
Lower	48 25.53%	27 14.36%	102 54.26%	2 1.06%	9 4.79%	**0.3693**
Lower middle	10 35.71%	4 14.29%	11 39.29%	1 3.57%	2 7.14%	
Upper lower	8 20.51%	6 15.38%	24 61.54%	1 2.56%	0 0.00%	
Upper middle	1 100.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	

Weight for length/	< -3 SD	-3 TO -2 SD	-2 TO 2 SD	2 TO 3SD	>3SD	p-value

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height						
Lower	61 32.45%	46 24.47%	78 41.49%	3 1.60%	0 0.00%	**: 0.045**
Lower middle	11 39.29%	12 42.86%	4 14.29%	0 0.00%	1 3.57%	
Upper lower	15 38.46%	12 30.77%	12 30.77%	0 0.00%	0 0.00%	
Upper middle	1 100.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	

BMI for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**P-VALUE**
Lower	49 26.06%	53 28.19%	83 44.15%	3 1.60%	0 0.00%	**0.0719**
Lower middle	11 39.29%	10 35.71%	6 21.43%	0 0.00%	1 3.57%	
Upper lower	16 41.03%	11 28.21%	12 30.77%	0 0.00%	0 0.00%	
Upper middle	1 100.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	

Type of family:

Weight for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**> 3 SD**	**TOTAL**	**p-value:**
Joint	20 46.51%	10 23.26%	13 30.23%	0 0.00%	**43** **100.00%**	**0.4293**
Nuclear	94 44.13%	32 15.02%	85 39.91%	2 0.94%	**213** **100.00%**	

Length/ Height for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**TOTAL**	**P-VALUE**
Joint	16 37.21%	6 13.95%	20 46.51%	1 2.33%	0 0.00%	43 100.00%	0.226
Nuclear	51	31	117	3	11	213	

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	23.94%	14.55%	54.93%	1.41%	5.16%	100.00%	

Weight for length/ height	**< -3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3SD**	**>3SD**	**TOTAL**	**P-VALUE**
Joint	16 37.21%	13 30.23%	13 30.23%	1 2.33%	0 0.00%	**43** **100.00%**	**0.6185**
Nuclear	72 33.80%	57 26.76%	81 38.03%	2 0.94%	1 0.47%	**213** **100.00%**	

BMI for age	**<-3 SD**	**-3 TO -2 SD**	**-2 TO 2 SD**	**2 TO 3 SD**	**> 3 SD**	**TOTAL**	**P-value**
Joint	16 37.21%	8 18.60%	18 41.86%	1 2.33%	0 0.00%	**43** **100.00%**	**0.3391**
Nuclear	61 28.64%	66 30.99%	83 38.97%	2 0.94%	1 0.47%	**213** **100.00%**	

4. DISCUSSION

The current study assesses the nutritional status of children below five years of age presenting to tertiary care center in Tumakuru. This study also assessed about various factors determining the nutrition status of the children enrolled in the study.

It was observed that in the present study, 104 (40.62%) were stunted, 137(53.52%) were of normal height and 15(5.86%) were tall for their age. Approximately, 156 (60.94%) were underweight, 98(38.28) were of normal weight and 2(0.78) were obese. Nearly, 158(61.72%) were wasted, 97(37.89%) were of normal weight for length and 4(1.56) were overweight/ obese.

Age of child (length for age, weight for age and BMI for age), gender (length for age, weight for age, weight for height), mothers education (BMI for age, weight for height) and

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socioeconomic status (weight for age, weight for height) were significantly associated with mean z-scores as mentioned in the bracket (p-value<0.05).
However, there was no association between parents age, birth order, fathers education and type of family with nutritional status of under-five children.

5. CONCLUSION

The prevalence of malnutrition was high among the under fives.
Age of child, gender, mothers education and socioeconomic status were found to be significantly associated with nutritional status of the children.

Limitations:
The study was restricted to one tertiary care unit in Tumkuru district .So the results cannot be generalized to the whole population due to the probable variations in the socio demographic characteristics.
Maternal nutritional status, birth history & feeding history should have been considered.

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