

**SEX DIFFERENTIALS IN PHYSICAL GROWTH AND
NUTRITIONAL STATUS AMONG TRIBAL CHILDREN
IN VIZIANAGARAM DISTRICT OF ANDHRA PRADESH**

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Abstract:

The study was carried out on 215 tribal preschool children of Vizainagaram district of Andhra Pradesh. the study aimed to investigate the sex differentials in the pattern of physical growth and nutritional status. standard anthropometric methods were applied to measure the height and weight of the children. our study shows that average weight and height of boys was more than girls. The mean BMI of girls was lower than the boys. Prevalence of under nutrition in terms of underweight, stunting and wasting was found similar in both the sexes. Further, a higher prevalence of Bitot spots , B-complex and anemia deficiencies reflect the poor micronutrient status of the community. The comparison of boys and girls reveal much deference between boys and girls. The frequency of clinical symptoms was more in boys than in girls. The incidence of vitamin B is less in the studied population compared to other vitamin deficiency symptoms. This may be because of the fact that diet is cereal based, which is a part of the diet and fulfill the requirements of this vitamin to certain extent. The mean \pm SD of the BMI of males and that of females is which again speaks of the females more undernourished status. It is observed that both males and females have high rates of CED indicating a critical situation. The present study reveals the relationship between height, weight, BMI and age

Key words: Nutritional status, sex differential, under nutrition, BMI, Tribal children, Andhra Pradesh

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Introduction

Children below the age of five years constitute the most vulnerable segment of any community and suffers the highest rates of morbidity and mortality (ICMR Report1986; Gupta and Shukla,1992).Nutrition during the first five years has an impact not only on growth and morbidity during childhood, but also acts as a determinant of nutritional status in adolescent and adult life. As per the National Family Health Survey, 2005-06 (NFHS-3), 54.5 % children under 5 years belonging to Scheduled Tribes have been reported to be underweight. In India children living in the back ward and drought prone areas (VijayaRagavan et al.,2003), urban slums (Ghosh and Shah,2004), and those belonging to the socially backward groups like schedule caste (Uppal et al., 2005) and tribal (NIN,2000) communities are highly susceptible to under nutrition. But condition is worst among the schedule tribal communities. Geographical isolation, primitive agricultural practices, inadequate food habits along with traditional socio-cultural and biological activities, lack of formal education, poor infrastructure facilities, improper health seeking behavior, poverty etc may lead to the development of various morbidities and under nutrition. (Blagir et al., 2002 and Rao et al., 2006). Apart from having a biological effect on a child's nutritional status, gender differences may also result from differential preferences for having boys than for girls (Clark 2000, Griffiths et al. 2002, Bhargava 2003).

Vizianagaram is homeland of different tribal groups which includes Manne Dora, Konda Dora, Valmiki, Mooka Dora, Gadaba, bagata, Jatapu and Savara. Among these tribal communities, the Savara and Jatapu are indigenous groups, have low female literacy, more sensitive to nutrition and health issues. Jatapu are an acculturated tribe and agriculture is their main source of subsistence. Savara are one of the most vulnerable tribal groups of Andhra Pradesh and still at the pre-agricultural stage of economy with low literacy rate and isolation. There are no studies on the growth pattern of the Savara and Jatapu tribes and are the predominant tribal communities of Vizianagaram district. This study is aimed to investigate the pattern of growth and the nutritional status of Jatapu and Savara children.

Methodology

This was community based study, carried out by adopting three stage random sampling procedure. Mandal formed the first stage unit, village was second stage unit and household were

third stage unit. The district has 34 Mandals, of which eight Mandals are mostly inhabited by the tribals. During the second stage of stratification two tribal Mandals namely Kurupam and Gummalakshmpuram, which were inhabited by Savara and Jatapu tribes, were selected at random. From each of the selected mandal, 15 villages were selected randomly for the survey. The selection of the sample of households forms the final phase of sampling. A household with a couple having at least one girl child in the age group of 1-5 years at the time of survey was selected as the unit of study. Only one couple from each household was chosen for the study. A total of 215 children constituting 120 girls and 95 boys between 1-5 years age and their mothers from 120 households represents the sample of this study. A pre-tested schedule was used for health and nutritional survey to measure anthropometric measurements like height and weight. Body mass index (BMI) was calculated as the ratio of (weight (kg)/height² (m)). For assessing the nutritional status of subjects' weight deficit for age and height deficit for age have been calculated. The classification for height deficit for age and weight deficit for age was followed from Gomez and Indian academy of Pediatrics. Subjects were also categorized as underweight, normal, over weight and obese on the basis of their BMI as described by WHO. Mean and standard deviation were computed for each anthropometric variable for each age group. Growth pattern of children was compared with the reference data of the Indian standards (**Hanumanth Rao D. et al 1976**). Pearson's correlation coefficient was used to evaluate the relationship among anthropometric parameters. The statistical analyses were performed using statistical package for social science (SPSS software).

Results

Growth patterns

The sex differentials in mean and standard deviation of mean of different anthropometric parameters of each age group of Jatapu and Savara children are presented in Table 1. The mean weight among Jatapu tribal wards increased from 5.75 kg and 7.08 kg for girls and boys respectively in the 1+ age group to 14.11 kg and 16.68 kg respectively in the 5+ age group. For Savara it was 6.31kg and 5.75kg for girls and boys in the 1+ age group to 13.50 kg and 16.16kg for girls and boys in 5+age group. In accordance with tribe wise among Jatapu children, the mean weight of boys was more than the girls while in case of Savara, girls mean weight was

more at the one year age, thereafter boys weighed more than girls. The mean height among Jatapu girls was lower than the boys for all age groups except four and five years of age group. In those age groups, girls were taller than the boys. While in case of Savara children, the mean height of girls was lower than the boys for all age groups except three, four and five years of age group. In those age groups, girls were taller than the boys. The mean BMI of girls was lower than the boys for all age groups, except second and first year's age group in Jatapu and Savara.

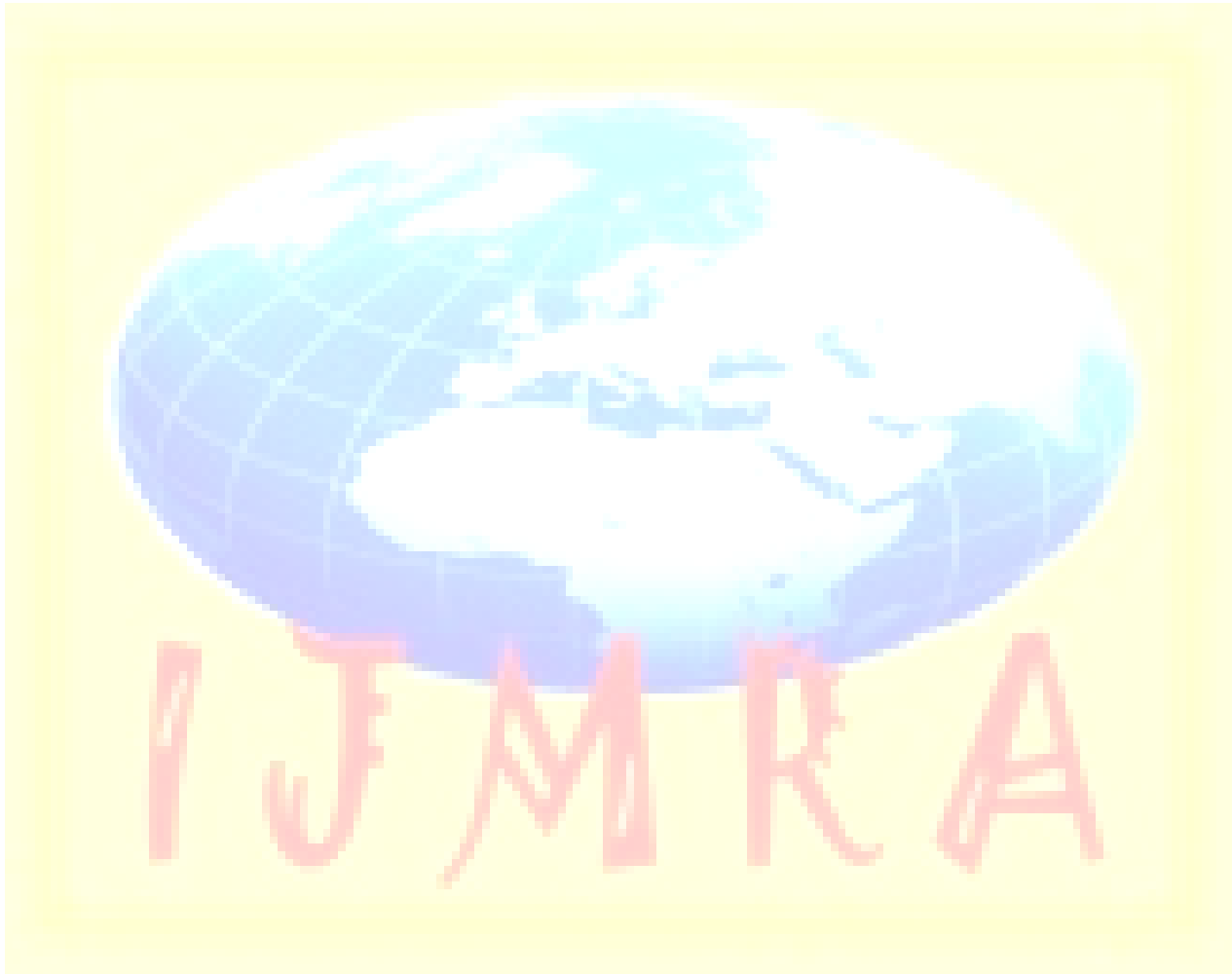


Table:1 Mean and Standard Deviation of mean of weight, height and body mass index for tribal children

Age group	Jatapu							
	Girls				Boys			
	N	Weight(kgs)	Height(cm)	BMI(kg/m ²)	N	Weight(kgs)	Height(cm)	BMI(kg/m ²)
1	10	5.75±0.48	69.05±3.04	12.11±1.45	6	7.08±1.02	71.83±9.94	14.40±4.69
2	13	7.80±0.94	74.19±6.63	14.42±2.74	3	7.50±0.50	79.66±17.78	12.96±5.13
2	9	9.16±1.98	87.88±6.39	12.01±2.86	5	10.40±0.82	88.60±9.55	13.73±3.69
4	14	11.53±1.89	96.85±9.81	12.63±3.79	13	13.76±1.21	90.84±8.69	17.05±3.16
5	17	14.11±2.40	102.41±9.61	13.79±3.68	25	16.68±3.11	98.36±9.03	17.79±5.57
Savara								
1	8	6.31±0.79	68.50±2.26	13.42±1.26	4	5.75±0.95	69.50±12.12	11.86±2.88
2	9	7.22±0.93	77.44±8.01	12.52±3.70	9	7.50±1.39	78.22±10.35	12.96±4.70
2	10	9.40±2.37	87.50±5.01	12.63±4.62	5	12.60±0.96	83.20±5.93	17.74±4.21
4	19	12.05±1.77	94.78±8.59	13.58±2.41	11	12.31±1.18	93.36±14.24	15.38±6.32
5	11	13.50±3.07	99.72±5.25	13.57±2.77	28	16.16±2.70	96.07±10.23	18.23±5.42

Nutritional Status

Of all the deficiencies, iron deficiency were more prevalent among girls in the age group of 1-5 years (46 per cent) followed by Vitamin C (cold 21.7 per cent) Vitamin A (Bitot spots 16.7 per cent) and Vitamin B deficiency (Numbness 5.0 per cent)(Table:2) .Where as in case of boys, about 76 per cent found to have Iron deficiency followed by Vitamin A(Bitot spots 36.8 per cent), Vitamin C(cold) and Vitamin B deficiency(Angular stomatitis 5.3 percent; Numbness 5 per cent). Quite interestingly, the boys of Jatapu and Savara are showing higher percentages of vitamin deficiencies than girls. According to Tribe wise, more number of Jatapu children had vitamin deficiencies than Savara children.

Table:2 Sex differentials in Vitamin deficiencies of tribal children (1-5 years)

	Jatapu		Savara		Total	
	Girls (N=63)	Boys (N=49)	Girls (N=57)	Boys (N=46)	Girls (N=120)	Boys (N=95)
Vitamin 'A' deficiency						
Normal	82.5 (52)	61.2 (30)	84.2 (48)	65.2 (30)	83.3 (100)	63.2 (60)
Bitot spots	17.5 (11)	38.8 (19)	15.8 (9)	34.8 (16)	16.7 (20)	36.8 (35)
Vitamin 'B' deficiency						
Normal	95.2 (60)	87.8 (43)	94.7 (54)	93.5 (43)	95.0 (114)	90.5 (86)
Numbness	4.8 (3)	8.2 (4)	5.3 (3)		5.0 (6)	4.2 (4)
Angular stomatitis		4.0 (2)		6.5 (3)		5.3 (5)
Vitamin 'C' deficiency						
Normal	74.6 (47)	67.3 (33)	82.5 (47)	80.4 (37)	78.3 (94)	73.7 (70)
Bleeding gums				4.3		2.1

				(2)		(2)
cold	25.4 (16)	32.7 (16)	17.5 (10)	15.3 (7)	21.7 (26)	24.2 (23)
Iron deficiency						
Normal	44.4 (28)	16.3 (8)	64.9 (37)	32.6 (15)	54.2 (65)	24.2 (23)
Weakness	12.7 (8)	18.4 (9)	12.3 (7)	2.2 (1)	12.5 (15)	10.5 (10)
Paleness	15.9 (10)	49.0 (24)	3.5 (2)	56.5 (26)	10.0 (12)	52.7 (50)
Weak and paleness	27.0 (17)	16.3 (8)	19.3 (11)	8.7 (4)	23.3 (28)	12.6 (12)

Weight- for -age

The prevalence of underweight children varied by age .Of these tribal groups, significant proportion of girls (90.0 Per cent) and about 78.9 per cent of boys under five years of age are under weight and belonged to various grades of malnutrition(Table:3). The proportion of children who are underweight, about 17.5 percent and 14.7 per cent of girls and boys belonged to grade III malnutrition followed by 54.1 per cent of girls and 29.3 per cent of boys belonged to grade II malnutrition and 19.2 per cent of girls and 34.9 per cent belonged to grade I malnutrition. About one-tenth of girls and one fifth boys of these tribal groups were normal. Disparity in under weight is highest in both tribes. Tribe wise more number of Jatapu children are under nourished than Savara children.

Table: 3 Percentage distribution of weight for age of 1-5yrs tribal children (under weight)

	Jatapu		Savara		Total	
	Girls	Boys	Girls	Boys	Girls	Boys
Grade III malnutrition	15.9 (10)	7.7 (4)	19.3 (11)	21.0 (12)	17.5 (21)	14.7 (16)
Grade II malnutrition	57.2 (36)	28.8 (15)	50.9 (29)	29.8 (17)	54.1 (65)	29.3 (32)

Grade I malnutrition	19.0 (12)	46.2 (24)	19.3 (11)	24.6 (14)	19.2 (23)	34.9 (38)
Normal	7.9 (5)	17.3 (9)	10.5 (6)	24.6 (14)	9.2 (11)	21.1 (23)
Total	100.0 (63)	100.0 (52)	100.0 (57)	100.0 (57)	100.0 (120)	100.0 (109)

Height for age

Height-for-age denotes genetic endowment of health status and represents an overall growth of children. The height of the individual is the sum of four components: leg, pelvis, spine and skull. In the sample population about one-fifth of girls (19.2 per cent) and nearly one-third of boys (28.4 per cent) under five years age were normal (Table:4). While remaining 80.8 per cent of girls and 71.6 per cent of boys were stunted. The proportion of children who are stunted, more number of boys (44.0 per cent) than girls belonged to severely malnutrition status followed by 37.5 per cent of girls and 15.6 percent of boys belonged moderate malnutrition and 20.8 per cent of girls 11.9 per cent of boys belonged to marginal malnutrition. In accordance with tribe wise more or less similar findings was observed, which may result from inadequate recent food intake or a recent illness.

Table:4 Percentage distribution of height for age of 1-5yrs girls (stunted)

	Jatapu		Savara		Total	
	Girls	Boys	Girls	Boys	Girls	Boys
Severe malnutrition	23.8 (15)	44.2 (23)	21.1 (12)	43.8 (25)	22.5 (27)	44.0 (48)
Moderate malnutrition	38.1 (24)	11.5 (6)	36.8 (21)	19.3 (11)	37.5 (45)	15.6 (17)
Marginal malnutrition	17.5 (11)	19.2 (10)	24.6 (14)	5.2 (3)	20.8 (25)	12.0 (13)

Normal	20.6 (13)	25.0 (13)	17.5 (10)	31.7 (18)	19.2 (23)	28.4 (31)
Total	100.0 (63)	100.0 (52)	100.0 (57)	100.0 (57)	100.0 (120)	100.0 (109)

Body mass index(BMI)

In the present study majority of children under five years of age are falling under weight. Out of 120 girls 93.3 per cent are under weight and 5.8 per cent are normal range of BMI while in the case of boys, 69.7 per cent are under weight and 22.9 per cent are normal (Table: 5). The comparative analysis in between these two tribes clearly depicts that, sex differences are found in under weight category. More number of girls is found in under weight than their counter parts. And more number of Savara girls and Jatapu boys show higher incidence of under weight.

Table: 5 Tribe and sex wise of BMI of 1-5 years children

	Jatapu		Savara		Total	
	Girls	Boys	Girls	Boys	Girls	Boys
Under weight	92.1 (58)	73.1 (38)	94.7 (54)	66.7 (38)	93.3 (112)	69.7 (76)
Normal	6.3 (4)	23.1 (12)	5.3 (3)	22.8 (13)	5.9 (7)	33.0 (25)
Over weight	1.6 (1)	----	----	10.5 (6)	0.8 (1)	5.5 (6)
Obese		3.8 (2)				1.8 (2)
Total	100.0 (63)	100.0 (52)	100.0 (57)	100.0 (57)	100.0 (120)	100.0 (109)

Correlation Coefficient

Table 6 shows the correlation coefficient among different anthropometric parameters in Jatapu and Savara tribes. In both sex (girls and boys) and tribes- age, height, weight and BMI are

significantly correlated to each other. But , BMI of girls in both tribes did not show any significant relation ship to age. Interestingly, BMI of children in both tribes shows negative significant relation ship to height except in case of savara girls.

Table: 6 Correlation coefficient study of different anthropometric parameters of tribal children

Sex	Jatapu				Savara			
	Age	Height	Weight	BMI	Age	Height	Weight	BMI
Girls								
Age	-	0.853**	0.865**	0.065	-	0.847**	0.795**	0.078
Height	-	-	0.759**	-0.312*	-	-	0.701**	-0.245
Weight	-	-	-	0.361**	-	-	-	0.496**
BMI	-	-	-	-	-	-	-	-
Boys								
Age	-	0.684**	0.837**	0.307*	-	0.628**	0.860**	0.374**
Height	-	-	0.541**	-0.338*	-	-	0.475**	-0.384**
Weight	-	-	-	0.593**	-	-	-	0.605**
BMI	-	-	-	-	-	-	-	-

*p<0.01, **p<0.001

Discussion

Under nutrition was found to be widely prevalent(86 per cent) among pre-school children of the Jatapu and Savara tribes of Vizianagaram district. Similar higher prevalence of underweight was observed Kamar tribal children of Chhattisgarh (Mitashree Mitra et al., 2007). It was observed that comparatively lower prevalence has been reported in Kodakupreschool children (Dolla et al., 2005), Sharai primitive tribe of Rajasthan(Rao M.K et al (2006).A comparison of male and female children indicates that about 90.0 per cent girls and 78.9 per cent of boys were underweight. In the present study prevalence of stunting(stunt growth) was 76.4 per cent (80 per

cent of girls and 71.6 per cent of boys),which was only 25 per cent in Kodak Pre-school children in MP (Dolla et al., 2005) and) and 40.0 per cent among Saharia primitive tribe of Rajasthan(Rao M.K et al (2006) . In Gond tribal preschool children of MP (Rao et al., 2005), found that 61.6 percent and 51.6 per cent of children were underweight and stunted Prevalence of under nutrition in terms of underweight, stunting and wasting was found similar in both the sexes. Further, a higher prevalence of Bitot spots , B-complex and anemia deficiencies reflect the poor micronutrient status of the community. The comparison of boys and girls reveal much deference between boys and girls. The frequency of clinical syptoms were more in boys than in girls.The incidence of vitamin B is less in the studied population compared to other vitamin deficiency symptoms. This may be because of the fact that diet is cereal based, which is a part of the diet and fulfill the requirements of this vitamin to certain extent. The mean \pm SD of the BMI of males and that of females is which again speaks of the females more undernourished status. The prevalence of chronic energy deficiency (CED) among these tribes. It is observed that both males and females have high rates of CED indicating a critical situation. The present study reveals that there is a relationship between height, weight, BMI and age

Conclusion

The findings of the study indicate that sex differences continues to exist in growth and nutritional status in the tribal society, irrespective of a particular tribe. In this regard, however a consistent pattern is not observed between tribes. The presence and extent of sex differences depend to a considerable extent on the birth order of the index child and the sex composition of older living siblings.. Poor environmental sanitation and unhygienic personal habits appear to predisposed them to the risk of skin infections. In additions to the infections, adverse cultural practices relating to child rearing, breastfeeding and weaning were other contributory factors for malnutrition and playing an important role in these vulnerable tribal communities. The government should take effective steps to improve the nutritional status of these tribal preschool children by monitoring and improving the existing supplementary feeding programmes. There is need to improve the household consumption of protective foods such as green leafy vegetables, fruits etc through dietary diversification by promoting kitchen gardening. IEC activities need to be strengthened to impart health and nutrition education to ensure better infant feeding and child rearing practices, personal hygiene and environmental sanitation.

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