

Prevalence of Thinness among the Kolam Pre-School Children

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ABSTRACT

To assess the prevalence of thinness among 2-5 years pre-school children, a cross-sectional study was conducted among 284 pre-school children (Boys-144; Girls-140) of Kolam tribe. Kolam, a primitive tribal group predominantly lives in Uttoor, Narnoor and Jainoor mandal (s) of Adilabad district, Telangana, India. Anthropometric measurements like height and weight were used to compute body mass index following standard techniques. The new international classification cut-off points provided for boys and girls aged 2 years to 5 years were used to identify the prevalence of under nutrition. It was observed that the participants of both the sexes showed a marked difference in body weight. The overall prevalence of thinness was 72.91% for Kolam boys and 72.14% for Kolam girls indicating that children of both the sexes were undernourished.

Key Words: Height. Weight. Body Mass Index. Thinness. Under nutrition.

INTRODUCTION

Under nutrition remains a major problem in children across many Indian communities. India is still experiencing the highest prevalence of childhood underweight and low birth weight in the world (UNSCN, 2009). Prevalence of thinness or underweight in a population is explained in grades as possessing under nutrition, malnutrition or over nutrition. Several studies have explored health and nutritional status of children in India (NNMB, 1978; IIPS and Macro International, 2007). Many studies have shown that the tribal populations in India are experiencing a state of under nutrition especially among pre-school children and their nutritional status was assessed by using anthropometric characteristics (Mitra et al., 1993; Kumar et al.,

1993; Mitra and Tiwari, 1997; Rao et al., 1994; Rao et al., 2005; Mitra et al., 2007). Poor nutritional status affects brain growth during prenatal and postnatal (Pollitt et al., 1996), less intelligence and behavior (Bradley, 2002), poor micronutrient supplement during pregnancy leads to low birth weight babies and further affects lactation during infancy which also affects later part of life (Allen, 2006). In view of the high prevalence of malnutrition among children of the tribal populations, a cross-sectional study was carried out to investigate the nutritional status among Kolam tribal community from Adilabad district, Telangana.

Review of Literature

Body Mass Index is an important parameter used to measure the nutritional status of a population and further representation of individuals by showing the degree of thinness is helpful in categorizing the children and the adults separately. Some of the recent studies showed the prevalence of high rates of thinness in boys (61.5%) and girls (70.8%) among 2-6 years Bauri pre-school children of Puruliya (Das and Bose, 2009); 45.45% among 2-5 years Bhaina pre-school children of Bilaspur (Singh et al., 2014); 50.7% among 3-5 years pre-school children of Nadia (Biswas et al., 2009); 44.5% among 10-15 years school children of Paschim Medinipur and puruliya (Bose and Bisai, 2008); 62.2% among 5-10 years school children of Purba Medinipur (Chakraborty and Bose, 2009); 53.9% among 6-14 years school children of Dibrugarh (Medhi et al., 2006); 50.2% among 10-18 years children of Dibrugarh (Medhi et al., 2007); 48% among 1-5 years children of Central Orissa (Mishra and Mishra, 2007); 85.2% among 2-6 years ICDS children of Hooghly district (Mondal et al., 2009); 67.2% among 2-13 years Kora-Mudi tribal children of Paschim Medinipur (Bisai et al., 2010); 41.3% among 7-18 years Santhal children of Purulia of West Bengal (Das and Bose, 2011). Children experiencing under nutrition are described as malnourished due to inadequate supply of energy. Malnourished children are more likely to grow into thin adults with low BMI (Das and Bose, 2011). As such, information on thinness prevalence among children should be focused (Das and Bose, 2009; Mitra and Tiwari, 1997; Mondal and Sen, 2010; Sen and Mondal, 2012).

MATERIAL AND METHODS

Kolam tribe lives in the interior forests and hilly tracts of Adilabad district of Telangana district, India. As per 2011 census, 8.38% share of state tribal population consists of different tribal groups in Adilabad district with 13.61% children aged 0-6 years and sex ratio 956 females per

males (ICMR, 2014). About 25% of the mandals in the scheduled area have been selected randomly taking into consideration the numerical predominance of the tribal population in the tribal sub-plan area and accordingly Utnoor, Narnoor and Jainoor mandals of Adilabad district were selected. Data on anthropometric measurements for children 2 to 5 years was collected from villages. Thinness prevalence was assessed among 284 children belonging to both the sexes. The sample data for boys and girls satisfies the normal distribution and the variation in the sample size at each age group depends on the availability of the children at the time of data collection. The data were collected during 2010-2011.

The ages of the participants were recorded as per the records maintained by anganwadi workers in the study villages. All the participants between the ages 2.0 to 5.0 years were considered for the study (Tanner, 1962; Eveleth and Tanner, 1976). Data on anthropometric measurements were collected following the standard techniques of Weiner and Lourie (1969).

Table 1: International BMI Cutoff points for BMI for thinness grades 1, 2 and 3 by sex for exact ages between 2 and 5 years

Age (years)	BMI Standards of Boys (kg/m ²)			BMI Standards of Girls (kg/m ²)		
	G-III (<16.0 kg/m ²)	G-II (16.0-16.9 kg/m ²)	G-I (17.0-18.49 kg/m ²)	G-III (<16.0 kg/m ²)	G-II (16.0-16.9 kg/m ²)	G-I (17.0-18.49 kg/m ²)
2+	13.37	14.12	15.14	13.24	13.90	14.83
3+	13.09	13.79	14.74	12.98	13.60	14.47
4+	12.86	13.52	14.43	12.73	13.34	14.19
5+	12.66	13.31	14.21	12.50	13.09	13.94

International Cut Off points of BMI (kg/m²) for thinness grade, I, II, and III by age and sex specific grades (Cole et.al., 2007)

Weight was measured to the nearest 0.1 kg with subjects dressed in light garments and without shoes using weighing machine (standard). Height was measured to the 0.1cm against a wall using anthropometric rod (Galaxy Informatics, New Delhi). The equipment was regularly checked for accuracy and the measurements were taken by trained anthropologists. Body Mass Index is calculated as the ratio of the weight in kilograms to height in meter squared (BMI = Weight (Kg)/ Height (m²)). The values of body weight and stature were used to compute the body mass index. Thinness was determined using the age and sex specific International Standards showing Cutoffs points of Body Mass Index as provided in Table 1 from 2+ years to 5+ years age group (Cole et. al., 2007). Nutritional status was evaluated using the age-sex

specific cut-off points of BMI for children as described by Cole et al., (2000, 2007). The chronic energy deficiency (CED) grades III, II and I of thinness refer to severe, moderate and mild undernutrition respectively. Statistical analysis was performed using SPSS software (16.0 version). Student's t-test was performed to test for age differences in means of weight, height and BMI. Statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

The mean body weight of Kolam boys and girls was shown in Table 2 and mean stature was presented in Table 3. It is found that with the advancement of age, there was an increase in height and weight. The mean weight is found to be higher among boys (14.55 kg) than girls (13.23 kg). Similarly, the mean height is recorded to be higher among boys (103.86 cm) than girls (99.01 cm) recorded in Table 3. The mean values of both weight ($t = 3.433$, $p = 0.001$) and height ($t = 3.373$, $p = 0.001$) are statistically significant between the sexes.

Table 2: Mean and Standard Deviation for Weight of Kolam boys and Kolam girls (2+ years to 5+ years)

Age (years)	Boys (N=144)			Girls (N=140)			t-value	p-value
	N	Weight (kg)		N	Weight (kg)			
		Mean	S D		Mean	S D		
2+	30	10.49	2.73	30	8.56	1.48	3.412	0.001 *
3+	34	11.10	1.77	30	10.55	1.04	1.496	0.140
4+	32	12.86	1.88	38	12.19	2.97	0.101	0.275
5+	48	14.55	1.90	42	13.23	1.71	3.433	0.001*
Total	144	12.51	2.63	140	11.37	2.64	3.647	0.000*

N= Sample size

*Statistical significance was set at $p < 0.05$

Table 3: Mean and Standard Deviation for Height of Kolam boys and Kolam girls (2+ years to 5+ years)

Age (years)	Boys (N=144)			Girls (N=140)			t-value	p-value
	N	Height (cm)		N	Height (cm)			
		Mean	S D		Mean	S D		
2+	30	85.98	20.31	30	78.72	6.61	1.862	0.068
3+	34	88.65	7.66	30	88.11	4.31	0.340	0.735
4+	32	96.02	6.69	38	93.81	12.48	0.896	0.373
5+	48	103.86	6.02	42	99.01	7.61	3.373	0.001*
Total	144	94.80	13.11	140	90.91	11.28	2.673	0.008*

N= Sample size *Statistical significance was set at $p < 0.05$;
 Significant sex differences ($p < 0.001$) in height was observed in 5 years age group.

Table 4: Mean and Standard Deviation for Body Mass Index of Kolam boys and Kolam girls (2+ years to 5+ years)

Age (years)	Boys (N=144)			Girls (N=140)			t-value	p-value
	Body Mass Index (kg/m ²)			Body Mass Index (kg/m ²)				
	N	Mean	SD	N	Mean	SD		
2+	30	15.68	5.28	30	13.83	1.92	1.792	0.078
3+	34	14.20	1.13	30	13.76	1.58	1.268	0.209
4+	32	13.95	1.66	38	14.03	4.93	-0.086	0.932
5+	48	13.53	1.66	42	13.54	1.72	-0.030	0.976
Total	144	14.23	2.84	140	13.78	2.94	1.291	0.198

N= Sample size *Statistical significance was set at $p < 0.05$

The mean and standard deviation of body mass index of both the sexes is presented in the Table 4. The mean body mass index of both the sexes decreased with increasing age barring a few. The p-value shows that there is no significant sex difference(s) in body mass index from 2+ years to 5+ year's age group.

Table 5 shows the prevalence of thinness by age and sex among Kolam boys and girls that exhibit grades for underweight classified as Grade I, II and III. The frequency of thinness among boys is found to be high (31.25%) classified under Grade I, followed by girls (18.57%).

Table 5: Prevalence of thinness (BMI) by age and sex among 2-5 years Kolam Pre-School Children

Age (years)	Boys (N=144)							Girls (N=140)							χ^2
	Sample size	G-I (17.0-18.49 kg/m)	G-II (16.0-16.9 kg/m ²)	G-III (<16.0 kg/m ²)	Overall	Normal	Over weight	Sample size	G-I (17.0-18.49 kg/m)	G-II (16.0-16.9 kg/m)	G-III (<16.0 kg/m ²)	Overall	Normal	Over weight	
2+	30	9 (30.0)	4 (13.3)	7 (23.3)	20 (66.67)	7 (23.3)	3 (10.)	30	2 (6.7)	9 (30.0)	10 (33.3)	21 (70.0)	8 (26.7)	1 (3.3)	0.267
3+	34	12 (35.3)	4 (11.8)	8 (23.5)	24 (70.58)	10 (29.4)	-	30	5 (16.7)	5 (16.7)	12 (40.0)	22 (73.3)	6 (20.0)	2 (6.7)	0.163
4+	32	10 (31.2)	10 (31.2)	5 (15.6)	25 (78.1)	5 (15.6)	2 (6.2)	38	11 (28.9)	1 (2.6)	17 (44.7)	29 (76.3)	8 (11.4)	1 (2.6)	0.235
5+	48	14 (29.2)	3 (6.2)	19 (39.6)	36 (75.0)	11 (22.9)	1 (2.1)	42	8 (19.0)	10 (23.8)	11 (26.2)	29 (69.04)	11 (26.2)	2 (4.8)	0.576
TOTAL	144	45 (31.2)	21 (14.58)	39 (27.0)	105 (72.91)	33 (22.91)	6 (4.1)	140	26 (18.5)	25 (17.8)	50 (35.71)	101 (72.14)	33 (23.57)	6 (4.28)	0.227

(The values in the parenthesis indicates percentages)

One way ANOVA was performed to test the age differences in means of height, weight and BMI

$p = 0.665$; $df = 1$ (between groups); $F = 0.188$

#Age combined prevalence of under nutrition (Grades I, II and III Combined) among boys and girls

Age wise prevalence of Grade III thinness among Kolam boys signifies high prevalence among 5+ years (39.6%); 3+ years (23.5%) followed by 2+ years (23.3%) etc. Similarly, among girls, the prevalence of Grade-III thinness is found to be high at 4+ years (44.7%) followed by 3+ years (40.0%), later among 2+ years (33.3%) etc. Further, it is noted that the prevalence of thinness is observed to be high among Kolam boys than Kolam girls reflecting less than 50% of boys experiencing Grade-I thinness. The overall prevalence of thinness is observed to be high among Kolam boys (72.91%) shows more pervasiveness of body mass index categorization than Kolam girls (72.14%). This differentiation can be attributed due to increased frequency of

thinness in Grade I (31.25%) thinness and Grade III (27.08%) in Kolam boys than the prevalence of thinness among Kolam girls in Grade III (35.71%) and Grade I (18.57%) thinness. The p-value is not statistically significant among 2+ to 5+ years age group indicating the prevalence of under nutrition among Kolam pre-school children.

Few studies have reported the presence of under nutrition in different regions of the country among Indian children. High prevalence of thinness is reported in the present study when compared with other studies such as Bauri pre-school children (65.3%: Das and Bose, 2009); Bhaina pre-school children (18.18%: Singh et al., 2014); school children of Nadia (50.7%: Biswas et al., 2009); school children of Paschim Medinipur and puruliya (44.5%: Bose and Bisai, 2008); school children of Purba Medinipur (62.2%: Chakraborty and Bose, 2009); school children of Dibrugarh (53.9%: Medhi et al., 2007); children of Central Orissa (48.0%: Mishra and Mishra, 2007); Kora-Mudi tribal children of Paschim Medinipur (67.2%: Bisai et al., 2010). However, the present study reported less thinness when compared with ICDS children of Hooghly district (85.2%: Mondal et al., 2009).

CONCLUSION

Kolam tribe is reported to have an overall prevalence of thinness of 72.91% among boys and 72.14% among girls. This critical situation can worsen their latter part of life which further drastically affects the next generation. Similar studies have to be conducted to find sex differentiation as well overall prevalence of thinness among other adjacent tribal groups. More intensive nutrition programmes have to be initiated and trained personnel should be employed to take follow up studies systematically and monitor regularly for implementation of these programmes to avail the outreach services.

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Conflict of Interests

The first author was Project Fellow of the project entitled, “Physical Growth, Health and Nutritional Status among Primitive Tribal Groups of Andhra Pradesh”, a University Grants Commission Major Research Project for the period 2010-2013. During the tenure of the project, the first author has collected the data from the defined areas, entered the data in master sheets and analyzed different aspects of data by framing tables and statistical analysis was done using SPSS software. The present study is part of the project data of one population, namely, Kolam tribe of Adilabad district, Telangana State (the then part of Andhra Pradesh State). The author declares that there is no conflict of interests regarding the publication of this paper.

REFERENCES

1. Allen LH. 2006. Cause of nutrition-related public health problems of preschool children: Available diet. *J.Pediatr Gastroenterol Nutr.* 43 (suppl), 30: 8-12.
2. Bisai S, Ghosh T, De Kumar G, Bose K. 2010. Very High Prevalence of Thinness among Kora-Mudi Tribal Children of Paschim Medinipur District of West Bengal, India, *EJBS* 3(1): 43-49.
3. Bisai S, Bose K, Ghosh A. 2008. Nutritional Status of Lodha Children in a village of Paschim Medinipur district, West Bengal, India. *Indian J Public Health*, 52 (4): 203-206.
4. Biswas S, Bose K, Bisai S, Chakraborty R. 2009. Prevalence of thinness among rural Bengalee pre-school children in Chapra, Nadia district, West Bengal, India. *Mal..J.Nutr.*15(2): 155-164.
5. Bose K, Bisai S. 2008. Prevalence of under nutrition among rural adolescents of West Bengal, India. *J.Trop.Pediatr.*, 54: 422-423.
6. Bradley RH, Corwyn RF. 2002. Socioeconomic status and child development. *Ann Rev Psychol.* 53: 371-399.
7. Chakraborty R, Bose K. 2009. Very high prevalence of thinness using new international body mass index cut off points among 5-10 years old school children of Nandigram, West Bengal, India. *J.Res.Med.Sci.* 14: 129-133.
8. Cole TM, Bellizzi MC, Flegal KM, Dietz WH. 2000. Establishing a standard definition for child overweight and obesity worldwide: International survey. *BMJ.* 320 (1240): 1-6.
9. Cole TJ, Flegal KM, Nicholls D, Jackson AA. 2007. Body mass index cuts offs to define thinness in children and adolescents: International Survey. *BMJ.* 335(7612): 194-197.

10. Das, Bose K. 2011. Prevalence of thinness using new international cut-off points among Santhal tribal children and adolescents of Purulia District, West Bengal, India. *Sri Lanka J.Child Health.* 40(3): 105-110.
11. Das S, Bose K. 2009. Anthropometric Characteristics and Nutritional Status of Bauri Pre-School Children of Nituria Block, Purulia, West Bengal. *Intern. J. Biol. Anthropol.* 3(2): 1-10.
12. Das S, Bose K. 2011. Prevalence of thinness among Santhal pre-school children using new body mass index cut-off points. *Jour. of Anthropol.* 2011: 1-4.
13. Eveleth PB, Tanner JM. 1976. World-wide variation in Human Growth. Cambridge University Press, Cambridge.
14. ICMR. 2014. Tribal Health Bulletin. 20 (Special issue), Jabalpur, India.
15. IIPS and Macro International. 2007. National Family Health Survey-III 2005-06, International Institute for Population Studies, Mumbai.
16. Kumar PV, Singhrol CS, Mitra M. 1993. Assessment of nutritional status among the Kamars of Raipur District with special reference to nutritional anthropometry. *J.Ravishankar Univ.* 6: 19-28.
17. Mandal GC, Bose K, Bisai S. 2009. Thinness among rural children in Bengal. *Indian J.Pediatr.* 76: 817-819.
18. Medhi GK, Barua A, Mahanta, J. 2006. Growth and Nutritional Status of School Age Children (6-14 years) of Tea Garden Worker of Assam, *J.Hum.Ecol.*,19: 83-85.
19. Medhi GK, Hazarika NC, Mahanta J.2007. Nutritional Status of Adolescents among Tea Garden workers. *Indian J.Pediatr.*, 74:343-347.
20. Mishra B, Mishra S.2007. Nutritional Anthropometry and Preschool child feeding practice in working mothers of Central Orissa. *Stud. Home Comm. Sci.*, 1: 139-144.
21. Mitra M, Tiwari A. 1997. Malnutrition in Preschool Children- A study of Brahmin Rawat and Teli Preschool Children of Raipur. *Annual Conference of Indian Society of Human Genetics*, XXIII, New Delhi, India.
22. Mitra M, Kumar PV, Pal R. 1993. Environmental, sociocultural and nutritional factors associated with childhood malnutrition into primitive tribes. *Topological and Ethnological Science Conference*, Mexico.

23. Mitra M, Sahu PK, Chakrabarty S, Bharati S, Bharati, P. 2007. Nutritional and Health status of Gond and Kavar tribal pre-school children of Chhattisgarh. *Ind.J.Hum.Ecol.* 21(4): 293-299.
24. Mondal N, Sen J. 2010. Prevalence of Under-nutrition among children (5-12 years) belonging to three communities residing in a similar habitat in North Bengal, India. *Annls. of Hum. Biol.* 37: 199-217.
25. NNMB (National Nutrition Monitoring Bureau). 1978. Dietary and Nutritional status of population in different states. Reports of the NNMB. NIN. Hyderabad, India. 1978.
26. Pollitt E, Golub M, Gorman K, Grantham-McGregor S, Levitsky D, Schurch B. 1996. A reconceptualization of the effects of undernutrition on children's biological, psychological and behavioural development. *Soc.Res.Child Develop.* 10: 1-24.
27. Rao H, Rao M, Radhaiah G, Rao P. 1994. Nutritional status of tribal preschool children in three ecological zones of Madhya Pradesh and Chhattisgarh. *Ind.Pediatr.* 31: 635-640.
28. Rao VG, Yadav R, Dolla CK, Kumar S, Bhoneley MK, Ukey M. 2005. Undernutrition and Childhood morbidities among tribal preschool children. *Ind.J.Med.Res.* 122: 43-47.
29. Sen J, Mondal N. 2012. Socio-economic and Demographic factors affecting the Composite Index of Anthropometric Failure (CIAF). *Annls. of Hum Biol.* 39: 129-136.
30. Singh HS, Gritlahre M, Das S. 2014. Nutritional Status among Females of Bhaina Tribe of Bilaspur, Chhattisgarh, India: An Anthropological Insight. *Jour. of Anthropol.* 2014: 1-7.
31. Tanner JM. 1962. Growth at Adolescence. Blackwell, Oxford.
32. United Nations Standing Committee on Nutrition. 2009. 6th Report on the World Nutrition Situation, Geneva.
http://www.unscn.org/files/Publications/RWNS6/report/SCN_report
33. Weiner JS, Lourie JA. 1969. Human Biology: A Guide to Field Methods. IBP Handbook No.9. Blackwell, Oxford.