

Nutritional Status of Children (5 - 18 Years) by Using Anthropometric Indices: A Cross-Sectional Study Among the Sartang and Miji, Lesser Known Tribes of Arunachal Pradesh, India

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ABSTRACT

Introduction: In this era of globalization, planners often fail to understand the importance of community specific nutritional intervention among children due to dearth of study specifically among the lesser known communities in tribal dominated Indian state like Arunachal Pradesh. In order to find out the present condition of nutritional status in such lesser known tribal groups in the state, this present cross-sectional study was conceptualized to assess the nutritional status by using anthropometric indices in the Sartang and Miji tribal children in Arunachal Pradesh, India.

Methods: A total of 452 children aged five to 18 years living in rural areas of West Kameng district of Arunachal Pradesh, India were considered for the present analysis. The international standards were used to collect height and weight data and height for age and BMI for age percentile were calculated.

Results: The results revealed that the prevalence of stunting (< - 2 SD height for age) was higher among the Sartang male (34.0%) and female (46.3%) compared to Miji male (26.7%) and female (23.1%), respectively. Conversely the prevalence of overweight (percentile of BMI for age > 85) was also higher among the Sartang male (19.1%) and female (27.8%) compared to Miji children. It may be due to the alteration of traditional food habits, consumption of regular fast food and increasing less socio-economic equity and higher inequality in both the communities.

Conclusions: Therefore, undernutrition as well as over nutrition are prevalent among studied children perhaps correlated with rapid change in their food habits and lifestyle in the early age.

Keywords: BMI; children; height; nutritional status; tribe; weight



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INTRODUCTION

Inadequate and improper nutritional intake is considered as one of the prime global health problems both in macro and micro level communities.¹ It is associated with waste of resources and lost productivity, because children who are undernourished or over nourished are less productive both physically and intellectually during adulthoods.² The reflection of nutritional intake is often measured by using anthropometric measures and indices due to its international acceptance of methods and easy to operate in the field.^{3,4}

In India, recent Comprehensive National Nutrition Survey 2016-18 among the children from birth to 19 years showed that adverse nutritional status of children is not only restricted about the prevalence of undernutrition but also over nutrition as India is passing through double burden of malnutrition.⁵ The macro level reflection is also noted in micro level regional studies throughout the India.

The studies of nutritional status among children and adolescent by using anthropometric measures have been conducted in different Northeast Indian tribes for the last two decades⁶⁻¹² but only few have been reported from Arunachal Pradesh.¹³⁻¹⁴ This state with around 26 distinct major tribes with numerous minor or lesser known tribes is less studied in term of nutritional status of the children. While the nation has developed its public health policies to crop off the double burden of nutrition, the state is yet to develop a basic baseline data to represent the nutritional status of various major and minor communities. Therefore, this study was conceptualized to assess the nutritional status by using anthropometric indices in the Sartang and Miji tribal children aged five to 18 years, living in rural areas of West Kameng district of Arunachal Pradesh, India.

METHODS

The present cross-sectional study was performed on 452 tribal children from two different lesser known tribal groups (Sartang 202 and Miji 250) aged five to 18 years in rural areas of Arunachal Pradesh state in India. The data was collected by using purposive sampling due to the different terrain of settlements of the studied households. In view of the

operational difficulties in the field, statistical sampling was not done for instance, the unavailability and unwillingness of the certain individuals. The data of the Miji samples were collected from Nafra and for Sartang data were collected from Rahung and Salari (Namkuthangka), located in West Kameng district of Arunachal Pradesh.

The data of the present study was collected by using the household schedule including age, sex, place of birth, immunization status, place of delivery, breastfeeding pattern from the respective mothers in retrospective manner. The household schedule was pre-tested and pre-structured in the same population before starting the final data collection. Age was recorded through the official Anganwadi records or horoscope or in relation to specific festival or to some important local event like natural calamities etc. and also cross checked from different sources. This project was approved by the Institutional Ethical Committee of Rajiv Gandhi University, Arunachal Pradesh, India, and also followed by the human experiments as laid down in the Helsinki Declaration of 2000.¹⁵ Informed consent and assent was taken before data collection from each child in the presence of their guardian.

Anthropometric measurements like height (cm) and weight (kg) were measured following the international as well as standard techniques by using anthropometer and manual weighing machine.¹⁶ Height and weight were recorded to the nearest 0.1 cm and 0.5 kg respectively. The children were made to stand in standard anatomical positions with bare feet and horizontal planes. The weight of the children was recorded in wearing minimum clothing and with bare feet. Anthropometric data was collected and subsequently recorded by a single researcher.

The nutritional anthropometric index such as "height for age z score" (HAZ) was calculated using World Health Organization (WHO) standards.¹⁷ On the other hand, Body Mass Index [BMI = weight (kg) / height (m²)] for age percentile index was calculated using same standard (WHO, 2000). Z - Scores < - 2 SD of the above HAZ were considered stunting (HAZ) and BMI for age

percentile > 85 was considered as overweight. All cut off values were internationally approved.¹⁸

The immunization status of the children was categorized as “complete” and “incomplete” doses. The children who received one dose of BCG, three doses of DTP3, and one dose of MCV were considered complete dose. Similarly, children who received one or two but not all were considered incomplete doses of immunization. Total breastfeeding duration was categorized as “Less than 24 months” and “24 months and above”. Contingency χ^2 test was used to assess the association between communities under study and nutritional status. Bivariate logistic regression was performed to identify the significant factors associated with both the stunting and overweight. Stunting (< - 2 SD HAZ) and overweight (> 85 BMI for age percentile) were coded as 1 in comparison to their counterparts as coded 0 for logistic regression analysis. All the analyses were done using SPSS 16.0 version and Excel 2000.

RESULTS

Table 1 depicts the background characteristics of the studied children. It was observed that more or less equal percentages of male and female were considered in the present study in both the Sartang and Miji population. It was interesting to note that even in present time more than 70% birth was occurred in home in both the groups. The percentage of complete doses of immunization was higher among the Sartang group (72.3%) compared to Miji group (51.2%). Besides, majorities of the studied children did not get the 24 months mother

Table 1. Background characteristics of the studied children

Variable	Sartang (n = 202)		Miji (n = 250)	
	n	%	n	%
Age group (years)				
5 – 10	105	52.0	91	36.4
Above 10	97	48.0	159	63.6
Sex				
Male	94	46.5	116	46.4
Female	108	53.5	134	53.6
Place of delivery				
Home	145	71.8	194	77.6
Hospital	57	28.2	56	22.4
Immunization status				
Complete	146	72.3	128	51.2
Incomplete	56	27.7	122	48.8
Total duration of breastfeeding				
Less than 24 months	22	10.9	59	23.6
24 months and above				

milk in both the group i.e. more than 75% children in both the group.

Table 2 describes the age group, sex and community-wise mean and SD of anthropometric measures (height and weight) and index (BMI) among the studied children. It was noted that mean BMI was comparatively higher among the Sartang than Miji tribal children all through the ages and sex.

Findings of this study showed (table 3) that prevalence of stunting (< - 2 SD height for age) in the total study population was higher among the Sartang male (34.0%) and female (46.3%) compared to Miji male (26.7%) and female

Table 2. Age group, sex and community-wise mean and SD of anthropometric measures among the studied children

Community	Height in cm (mean ± SD)		Weight in kg (mean ± SD)		BMI in kg / m2 (mean ± SD)				BMI in kg / m2 (mean ± SD)			
	Male		Female		Male		Female		Male		Female	
	5 - 10 years	Above 10 years	5 - 10 years	Above 10 years	5 - 10 years	Above 10 years	5 - 10 years	Above 10 years	5 - 10 years	Above 10 years	5 - 10 years	Above 10 years
Sartang	117.2 ± 13.5	146.3 ± 11.9	112.3 ± 12.5	144.9 ± 6.8	22.6 ± 6.4	44.0 ± 11.8	20.9 ± 5.7	44.8 ± 9.1	16.3 ± 2.4	20.3 ± 3.5	16.3 ± 2.0	21.1 ± 3.0
Miji	116.7 ± 11.4	150.1 ± 9.7	116.2 ± 12.9	146.2 ± 8.2	21.9 ± 4.9	43.0 ± 8.9	21.7 ± 6.1	44.0 ± 8.1	15.9 ± 1.6	18.9 ± 2.3	15.8 ± 2.2	20.5 ± 3.1

Table 3. Sex and community-wise distribution of stunting and overweight among the studied children

Community	Height for age		BMI for age (Percentiles)		
	< - 2 SD (Stunting)	2 SD and above (Normal)	< 5th (Undernutrition)	5 - 85 (Normal weight)	> 85 (Overweight)
Male					
Sartang	32 (34.0)	62 (66.0)	6 (6.4)	70 (74.5)	18 (19.1)
Miji	31 (26.7)	85 (73.3)	5 (4.3)	103 (88.8)	8 (6.9)
Chi-square	1.324	8.105*			
Female					
Sartang	50 (46.3)	58 (53.7)	4 (3.7)	74 (68.5)	30 (27.8)
Miji	31 (23.1)	103 (76.9)	5 (3.7)	105 (78.4)	24 (17.9)
Chi-square	14.407**	3.392			

** $p < 0.01$ * $p < 0.05$

(23.1%), respectively. Conversely the prevalence of overweight (percentile of BMI for age > 85) was also higher among the Sartang male (19.1%) and female (27.8%) compared to Miji children, respectively. The distribution of height for age (stunting) in female and BMI for age (overweight) in male was significantly varied according to communities under study. The bivariate logistic regression analysis of background characteristics on stunting and overweight was also confirmed these findings, where the Sartang children were significantly more than two times likely to be stunted and overweight compared to Miji counterparts. Besides stunting and overweight was higher among the children (irrespective of groups

and sex) in 5 - 10 age group (years), breastfeeding duration 24 months and above and completed immunization status.

DISCUSSION

It is evident from the present study that there was significant variation in both the stunting and overweight prevalence amongst pre-adolescent and adolescent children (male and female) aged five to 18 years among the lesser known tribes (i.e. Sartang and Miji) living in the rural areas of West Kameng district of Arunachal Pradesh, India. This is probably the first exploration of child nutrition among these groups. Comparatively, Sartang children had higher prevalence of both stunting and

Table 4. Bivariate logistic regression analysis of background characteristics on stunting and overweight

Variables	Stunting (< - 2 SD HAZ)		Overweight (> 85 BMI for age percentile)	
	Wald	OR (95% CI)	Wald	OR (95% CI)
Community Sartang (Ref-Miji)	12.444	2.072** (1.387 - 3.096)	8.977	2.123* (1.297 - 3.475)
Sex Male (Ref-Female)	0.624	1.174 (0.788 - 1.748)	7.429	2.033* (1.221 - 3.385)
Age group (years) 5-10 (Ref- Above 10)	0.101	1.067 (0.716 - 1.589)	0.006	1.019 (0.626 - 1.659)
Breastfeeding duration 24 months and above (Ref - Less than 24 months)	0.544	1.221 (0.719 - 2.073)	0.012	1.036 (0.549 - 1.953)
Immunization status Complete (Ref-incomplete)	0.586	1.173 (0.780 - 1.764)	4.525	1.770* (1.046 - 2.996)

** $p < 0.01$, * $p < 0.05$

overweight percentage compared to Miji group. This may be the reflection of associating with impaired fat oxidation, a factor that predicted obesity among the stunted children.¹⁹

The Miji is a lesser-known tribe in Arunachal Pradesh, also known as Sajolang or Damai. They are predominantly inhabited in West Kameng and East Kameng districts with a population of about 8000.²⁰ Most of them follow animism but some of them have started following Christianity. Sartang is another lesser-known tribe of Arunachal Pradesh inhabiting in West Kameng district of Arunachal Pradesh. Their population is about 5000. Due to the influence of the Monpa, a neighboring tribe, the majority of the Sartang population follows Buddhism. However, still, a few of them continue to follow their animism.²¹

The background characteristics of the studied children showed that majorities of them in both the tribes were born in home and less immunized compared to National averages.²² Besides, the studied children did not get the full duration of mother breast milk that may have forced them to adapt early complementary feeding. It was evident from the first-hand observation during fieldwork that most of the families preferred local vegetables with rice in their meal compared to pulses. Therefore, in depth study of dietary consumption among children is urgently required and this may be the limitation of the present study. However, it was clearly summarized the changing dimension of traditional food consumption among the tribes of Arunachal Pradesh due to globalization.²³

The prevalence of stunting across the study tribes and in both sexes was over 20%, where highest and alarming prevalence of stunting was reported among Sartang females (46.3%). A study among Hmar tribal children in four villages in Aizawl district of Mizoram state in India showed similar high prevalence of stunting (moderate plus severe forms) for all age groups above 44.0%.¹⁰ The national level Comprehensive National Nutrition Survey (CNNS) 2016-18 also showed stunting of children aged five to nine years was 18.2% in Arunachal Pradesh.⁵ On the other hand, the prevalence of overweight among Sartang male and

female was over 19% on the basis of BMI for age, where females were outnumbered than males. Similar trends were observed among the Ao Naga tribal children of Nagaland including the higher prevalence of overweight among the female than male.⁷ On the other hand, the same CNNS 2016-18 Arunachal Pradesh study also showed 11% of adolescent aged 10 - 19 years were overweight.⁵ A micro level regional study of nutritional status among the adjacent the Aka (Aka is also from the same district under study and a lesser known tribe) male aged nine to 18 years in Arunachal Pradesh showed comparatively lower stunting (2.67%) and overweight (1.67%) than the present children.¹⁴

Overall the villages of both the studied populations were in hilly region with poor road connectivity. During raining seasons the condition of these roads became worse. There was very limited public transportation connecting nearby district headquarters and may be associated with poor public distribution system. It has reported how difficult topography and climatic condition affect the nutritional status of children in Baiga tribes of Madhya Pradesh.²⁴

CONCLUSIONS

On the basis of the present findings, it may be concluded that both stunting and overweight are highly prevalent among male and female children of the studied Sartang and Miji tribes of rural Arunachal Pradesh. It may be the true reflection of double burden of malnutrition in community level. Further detail study is needed to find out the determinants of the cause behind the double burden of malnutrition in the study population. Such micro level population based studies in anthropological research highlight local problems prevalent in the specific population. This should help the policy makers to emphasize on equal distribution of food resources in such regions and also represents the rapid change in the livelihood and lifestyle of the local community.

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