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Nutritional Status of Baiga Tribe of Baihar, District Balaghat, Madhya Pradesh

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Abstract

A community based cross-sectional study was carried out to assess the nutritional status of Baiga tribal population of Baihar, Balaghat district of Madhya Pradesh. A total of 1197 individuals from 436 households were studied for anthropometric measurements and clinical examination. The consumption of all the food stuff except cereals and millets were lower than recommended dietary allowances. The intake of micronutrients was lower than recommended dietary allowances. Vitamin 'A' deficiency was a major nutritional deficiency disorder in this tribe. The magnitude of wasting (weight for height<Median-2SD) in pre-school children was significantly higher (42.3%) than the rural children (23.8%) of Madhya Pradesh. The prevalence of chronic energy deficiency (BMI<18.5) among adults was significantly higher (55.8% male and 62.9% female) as compared to rural population of Madhya Pradesh (28% male and 31% female). The results revealed that malnutrition is still a leading problem among Baiga tribe and this has not much improved in spite of nutrition intervention programmes which are currently in operation.

Keywords: India; Baiga; Nutritional status; Pre-school children

Introduction

The tribal population constitutes about 8% of total population of India. They live in unique physical socio-economic and cultural environment, isolated from general population. Their food intake is influenced by vagaries of nature with large seasonal variation [1]. Government of India identified a total of 74 such tribal communities as primitive tribes on the basis of low growth rate, pre-agriculture level of technology and extremely low level of literacy [2]. The Baiga is one of those primitive tribes inhabiting in Baihar tahsil of Balaghat District of Madhya Pradesh. The total population is about 17146 spread over in 190 villages. Their economy is still dependent on primitive agricultural techniques like gleaning and making of bamboo articles which are sold in nearby market. The modern method of raising the agriculture production has not yet been adopted by this tribe. The tribal population is at risk of under nutrition because of their dependence on primitive agriculture practices and uncertainty of food supply [3]. Health and nutritional problems are the result of unsatisfactory food intake or severe and repeated infections or a combination of both. These conditions are closely linked to inadequate food consumption, neglected care for mothers and children, insufficient health services and unhealthy environment i.e. open field defecation and improper or non-availability of drainage system [4]. Approximately 38 Million children are born in south Asia and one in eight fails to survive to age of 5 years. Approximately 3 million at these child death are directly or indirectly associated with malnutrition [5]. There is considerable data regarding the food habits and nutritional status of urban and rural communities of Madhya Pradesh, while such information is scanty on the Baiga tribe of Balaghat district. Hence a study was carried out by Regional Medical Research Center for tribals during month April 2009 with an objective to assess the nutritional status of Baiga tribal population.

Materials and Methods

A cross sectional study was carried out in the Baihar tahsil of Balaghat district of Madhya Pradesh. Trained Medical officer, Nutritionists, Social worker and field Investigators were involved in data collection using standard equipments and procedures.

Selection of village and households

The study was carried out in the Baihar tahsil of Balaghat district in the year 2009. The study area is spread out in 190 villages in the three blocks namely Baihar, Birsa and Paraswada. A total 23 villages were selected using probability proportion to population size (PPS) sampling methods with an assumption that an estimated proportions of 50% population being affected with a cluster size of 20, with a confidence coefficient of 90% and confidence interval of ± 10% with a 0.3 rate of homogeneity and design effect of 6.70, based on right size statistical software of CDC Atlanta. Households were selected by systematic random sampling.

Data collection

In a selected village data collection initiated from the north east corner of the village. The information on socio-demographic profile was collected for all the households. The data were recorded on pre-designed and pre-tested questionnaire. The medical officer examined all individuals following the complete clinical examination and a medical file was established for each individual. Anthropometrical measurements such as weight and height were measured using standard procedure and equipment [6]. Lever actuated (SECA, Germany) Weighing scales were used and calibrated before and after each session. The children were weighted with only minimum clothing and the average of two reading was taken. Height were measured on height board, care was taken to ensure that children were standing upright with feet flat and firmly against the well. Weights were measured to the nearest 0.01 kg and height to the nearest 0.1 cm. Family diet survey was carried out from 10% households by 24 hours recall methods [7]. Data was collected from the women who Cooks and serve food to households members.

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Analysis

All data were initially recorded on microcomputers using CSpro 4.0 version U .S. census *burros* Washington DC 20233-8860 USA. Double data entries were done as a check for entry errors. Using SPSS windows version11.0, statistical analysis such as arithmetic mean, standard deviation and percent distribution of households/Individuals according to different variables was carried out. The percent distribution of children according to weight for age, height for age and weight for height according to standard Deviation (SD) classification by using National Center for Health Statistics (NCHS) standard was carried out [8]. In this classification the children whose weight was 90% of the standard weight for their age were considered normal those whose weight or height was greater than 10% were regarded as above standard and those below 10% were regarded as stunted, wasted and underweight, respectively. The nutritional status of adult men and women was determined by computing Body mass Index (weight in kg/height in meters^2). Based on body mass index the individuals were categorized into different nutritional grades using James classification [9]. The average daily intake of food were computed and compared with the recommended dietary allowances for Indian [10]. The average daily intakes of nutrient were calculated using food composition tables [11] and compared with the recommend daily allowances [12]. The results of the present study were compared with that rural population of Madhya Pradesh [13]. To test the significance of association between independent and dependent variables chi square (χ^2) test was used, while t test was applied to evaluate significance between RDA with present results.

Results

A total of 436 households from 23 villages were covered in the present study. A sub-sample of 114 households was covered for family diet survey. Nutritional anthropometry and clinical examination was carried out on 1197 individuals.

Socio-economic profile

About 82.3% of the families were nuclear while about 17.7% were joint families. 95.9% of the houses were *Kaccha* and 0.5% was semi *pucca* while *pucca* houses accounted for only 3.7%. More than 41% populations were illiterate. Unskilled labour work was the major occupation of the head of the house-holds in about 89.1%, while only 4.4% house-holds were cultivators. Hand pump formed the major source of drinking water in about 81.7% of the households while the rest fetched the same from open well and stream. Majority of the households (97.8%) does not have sanitary latrine and 39% do not have a separate Kitchen. Nearly one forth Families (21.4%) do not have electrification, (Table 1).

Prevalence of nutritional deficiency signs

The prevalence of conjunctival xerosis and Bitot's spots the signs of vitamin 'A' deficiency in the children were found 9.7% and 4.9% respectively and were significantly higher as compared to the Rural children of Madhya Pradesh [13] i.e. 3.4% and 0.6% (P<0.01). About 3.1% population had Angular Stomatitis indicative of B-complex deficiency. The prevalence of Marasmus was 1.8% which were almost absent in rural population of Madhya Pradesh [13]. More than 72.6% population was found normal and this proportion was lower than the Rural Madhya Pradesh which was 96.0% (P<0.0001) (Table 2) [13].

Anthropometry

The mean of anthropometric measurement according to age and

		Percentage
Type of House (n=436)	Kaccha	95.9
	Semi-pucca	0.5
	Pucca	3.7
Type of Family (n=436)	Nuclear	82.3
	Joint	17.7
Literacy Status (n=1197)	Illiterate	41.1
	Primary	21.6
	Middle	18.8
	High School	2.1
	Graduate	2.7
Occupation of Head of House-holds (n=436)	Laborer	89.1
	Cultivator	6.5
	Service	4.4
Source of Drinking water (n=436)	Open well	15.6
	Tube well	81.7
	Stream/River	2.8
Other features (n=436)	Yes	No
Sanitary latrine	2.2	98.4
Separate Kitchen	60.9	91.5
Electrification	79.6	71.3

Table 1: Distribution of Socio demographic factors of Baiga Tribe of Balaghat.

Deficiency Signs	Baiga (n=226) (%)	Rural (M.P.) (n=505) (%)
Conjunctival Xerosis	9.7	3.4*
Bitot's Spot	4.9	0.6*
Angular stomatitis	3.1	0.0
Marasmus	1.8	0.0
Dental carries	3.1	0.0
Others	4.9	0.0
NAD	72.6	96.0#

*p<0.01, # p<0.0001
NAD: No Abnormality Detected

Table 2: Prevalence (%) of Nutritional Deficiency Signs of pre-school Baiga Children of Baihar, Balaghat.

sex are given in Table 3. From one year to 17 years age Baiga children were found shorter than rural children [13] by about 8 cm and weighed less up to 4 kg. They were also shorter and lighter than their American counterparts (NCHS i.e. standard of National Centre for Health Statistics) [14]. Table 4 shows the nutritional deficit using standard deviation classification of underweight (weight for age), stunting (Height for age) and wasting (weight for height). The proportion of underweight children (<Median-2SD) was 65.9%, stunting (<Median-2SD) was 49.6% and wasting (<Median-2SD) was 42.3%. The proportion of children with severe underweight (<Median-3SD) was 35.4% followed by severe stunting with 28.8% and severe wasting with 10.7 percent. About 55.8% of adult males and 62.9% females had varying degrees of chronic energy deficiency (BMI<18.5). The prevalence were significantly higher than the rural adult population of 28.6% males and 38.8% females [13] and only 1.8% of the studied Baiga population were overweight (i.e. BMI>25), Table 5.

Food and nutrient intake

The average intake of cereals and millets was significantly higher than recommended level, while the intake of qualitative food such as pulses, vegetables, milk and milk products, Oil and fat, Sugar and Jaggery were significantly lower than the recommended level except for Roots and tubers (P<0.001). The consumption of milk and milk

Age Group	Boys				Girls			
	Height (cm)		Weight (kg)		Height (cm)		Weight (kg)	
	Baiga	Rural mp	Baiga	Rural mp	Baiga	Rural mp	Baiga	Rural mp
1+	66.0	72.2	5.6	8.0	63.3	71.0	5.1	7.6
2+	72.0	80.3	7.6	9.4	73.1	80.5	7.0	9.7
3+	80.6	88.0	9.0	11.7	83.4	86.7	9.4	10.7
4+	87.7	93.7	14.0	12.5	87.6	93.0	11.1	12.2
5+	93.3	100.6	15.4	13.9	95.5	100.4	12.4	13.7
6+	101.0	105.2	18.2	15.3	100.0	107.4	13.3	15.6
7+	108.1	111.3	19.1	16.5	109.1	111.2	16.1	16.8
8+	112.1	117.7	16.6	19.3	114.1	116.1	18.0	18.5
9+	116.5	123.2	18.7	21.0	114.5	122.1	19.6	20.8
10+	123.2	127.1	20.4	22.7	121.2	126.7	21.2	23.0
11+	125.2	134.1	21.2	25.8	128.4	132.5	22.3	26.1
12+	132.1	137.5	24.0	28.5	134.0	136.5	26.4	27.7
13+	139.0	140.5	29.4	30.2	135.1	142.0	28.1	32.3
14+	148.1	149.3	33.2	36.1	144.3	146.9	32.5	36.2
15+	147.3	151.6	34.5	40.4	149.0	147.5	36.4	37.7
16+	149.2	158.3	36.7	46.4	151.1	149.5	40.4	42.1
17+	154.1	160.8	45.4	47.4	150.1	149.6	40.6	41.4

Table 3: Distribution of Height and Weight of Baiga Boys and girls according to Age and sex of Baihar, Balaghat.

SD Classification	Weight for Age (Underweight)[1]		Height for Age (stunting)[2]		Weight for Height (wasting)[3]	
	Present Study (n=226)	Rural M.P. (n=565)	Present Study (n=226)	Rural M.P. (n=565)	Present Study (n=226)	Rural M.P. (n=565)
<Median-3SD	35.4	25.8	28.8	29.0	10.7	8.7
Median -3SD to – 2SD	30.5	31.7	20.8	19.8	31.6	15.1
>Median – 2SD	34.1	42.5	50.5	51.3	57.8	76.2

[1]χ^2=1.07; P=0.3004, Odds ratio=0.8553846, 95% CI (0.6366157-1.149316) (Cornfield)
[2]χ^2=1.17; P=0.2784, Odds ratio =0.849397, 95% CI (0.6324741-1.140733) (Cornfield)
[3]χ^2=6.14; P=0.0132, Odds ratio=1.505, 95% CI (1.088789 -2.0821) (Cornfield)

Table 4: Distribution (%) of 0-5 years Baiga Children of Baihar, Balaghat According to SD Classification (n=226).

BMI Grades	<16 (CED-III)		16-17(CED-II)		17-18.5(CED-I)		18.5-20 (Low weight-Normal)		20-25 Normal		25-30 overweight		>30 Obese	
	Present study	Rural M.P.	Present study	Rural M.P.	Present study	Rural M.P.	Present study	Rural M.P.	Present study	Rural M.P.	Present study	Rural M.P	Present study	Rural M.P.
Male[1]	5.3	3.9	18.5	6.0	32.0	18.7	29.0	27.4	14.9	41.4	.03	2.5	0	0.3
Female[2]	13.4	4.6	15.2	6.4	34.3	19.8	23.7	22.5	11.9	41.9	1.5	3.9	0	0.8

χ^2=11.45; P=0.0007, Odds ratio=1.828842, 95% CI (1.28559-2.601776) (Cornfield)
χ^2=22.72; P=0.0000, Odds ratio=2.120598, 95% CI (1.549681-2.901878) (Cornfield)
CED – Chronic Energy Deficiency

Table 5: Percent Distribution of Baiga Adult Male and Female of Baihar, Balaghat, According to BMI classification (n=691).

products was grossly inadequate in their daily diet; Table 6. The average intake of all the nutrients were considerably lower than the recommended dietary allowances for Indians (P<0.0001); Table 7. The extent of deficit in the intake of micronutrients in daily diet such as vitamin A (62%), Calcium (60%), Iron (46%), Riboflavin (36%) and Vitamin C (350%) was relatively more compared to Energy (25%) and Protein (26%).

Discussion

The food intakes of Baiga's were highly skewed. The daily intake of vegetables, milk and milk product, Flesh food, fruits, oil and fat is inadequate as compared to the recommended dietary allowances for

	Cereals	Pulses	GLV	Other Vegetable	Roots and tubers	Milk and Products	Meat and Meat products	Oil and Fat	Sugar and Jeggery
Mean (n=114)	491.0 ± 112.7	23.3 ± 39.8	21.4 ± 40.3	28.2 ± 52.9	46.4 ± 31.4	5.4 ± 21.3	8.2 ± 31.2	7.2 ± 7.4	6.7 ± 3.2
RDA* ICMR 1990	460	40	40	60	50	150	40	40	30
Z value	2.9369	4.48	4.937	6.418	1.22	72.4838	10.88	47.32	77.74
P value	P=0.0033	P<0.0001	P<0.0001	P<0.0001	P=0.2209	P<0.0001	P<0.0001	P<0.0001	P<0.0001

GLV: Green Leafy Vegetables

Table 6: Average food consumption (g/day) of Baiga Tribe of Baihar, Balaghat (n =114).

Nutrient	Energy kcal	Protein gm	Calcium mg	Iron mg	Vitamin C mg	Carotene µg	Thiamin mg	Riboflavin mg	Fat gm
Mean (n=114)	1821 ± 754.1	43 ± 31.1	161 ± 178.3	14.8 ± 12.8	26.2 ± 20.4	922 ± 793.1	1.0 ± 0.72	0.9 ± 0.5	11.5 ± 8.3
RDA* ICMR 1990	2425	60	400	28	40	2400	1.2	1.4	20
Z value	8.5519	5.8363	14.312	11.0107	11.5112	19.8975	2.9659	10.6771	10.9344
P value	P=0.0033	P<0.0001	P<0.0001	P<0.0001	P<0.0001	P<0.0001	P=0.003	P<0.0001	P<0.0001

*RDA- Recommended Dietary allowances

Table 7: Average Nutrient intake (per day) of Baiga Tribe, Baihar, Balaghat.

Indian [10]. Their diet is purely cereals based which results in higher intake of energy and protein levels, while intake of micronutrient such as Iron, Calcium, Vitamin A, Vitamin C and Riboflavin was highly deficient. This was reflected in higher prevalence of under nutrition. High prevalence of nutritional deficiency signs such as conjunctival xerosis and Bitot's spot indicates that vitamin 'A' deficiency is a major public health problem among this tribe which may be due to less consumption of green leafy vegetables and milk in their daily diet. Nearly two third of the Baiga children (65.9%) had weight below Median-2SD and about 35% children had severe under nutrition (<Median-3SD). This was higher than the rural Madhya Pradesh data reported by NNMB Rural MP (National Nutritional Monitoring Bureau) [13] where Median-2SD which was only (57.5%). The magnitude of the wasting in pre-school children that reflect recent nutritional stress and weight loss was significantly higher than their rural counterparts [13] which indicate that Baiga children's nutritional status were worse than their rural counterparts. About half of (55.8%) adult male had chronic energy deficiency and the condition were worst among female (62.9%), which is significantly higher than rural population 28.6% and 30.8% respectively. This could be due to non-availability of the food stuff or prevailing poor public distribution system. Earlier study carried out by RMRCT Jabalpur also revealed high (90%) proportion of anaemia especially among adolescent girls [15]. Considering anaemia as a high risk factor among adolescent girls Government of Madhya Pradesh initiated a Baiga special component programme in this area. In spite of the government effort the nutritional situation did not improve. Further strengthening of the existing programes is required along with improvement of public distribution system, poverty alleviation programmes in a comprehensive manner for the overall development of this tribe.

Acknowledgement

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