Health and Nutrition Profile of Tribals of Madhya Pradesh and Chhattisgarh

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Abstract

Central India, which constitutes mainly of Madhya Pradesh, Chhattisgarh and its adjoining area, holds 23% of the total population of the country. Madhya Pradesh and Chhattisgarh has about 46 Scheduled Tribes of which 7 of them are declared as primitive tribes. The primitive tribes are Saharias of Chambal division, Bharias of Patalkot, Baigas of Baigachak area, Hill Korbas and Birhors of Sarguja, Kamars of Raipur and Abujhmarias of Bastar. Due to different socio-cultural milieu, different diseases are prevailing among them. However, some of the diseases are common among all these primitive tribes: like acute respiratory infections, sexually transmitted diseases, diarrhoeal diseases and nutritional disorders are common among all these tribes. Some of the genetic disorders like sickle cell anaemia, thalassaemia are restricted to their clan because of consanguineous marriages.

Baiga tribe has highest prevalence (22%) of Sickle cell disease, followed by Abujhmaria tribe (17%) and Bharia tribe (13.7%). Sickle cell anaemia was absent among Saharia, Hill Korba, Kamar and Birhor tribes. Thalassaemia was commonly seen among the Hill Korba (10%), Saharia (8.7%) and Kamar (7 %) tribe, while thalassaemia was absent among Abujhmaria, Baiga and Bharia tribe. G6PD deficiency was seen among all these tribes except Birhors.

About 21% of the Birhor pre-school children were severely malnourished followed by Kamar (10%), Saharia and Bharia (9%), Abujhmaria (8%) and Baiga (7%) children. Hookworm infestation was 27% among Abujhmarias followed by Baigas 13% and 7% among the Bharias. Nutritional anaemia ranged from 30% to 100% among 6-14 years children of these tribes. Recent study carried out in the Bijadandi block revealed that Iron deficiency anaemia was 94% among the tribal adolescent girls.

Some of the tribes also had different diseases, which are restricted to some specific geographical area. Yaws was restricted to Abujhmarias of Bastar only. The prevalence reduced from 70/1000 in 1987 to 9/1000 in 1997 after three Penicillin campaign and it is now on the verge elimination. Similarly Goitre was restricted among the Bharias living in the Patalkote Valley only. The visible Goitre rate among more 15 years age was 51% in 1998 which reduced 11.6% in 1993 after specific Iodised salt supplementation programme. Sexually transmitted disease (Syphilis) was restricted to Khairwar tribe of Sidhi district. About 64% of the blood samples were VDRL positive. Overall filariasis rate was 7.5% in Panna district. Sputum positive tuberculosis was 12/1000 among the Saharia tribes of Karhal block.

In recent times fluorosis has emerged as a new public health among the tribals of Madhya Pradesh. In Mandla district (Tilaipani village) dental mottling (74%) and genuvalgum (52%) was seen in children and young adults of less 20 yrs of age. Fifty percent drinking water sources of Mandla and Dindori district had high fluoride contamination.

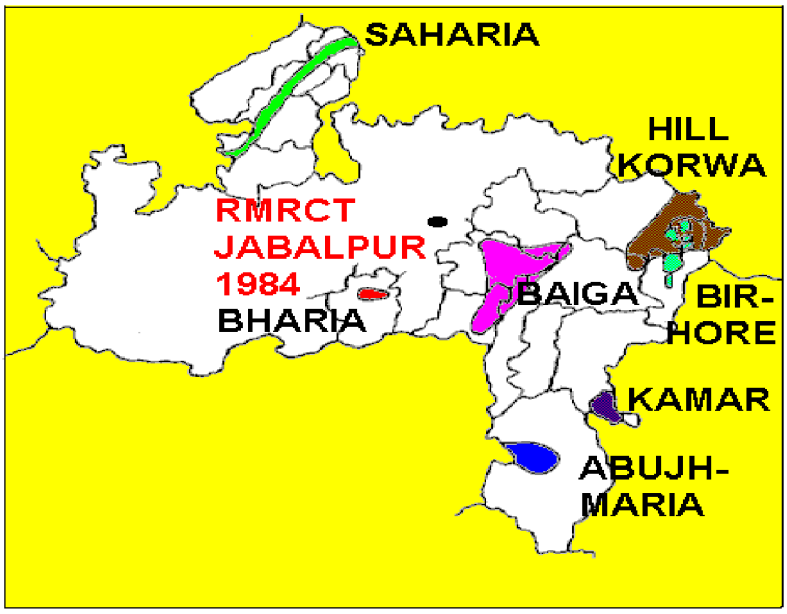
The paper highlights that there are few diseases, which are common to all the tribes, which can be managed with common programme, and area/tribe specific problems needs to be addressed separately.

Introduction

Madhya Pradesh (undivided) is the largest state of the country. The state has a total population of 603.48 lakhs as per 2001 census and ranks sixth in the country, with a total tribal population of 120.69 lakhs. There is about 23% of the total tribal population of the country.

There are 46 scheduled tribes spread over in 45 districts of undivided Madhya Pradesh (henceforth Madhya Pradesh means undivided Madhya Pradesh). Out of these 46 tribes, 7 tribes are most backward tribes and are identified as primitive tribes (Tiwari, 1984) based on their pre-agricultural level of technology, low level of literacy and stagnant or diminishing population. The seven primitive tribes viz. Abujhmarias, Baigas, Bharias, Hill Korwas, Kamars, Saharias and Birhors shown in Fig. 1. Abujhmarias are located in Abujhmar area of Bastar district, Baigas are in the Baigachak area of Mandla district, Bharias are in the Patalkot area of Chhindwara district, Hill Korwas are in the Surguja district, Kamars are in Raipur, Saharias are in Morena district and Birhors are also located in the Raigarh district.

Fig.1: Location of various primitive tribes of MP and Chhattisgarh



Nutritional status of the population largely depends on the consumption of food in relation to their needs; which in turn is influenced by the availability of food and purchasing power. The literature on the tribal nutrition is very scanty.

This paper concentrates mainly on the studies carried out among the seven primitive tribes and also the other regional health problems studied by the centre.

Abujhmarias

Abujhmarias inhabit in Abujhmar area of Bastar district, which is known as 'unknown high land'. It is about 1500-1600 square miles spread over three tehsils (A) Narainpur (B) Bijapur and (C) Dantewara. The area is hilly & has innumerable number of streams which swell up during rainy season; as a result, the area remain cut off for almost 4 to 5 months in a year. The flora of Abujhmar is fabulously rich with Sal trees and Bamboo's, wild Mango and Mahua is also common. Among the food habits, Abujhmairas are omnivorous. It has correctly been stated that it is easier to prepare a list of what they do not eat rather then what they eat.

Table 1: Mean consumption of foodstuffs (cu/day/gram) in primitive tribes of Madhya Pradesh

Food Stuffs→ / Tribes↓	Cereals Mean ± SE	Pulses Mean ± SE	GLV* Mean ± SE	Other Veg. Mean ± SE	Roots &Tubers Mean ± SE	Oil & Fat Mean ± SE
Abujhmaria	441.5 ± 12.1	16.7 ± 2.9	13.5 ± 2.7	18.0 ± 2.6	20.0 ± 2.8	1.9 ± 0.2
Baiga	425 ± 11.6	17.6 ± 2.8	109.6 ± 18.6	51.1 ±7.5	13.6 ± 1.9	2.0 ± 0.7
Bharia	546 ± 15.93	50 ± 4.71	26 ± 6.90	33 ± 4.51	27 ± 8.49	3.0 ± 0.41
Birhor	654 ± 16.70	27 ± 3.60	80 ± 11.60	85 ± 8.08	39 ± 5.59	3.0± 0.60
Hill Korwa	537.67±14.67	10.63 ±1.71	51.73±5.90	21.01±4.32	14.40±2.53	1.87± 0.24
Kamar	573 ± 20.04	32 ± 4.67	22 ± 4.51	52 ± 7.68	49 ± 6.98	1.0± 0.32
RDA	460	40	40	60	50	40
Maria Gond (Maharastra)	671	9	55	69	15	4
NNMB 1994-95 (NCAER)	536	33	24	42	56	10

* Green leafy vegetables

The health and nutrition survey carried out by RMRC, Jabalpur in 1989-90 revealed that their diet is mainly cereal based (Table 1). Mean consumption of their daily diet was 441.5 ± 12.1 gm/cu/day. Pulses consumption was much lower (16.7 ± 2.9 gm/cu/day) than RDA (NIN Manual, 1995). Green leafy vegetables, oil and fat consumption were also negligible. Nutrient intake was also much lower than RDA (Table 2). Mean energy intake was 1677.2 ±78.9 cu/day. Protein & Iron intake was 41.3 $\pm$ 1.5 & 23.9$\pm$1.11 respectively. Vitamin A, Calcium (Ca^{++}), Thiamin, Riboflavin and Niacin consumption was also less than RDA (Table 2). Nutritionally the average adult Abujhmaria looks healthy, but among preschool children, 8.4% were severely malnourished, 25.1% were moderately & 50.8% were mildly malnourished when classified them by weight for age (Table 3). The percentage of severely malnourished children was much higher as compared to the primitive tribe Maria Gonds of Maharashtra (RMRCT, 1988-89). Worm Infestation (Table 4) (26.8%) and Sickle cell Anemia (17.1%) were the major morbid conditions observed (Fig. 2). Apart from these, Yaws was found to be 7% among the Abujhmarias in 1988 (Chakma T, 1992). Based on these findings the state govt. launched three penicillin campaigns in this area, which brought down the prevalence to 0.97% in 1996(Chakma T et al, 1992).

Table 2: Mean Nutrient intake pattern of Primitive tribes of Madhya Pradesh per CU/per day.

Nutrients → / Tribes↓	Energy(Kcal) Mean ± SE	Protein (Gm) Mean ± SE	Iron (mg) Mean ± SE	Vitamin A (Retinol) (µg) Mean ± SE	Calcium (mg) Mean ± SE	Thiamin (mg) Mean ± SE	Riboflavin (mg) Mean ± SE	Niacin (mg) Mean ± SE
Abujhmaria	1677 ± 78.9	41.30 ± 1.5	23.90 ± 10.1	134.70 ± 16.3	82.70 ± 7.8	0.40 ± 0.1	0.90 ± 0.1	8.80 ± 0.5
Baiga	1615 ± 57.3	50.20 ± 1.9	13.50 ± 0.5	1087 ±178.5	287.30 ±26.2	0.40 ±0.1	0.60 ±0.0	10.20 ±0.6
Bharia	1990 ±57.5	62.10 ±52.0	18.80 ±1.0	188.6 ±3.5	139.20 ±12.6	0.70 ±0.1	0.60 ±0.0	12.31 ±0.4
Birhor	2434 ±62.3	54.50 ±1.6	9.0 ±0.7	423.0 ±69.5	271.60 ±25.7	0.80 ±0.5	0.70 ±0.0	14.30 ±0.4
Hill Korwa	2112 ±74.8	54.70 ±1.7	22.38 ±1.1	371.98 ±44.8	278.30 ±25.3	0.40 ±0.1	0.50 ± 0.1	11.20 ±0.2
Kamar	2191 ±78.9	49.60 ±1.9	12.90 ±1.1	196.0 ±17.9	154.60 ±14.6	0.60 ±0.3	0.50 ±0.0	12.60 ±0.7
RDA	2425	60	28	600	400	1.2	1.4	16
Maria Gond (Maharastra)	2630	62.2	26.1	405	235	NA	NA	NA
NNMB 1994-95 (NCAER)	2245	59.1	27.1	308	361	1.3	0.9	16.4

Note: These values are excluding the values of less familiar food stuffs which could not been calculated because of non availability of their nutritive values but consumed by the tribe.

Baigas : Baigas are one of the oldest aboriginal tribes of Madhya Pradesh, dwelling in the five districts i.e Mandla, Bilaspur, Balaghat, Rajnandgaon and Shahdol. But the biggest concentration of this oldest aboriginal tribe is in the 'Baigachak' area of Dindori tehsil (now Dindori district) of Mandla district. The area is about 50 km. from dindori, surrounded by thick forest patches, rivulets and hillocks. Baigas economy mainly depends on agricultural pursuits and collection of minor forest produce. The other employment opportunities are unskilled labour and work in forest. They also love to work in the baris (land attached to the house) and grow maize, mustard, vegetables, roots and bulbs. Maize, Kodo, Kutki and Ramtila are the main crops grown by the Baigas. Maize and millets form the major foodstuffs consumed by the Baigas. These are consumed in the form of 'Pej', often supplemented by vegetables. Health and nutrition survey carried out by the centre in 1988-89, revealed that mean cereal intake was 425 $\pm$ 11.6 gm/cu/day. Pulses consumption was much less 17.6 $\pm$ 2.8 gm/cu/day as compared to RDA (40 gm.) (Table 1). Oil and fat consumption was negligible (2.2 $\pm$ 0.7 ml/cu/day). The mean energy intake was 1615 $\pm$ 57.2 kcal/day with protein intake of 50.2 $\pm$ 1.9 gm/day (Table 2).

The severely malnourished Baiga preschool children were 7.3% (Table 3), though percentage of normal preschool children was highest (33.3%) as compared to other primitive tribes (Table 3). The consumption of Calcium, Thiamin, Riboflavin and Niacin were also lower than RDA (Table 2). Vitamin A consumption in the form of the retinol was rather higher (1082 ± 178) than RDA (600 ìg). Worm Infestation 27% (Table 4) and Sickle cell anaemia was the major morbid conditions observed (Fig. 2). Goitre was also common (45%) in the area.

Fig. 2: Distribution of Haemoglobinopathies among the primitive tribes of Madhya Pradesh and Chhattisgarh

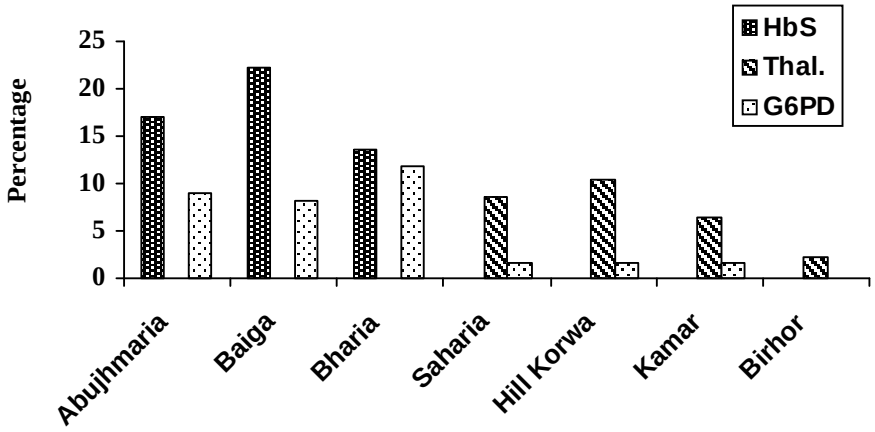


Table 3: Percentage distribution of preschool tribal children of Madhya Pradesh according to Gomez classification

Tribes	Year of Study	Gomez Grades			
Abujhmaria (311)	1988-92	15.6	50.8	25.1	8.4
Baiga (749)	1986	33.3	38.8	23.6	7.3
Birhor (83)	1993-94	24.1	27.7	27.7	20.5
Bharia (260)	1989-92	30.6	33.9	26.9	9.2
Hill Korwa (370)	1989-91	7.8	50.6	35.7	5.9
Kamar (704)	1992-93	2.8	42.5	45.2	9.5
Saharia (1225)	1992-93	16.3	40.7	34.5	8.5
NNMB (NCAER) (216)	1994-95	10.2	36.0	42.1	11.6
Maria Gond (Maharastra) (309)	1989	9.1	54.0	34.0	2.9

Table 4: Percentage of major morbid conditions of primitive tribes

Tribes → / Morbidity ↓	Abujhmaria (n=2647)	Baiga (n=5407)	Birhor (n=609)	Bharia (n=1599)	HillKorwa (n=2028)	Kamar (n=2760)	Saharia* (n=3892)
ARI	12.8	14	11.2	78	17.8	30.9	38
Scabies	--	--	7.1	5.5	--	12.9	--
Malaria	15.3	--	10.5	24.5	3.1	11.5	--
Worm infestation	26.8	27	--	--	--	--	9.4
Pulmonary Tuberculosis	--	--	--	--	--	--	1.2*
Yaws	7.0 (1988) 0.97(1996)	--	--	--	--	--	--
HbS	17	22.3	0	13.7	0	0	0
Thallasemia	0	0	2.2	0	10.4	6.5	8.7
G6PD def	9	8.3	0	11.9	1.7	1.6	1.6

* Tuberculosis Prevalence was 12.7/1000 only in Karhal block of Morena district.

Bharias : Bharias are one of the smaller tribal groups of Madhya Pradesh found in Chhindwara, Seoni, Mandla & Surguja. A small section of this tribe live in the 'Patalkot' area of Chhindwara district, are denoted as primitive. The area is a unique deep depression in the Satpura plateau. There are about 12 village spreads over 79 sq. km. area with a total population of about 1600. The approachability is extremely difficult as the ridges are almost vertical (locally known as 'Kanats'). Only two villages could be approached by road during fair weather. The rest of the villages could be reached, only by foot.

The economy of Bharias depends on 'Baris' attached to their hutments. Maize, Jowar, Kodo & Kutki are the commonest crops grown in their 'Bari'. Minor forest products like Mahua, Amla, Harra etc. also form part of their source of income. Preparation of deo-baharis (brooms) and selling them in the local market is also an important source of cash income. Though the valley is said to be very rich of medicinal plants, they are yet to be exploited as a source of income by the tribe. Maize consists the staple diet along with coarse millets like Jowar, Kodo and Kutki, which are consumed in the form of 'Pej'. Green vegetables are scanty. Vegetables like gourds and vejra are grown in their baris. Apart from it 'Kaccharia' is consumed during winter season, which is then preserved by drying & later consumed during summer/rainy season (RMRCT, 1992).

Health and nutrition survey carried out by the centre in 1992-93 revealed that their diet, mainly cereal based with mean consumption of 546 ± 15.93 gm/cu/day. This was much higher as compared to the RDA (460 gm). Mean consumption of pulses was 50 ± 4.7 gm/cu/day. Consumption of green leafy vegetable and other vegetables were very low (Table 1). Mean energy intake was 1990 ± 57.46 Kcal/cu/day while the protein intake was 62.1 ± 1.98 gm/cu/day. This is almost equal to RDA (60 gm). This could be probably because of high cereal contents in the diet. The consumption of Iron, Calcium and other micronutrients were much less than RDA (Table 2). Only about 30.6% preschool children were found to be normal. Severely malnourished were 9.2%, 26.9% moderately malnourished and 33.9% were mildly malnourished. Acute respiratory infection 78.0% and Malaria (24.5%) were the major morbid conditions observed apart from Sickle cell disease, which was 22.3% (Fig. 2).

Birhors : Birhors, means 'dwellers of the forest' (Bir-Forest, hor-dwellers), are one of the seven primitive tribes of Madhya Pradesh. Principal habitat of Birhor is in Bihar where more than 80% of the Birhors live. In Madhya Pradesh, they are mainly concentrated in Raigarh and Surguja districts. The total population of the tribe is only 938 in Madhya Pradesh, spread over in 26 villages of seven development blocks namely Lailoonga, Dharamjaygarh, Tamnar, Pathalgaon, Bagicha, Kasabel and Kunkuri. The tribe is mainly engaged in rope making and collection of forest produce. They are great adepts at ensnaring monkeys and other small animals and sell them off alive or eat them. Thus the tribe is extremely mobile and keeps moving, once the forest produce of the area is exhausted.

Health and nutrition survey carried out by the centre in 1993-94 revealed that it is also cereal-based diet, with mean consumption of 654 ± 16.7 gm/cu/day (Table 1). This is much higher as compared to RDA (460gm). However the consumption of pulses was very low at 27 ± 3.6 gm/cu/day as compared to RDA (40gm). The consumption of other vegetables was adequate, but green leafy vegetable consumption was slightly lower. Like other tribes the oil consumption was almost negligible (Table 1). Because of high cereal content Protein & Calorie intake was almost adequate 54.5 ± 1.6 gm/cu/day

and 2434 ± 62.3 kcal/cu/day (Table 2). The intake of Iron, Calcium, Vit.A and other micronutrients were much lower than RDA (Table 2). Though the adult Birhors looks apparently healthy, higher percentage of severely malnourished (20.5%) children were observed as compared to other primitive tribes. Moderately malnourished were 27.7% and equal numbers of children were also mildly malnourished (Table 3). Acute respiratory infections (11.2%) and Malaria (10.5%) were the two major morbidities observed followed by Scabies (7.1%). There was total absence of sickle cell disease (Table 4) in this tribe. However, β-thalessaemia was found to be 2.2% in this tribe (Fig. 2).

Hill Korwa : Korwa tribe is found mainly in the Raigarh, Surguja and Bilaspur districts of Madhya Pradesh. The history of the tribe reveals that they moved westwards to Jashpur tehsil (now district) of Raigarh from Chotanagpur area. During the course of migration and settlement those who remain on hills and in dense forest are called Hill Korwa or Pahari Korwas, and those who settled down in the plains are called Deharia Korwa. The Hill Korwas are only considered primitive tribe and not the Deharia Korwas. There are about 2502 families spread over 210 villages of 10 blocks of the three districts of Raigarh, Sarguja and Bilaspur. The Hill Korwas are landless and their economy is forest based. Since shifting cultivation or Beora has been stopped in almost the entire state, it continues to be the main source of sustenance, which is being regulated on ecological consideration. Hill Korwas raised various inferior crops through 'Shifting Cultivation', on the sides of the hills or 'Pats'. In these areas a kind of pulses like 'beora rahar' is grown along with 'gondli' and 'Makai'. Minor forest produces like, mahua, harra, bahera, amala, chironji etc. form a part of their economy. The staple diet of the tribe is coarse rice, maize or kodo. But often their diet is supplemented with various roots, tubers, leaves, ants & animals.

A health and nutrition survey carried out by the centre during 1990 revealed that mean cereal consumption was 537.67 ± 14.67 gm/cu/day, which was much higher than the RDA (460gm). The pulses consumption was low at 10.63 ± 1.71gm/cu/day. The consumption of green leafy vegetables, other vegetables, roots and tubers were also much lower than RDA (Table 1). The mean energy intake was 2112 ± 74.79 kcal/cu/ day. The protein intake was 54.70 ± 1.70gm/day (Table 2). Though these intakes were little less than RDA, their physical appearance looks to be very healthy. This could be because of the consumption of various less familiar foods frequently consumed by this tribe, which could not be calculated because of non-availability of their nutritive values. Nutritionally only 5.9% of the preschool children were severely malnourished (Table 3). Moderate and mild malnutrition were seen among 35.7% and 50.6% of the preschool children respectively. Acute respiratory infection 17.8% and malaria 3.1% was the prominent morbid conditions recorded (Table 4). Apart from these, prevalence of β-thalessaemia was highest 10.4% (Table 4) as compared to the other primitive tribes. There was total absence of Sickle cell disease among this tribe (Fig. 2).

Kamar : Kamars are circumscribed tribe living in the forest of southeastern part of Raipur District. Their total population is about 13500, spread over more than 200 villages in 4 blocks namely Gariaband, Chhura, Mainpur and Nagri. Today the Kamars earn their lively hood with the help of bows and arrows. Most of the Kamars are landless. Their main economy depends on collection of minor forest produces and as agriculture labourer. Kamars excel themselves in the collection of honey and in the manufacture of baichandi and tikhar. Apart from these they also hunt small animals like rabbits, field rats, squirrels etc. to eat.

Health and nutrition survey carried out by the centre in 1992-93 revealed that their diet also principally cereal based. In olden days, the staple food used to be 'madia' (Eleusine Coracana) is a variety of coarse millet. Now rice is their staple food. The mean cereal intake was 573 ± 20.04 gm/cu/day (Table 1), which is much higher than RDA (460gm). The mean pulses consumption was 27±3.60 gm/cu/day. The consumption of green leafy vegetables, other vegetables, roots and tubers, oil and fats were much lower than RDA (Table 1). The mean energy intake was 2191 ± 78.94 kcal/cu/day. Protein intake was 49.6 ± 1.86 gm/cu/day. Both the values were little lower than RDA (Table 2). Other micronutrients like Iron, Calcium, and vitamin A were also much lower than RDA (Table 2). Nutritionally this is the poorest tribe. Only 2.8% preschool children were found normal. Mild, Moderate and Severely malnourished were 42.5%, 45.2% & 9.5% respectively (Table 3). Acute respiratory infection (30.9%), Scabies (12.9%) and Malaria (11.5%) were the major morbidities recorded (Table 4). β-thalessaemia and sickle cell disease were found to be 6.6% & 0.9% respectively (Fig. 2).

Saharia : Saharias are mainly located in the Chambal division, i.e. Gwalior, Morena, Guna and Shivpuri bordering Rajasthan. Though as per record they are spread over in 21 districts of Madhya Pradesh, their main concentration is in Morena, Guna, Shivpuri and Gwalior district. From etymological point of view Saharia mean companion of tiger (SA - companion, HARIA - tiger). Their total population is over 2 lac, and is one of the poorest primitive tribe of Madhya Pradesh. Most of the Saharia families are land less, and the area is geographically often prone for draught hence drinking water is one of the major problem in the area. Their economy lies mainly on minor forest produce. Because of un-employment the young people migrate to nearby district or town in search of employment specially during summer. Though their staple diet is Jowar, Bajra & Maize in the form of Chapati, their detail diet survey is yet to be carried out. Nutritionally only 16.3% of the preschool children were normal, 40.7% were mildly malnourished, 34.5% moderately and 8.5% were severely malnourished (Table 3). Vitamin A deficiency in the form of night blindness, bitot spot and xerosis was 53.3%. Acute respiratory infection (38%) and worm infestation (9.4%) were the major morbid conditions observed (Table 4). There were complete absence of sickle cell disease among this tribe, but β-thalessaemia was found to be 5.2%. Cervical lymphadenopathy was observed in 20.4% of the available individuals, which prompted us to take up an in-depth survey on Tuberculosis in Karhal block of Morena district, where more than 50% populations were tribals. The prevalence of Sputum positive pulmonary tuberculosis was 12.7/1000 (Chakma et al, 1996).

Other regional health problems

1. Fluorosis in Madhya Pradesh

Endemic fluorosis has recently emerged as new public health problem in Madhya Pradesh. In 1995 the center reported high prevalence of genuvalgum and skeletal fluorosis in two villages of Mandla District of Madhya Pradesh (Chakma et al, 2000). Later an epidemiological study was undertaken to estimate the total fluoride burden in the body in five affected and two control villages. A total 2263 individuals from the study villages and 852 from the control village were studied. Dental fluorosis (Fig. 3) was observed among 252 (11.1%) individuals from study villages. Maximum number of sufferers was from children below 20 years (21.2%)

Fig. 3: A child with severe dental mottling

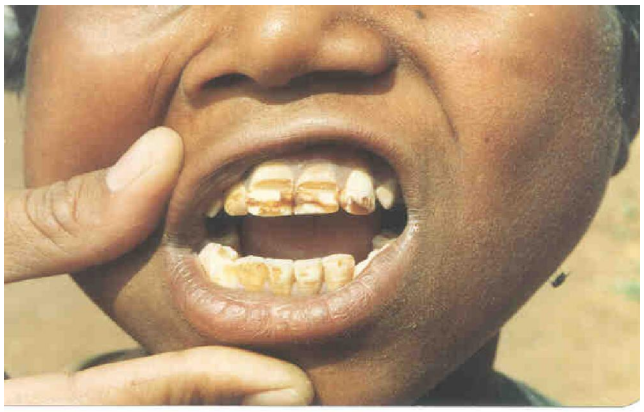
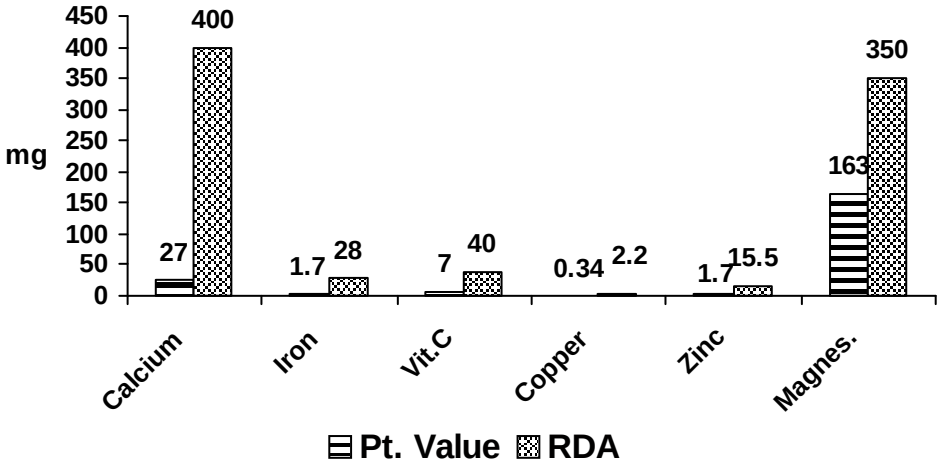


Fig. 4. A group of children with genuvalgum



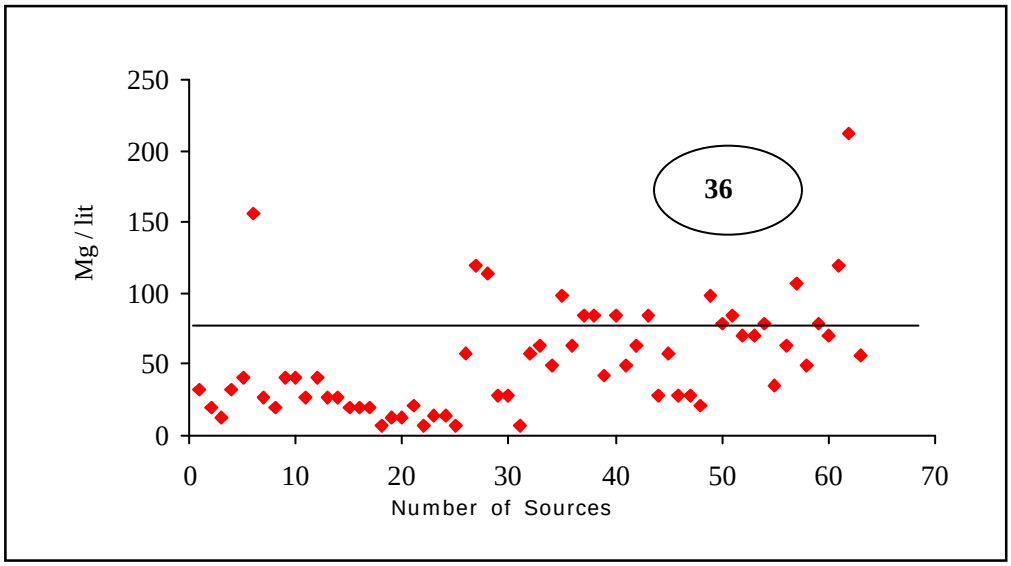
Genuvalgum or knock-knee (Fig. 3) was seen among 171 (7.5%) individuals from sudy villages and 5 (0.5%) individuals from control villages. Again the maximum sufferers were children below 20 years (10.2%). Skeletal fluorosis (Fig. 4) was observed among 303 (13.4%) individuals from study villages and not a single case was seen from the control villages. The number of contaminated sources are directly proportional to the percent prevalence of dental fluorosis, genuvalgum and skeletal fluorosis. The fluoride content ranged from 0.14 ppm to 10.6 ppm. Though, the level of fluoride seems to have no direct relation on the prevalence of disease, however it is directly proportional to the severity of the disease. Fluoride was more than 2 ppm in 40.8% urine samples An in-depth analysis of severely affected children's trace elements consumption pattern (Fig. 5) revealed that their consumption of Calcium, Iron, Vit.-C, Copper, Zinc and Magnesium was significantly lower as compared to RDA. The consumption pattern were almost similar in both study and control villages.

Fig 5: Mean Micronutrient intake of Fluorosis affected Patients (n=17)



A total of 66 water samples were analyzed for mineral contents. Out of these, 16 samples showed Ca^{++} hardness more than the recommended value of 75 mg/lit (Fig. 6). 18 samples Mg^{++} contents were also more than the recommended (30 mg/lit.) level. Cu^{++} & Zn^{++} contents were below detectable limit (DL) in all the water samples. (DL for Cu^{++} is -0.04 mg/lit. and for Zn^{++} - 2µg/lit.). All the water samples alkalinity was within normal range. Interestingly less number of cases was observed in those villages where calcium contents were high in the water. Various foodstuffs were analysed for the contents of trace elements like Zinc, Copper, Magnesium, Calcium & Fluoride. There is no significant difference in the trace element contents of the study and control villages.

Fig. 6: Calcium contents of the water samples



2. Infertility among Khairwar tribe

Khairwar is a sub tribe of Gond tribe, mostly confined to the northeastern Madhya Pradesh (Sarguja, Panna, Siddhi, Shahdol, Chhatarpur, Rewa, Bilaspur etc.). The total population Khairwar in the state is estimated to be about 14 lakhs. The traditional occupation of Khairwar is Katha (Catechu) making from Khair wood and this occupation has given the name to the tribe.

Table 5: Percentage distribution of VDRL and TPHA positivity in Kusmi and other blocks of Sidhi district

Block	VDRL +ve	TPHA +ve
Kusmi (n=41)	61(25)	63.4 (26)*
Other block (n=41)	9.8 (4)	17 (7)

*Statistically significant, $\chi^2=18.3$, df-1, $p<0.05$
Note: Figure in parenthesis indicates number
VDRL: Venereal Disease Research Laboratory test
TPHA: Treponema pallidum haemagglutination test

It was reported to us by the state Govt. that the tribe is dwindling in the last three decades. To investigate the problem an epidemiological study was undertaken to find out the reasons. The study was carried out in 23 randomly selected Khairwar villages with a population of 2800 spread over in four different blocks of Sidhi district. As high as 4.2% individuals above the age of 18 years were having the symptoms of sexually transmitted diseases. Blood samples were collected from the available symptomatic revealed that, 61% blood samples were found positive by VDRL test from Kusmi block. All the samples were subjected to Treponema Pallidum Haemagglutination Assay (TPHA) which revealed rather higher positivity at 63.4% (Chakma et al, 1999). This was significantly higher as compared to the other blocks of Sidhi district (Table 5).

Conclusion

To conclude the paper there are certain observations, which are common like all the tribes diet was cereal-based. Consumption of pulses was low in all the tribes except Bharias. Similarly, the green leafy vegetables (GLV) consumption varies from as low as 13.5 ± 2.7 gm/day among Abujhmarias to very high at 109.6 ± 18.6 gm/day among the Baigas. Consumption of other vegetables, roots and tubers were also not up to the mark. The consumption of oil & fat was almost negligible in all the tribes. This data is similar to that of rural Madhya Pradesh (Rao et al 1996) and that of Maria Gonds of Maharashtra (Rao et al 1994) whose diet is also cereal based. Energy intake was also below the RDA in all the tribes except for Birhors. Protein intake was also lower than RDA in all the tribes except Bharias. Consumption of Iron, Calcium, Vitamin A and all other micronutrients were lower than RDA. However, in spite of lower intake of calorie, protein, calcium & Iron, most of the tribes apparently look healthy. This could be because of consumption of less familiar foods like red ants by Abujhmarias, monkeys by Birhors, squirrel and field rats by Hill Korwas and Kamars etc who's nutritive value could not be calculated, probably take care of the micro nutrient requirements. There is an

essential need to analyze these less familiar foods. Nutritionally the pre-school age group children seems to be better than the rural Madhya Pradesh or other tribal areas of Madhya Pradesh like Sarguja, Bastar and Jhabua where severe malnutrition is 11.6%, 11.7%, 23.5% and 26.0% respectively (Hanumanth Rao et al,1994). Among various morbid conditions acute respiratory infection was commonly prevalent among all the tribes ranging from 11.2% among the Birhors to 78% among the Bharias. This needs to be studied in depth to prevent the disease. Malaria is another disease, which was commonly prevalent among almost all the tribes. High prevalence of acute respiratory infection and malaria was also reported by Chakma et al (1996) and Gyan Chand et al (1997) from the other tribal areas of Madhya Pradesh. It seems the malaria control programe is not effective in these areas. Specific health problems like Yaws among Abujhmarias and Tuberculosis among the Saharias needs to be tackled separately. Though yaws prevalence has been brought down from 7% in 1988 to 0.97% in 1996, after three penicillin campaigns by the State Govt. further effort should be made to eradicate the disease. The problem of tuberculosis draws a serious attention as short course chemotherapy or DOT therapy seems to be still out of reach for these tribals. Strengthening of PHC's are essential for effective implementation of DOT's. Fluorosis has emerged as a new public health problem in Madhya Pradesh, specially Mandla District. Integrated fluorosis control programmes are required to tackle this problem. The STD problems of Khairwars can be tackled with a single dose of penicillin injection but, due to in accessible terrain even this could not be done by the District Health Authorities. Though health problems are different in each tribe. Common problems like poor economy and low literacy should be dealt comprehensively, which will substantially contribute in reducing other problems like poor nutrition and health.

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