

Changing Bio-ecological Aspects of Food and Nutrition Among Five Tribes of the Nilgiris, Tamil Nadu

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KEY WORDS Nilgiri Tribes. Food. Nutrition. Bio-ecology. Change.

ABSTRACT The data on food and diet survey on five native tribes of the Nilgiris, Tamil Nadu, indicate the present condition of their food getting ways, food situation, food consumption patterns and their nutritional intake. The food and nutritional eco-systems of these tribes of the Nilgiris are varied. The average daily diet consumption shows that Todas and Kotas are better over other tribes, Irula, Paniya and Kurumba, in order and the same is reflected in the mean composition of important nutrients. When these consumption patterns of nutrients are compared with recommended dietary allowances only Todas and Kotas meet the daily requirements. These have again clearly reflected through nutritional anthropometry. Only Todas and Kotas have good BMI values, where as other three tribes exhibit lower BMI values. The prevalence of Protein Energy Malnutrition and other nutritional deficiency signs are more among the Paniya, Kurumba and Irula than among Todas and Kotas. The findings of the present survey further indicate the association of the Nilgiri tribes with forests for food and sustenance and consequent changes in their food habits with the change of environment.

INTRODUCTION

Food and nutrition and health are two important basic aspects of human life. Both have biological basis yet populations, whether tribes or non-tribes, view the process of food and health through cultural filters. However, in course of long evolution, populations seem to have adapted well to the varied environments and have developed varieties of subsistence strategies that help them bring about a satisfactory nutritional status and health. Physical anthropologists, of late, are interested in biological aspects of nutritional eco-systems, particularly of tribal populations as they seek to understand the interaction of bio-ecological aspects of food and nutrition (Reddy, K. N., 1987 and 1998).

Indian tribes form about 8% of the total Indian population and they are the integral part of our civilization. The eco-system in which these tribal communities live are varied and the nutritional and health status of these tribes are influ-

enced by the type of eco-system (Satyanarayana et al., 1974; Hanumantha Rao and Satyanarayana, 1987; Hanumantha Rao et al., 1992, 1993; Hanumantha Rao and Mallikharjuna Rao, 1994). The micro-nutritional studies on tribes of India are important for developing suitable strategies for their development and to bring them to mainstream. The 'bio-ecological perspectives of food' is developing subject matter of anthropology and a good beginning is made through this paper as it seeks to find out the nutritional status of the tribes of the Nilgiris who maintain a well niched nutritional eco-system as a whole. It is obvious that in an ecosystem there may be many culturally different communities and practice varied cultures with regard to food, nutrition and health.

MATERIALS AND METHODS

The materials for the present study are five native tribes, namely, Toda, Kota, Kurumba, Irula and Paniya of the Nilgiris, Tamil Nadu. The whole of the Nilgiris, eleven degrees north of equator, form an elevated steep upland from the low lands of Tamil Nadu in the east, Karnataka in the north and Kerala in the west. These hills were relatively isolated from the rest of the country for centuries. It is generally regarded that Toda, Kota and Kurumba are the aboriginals and original settlers followed by Irula, Paniya and Badagas, a Hindu migrant community (Breeks, 1873; Francis, 1908; Rivers, 1906 and Walker, 1986). In numerical strength, the Irulas figure as the largest tribe of Nilgiris with a population of 6900 followed by Paniyas (5780), Kurumbas (5000), Todas (1600) and Kotas (1400) according to 1991 census.

A brief note on these exotic traditional tribes of the Nilgiris is worth mentioning. The settlement patterns of them is very interesting as they involve relative advantage of location both in

relation to natural resources and their mode of economy. Todas being pure pastoralists occupied the highest plateau of the Nilgiris. The Kotas habitation lies at relatively lower altitude to that of Todas. The Kurumbas and Irulas occupied the middle and lower slopes of the Nilgiris. The other tribe, Paniya, restricted to the plains of western slopes of Wynad forests. Consequent to the opening of these Nilgiris by others like, Badagas, a Hindu migrant community, the British for their colonial establishment and migration of plains people to these hills, modernity has set in all tribes and their mode of traditional economy is in transition. Todas once pure pastoralists are now practicing mixed economy. Kotas once artisans and musicians are now established as good agriculturists. Kurumbas once sorcerers and hunters and gatherers are now serving as wage labors or cultivating tea plantations in their meagre lands. Irulas, once food gatherers and shifting cultivators are now practicing various modes of living, like, plantation laborers, agriculturists and are also taken to education and employment of late. Paniyas, once known as 'bonded labors' are now settled agriculturists and cultivators of coffee and tea plantations. The social-hierarchy of the tribes exists as, Toda, Kota, Irula, Kurumba and Paniya in the descending order and this system coincides not only with the habitation but also with the mode of economy.

For the purpose of the present study a sample of 50 randomly selected households in each tribe has been chosen uniformly for the purpose of nutritional evaluation. A three day food weighing method of diet survey was adopted. Certain anthropometric measurements were also taken to evaluate the relationship between the nutritional status and body measurements of the studied communities. The techniques for drawing these measurements are after Weiner and Lourie, 1969. Further, the data on the quantity of each food item consumed by the subjects have been analysed to assess the amount of nutrients of different types utilised by them. The raw food quantities consumed by each subject were converted into their nutritive values by using the tables constructed for Indian foods (Gopalan et al., 1987). The results thus obtained are compared with the recommended dietary allowances for Indians (ICMR, 1981).

RESULTS AND DISCUSSION

Nutritional Eco-systems Prior and After British Entry

The food subsistence of the tribes, Toda, Kota, Kurumba, Irula and Paniya were different than that of the Badagas, a Hindu migrant community, who arrived at the Nilgiris probably during 16th century. These tribes were relatively isolated from the rest of plains country for a long time. Consequently, there existed among them certain social order and symbiotic relationship in ritual, economic and social aspects of life for centuries until the advent of the British on these hills. The disturbance in the eco-system was started with them first as a health resort and subsequently to establish their sovereignty; and it was total with the mass destruction of forests, first for potato and other European vegetable and fruit cultivation and subsequently for the development of tea and coffee plantations which now dominate the Nilgiri Hills. Further, the Nilgiris were connected to plains by way of road and rail there by large scale migrations of non-tribals from plains had occurred and established their cultures on these hills. As a result of all these physical and environmental changes of these hills, the old social order of the native tribes, their co-existence and symbiotic relationship in food bartering, ritual and social aspects of life have been put to change and slowly disappeared in course of time. The traditional life styles of these tribes, ways of food getting and communication systems have totally changed. These changes have also brought compelling changes in their nutritional eco-systems.

These tribes had probably healthy diets of both animal and vegetarian foods when they moved freely in their original forest homelands. With the total destruction of their forest homelands by others for commercial purposes they are deprived of their natural environments. Further, they are driven to unfamiliar environments and lot many restrictions have been imposed in their movement of near by forests. They are eking out their lives in these unfamiliar environments and finding themselves in uneasy situation in confrontation with alien cultures. As a result, they have discarded their age-old hunting and food gathering techniques. Their

traditional skill and knowledge about the utility of various plants and animals in their diet are being discarded. Today, all the native tribes of the Nilgiris, Toda, Kota, Kurumba, Irula and Paniya are depending more on market system rather than forests or bartering system.

The major changes in the physical environment of the Nilgiris have also led to changes in the food systems of the Nilgiri tribes. All tribes have developed taste for rice and there by discarded use of traditional millets in their diet. Though all tribes excepting Todas are non-vegetarians but their consumption of flesh foods has come down considerably due to their free inaccessibility into neighbouring forests and also their inability to buy flesh foods in the market. European vegetables and fruits, like, potato, cabbage, cauliflower, beet-root, carrot, turnip and other vegetables, peaches, berries, pears and other fruits are introduced in their diet thereby losing grip over many varieties of leafy foods that are available in their immediate neighbourhood.

Today, the nutritional eco-systems of these tribes are varied. The comparative study of food consumption data and their nutritional situation among the five tribes is as follows.

The mean annual income of households and per capita income is found to be more for Paniyas followed by Todas, Kotas, Irulas and Kurumbas (Table 1). The higher per capita income for Paniyas is due to two reasons. One reason is that the wage rates drawn by Paniyas are of Government and as such they are more when compared to other tribes like Irula and Kurumba where they

Table 1: Mean annual income of the households and per capita income of the Nilgiris tribes

S. No.	Name of the Tribe	No. of Households	Household Size	Income of the Households (Rs.)	Annual per capita income (Rs.)
1	Toda	50	5.80	8850	1480
2	Kota	50	5.24	7525	1450
3	Kurumba	50	4.20	6590	1575
4	Irula	50	4.36	7065	1595
5	Paniya	50	5.02	9150	1830

work more in private estates and the wages drawn by them are comparatively lower to Paniyas. The second reason is that among Paniyas both males and females in a family equally participate in estate or other labour works and earn money, where as, among Irulas and Kurumbas, in majority only male members go to estate work and females attend to household works.

The diet composition and daily consumption of some important nutrients of the Nilgiri tribes are given in tables 2 and 3. The percentage frequency distribution of Protein Energy Malnutrition, the percentage prevalence of nutrition deficiency signs and mean values of various anthropometric measurements with BMI and robusticity indices are given in tables 4, 5 and 6. A survey of these comparative tables highlights the following nutritional situation. All tribes of the Nilgiris have developed taste for rice and rice is their staple food. Only some tribes like, Kota, Kurumba and Irula are found to take very little millets in their diet. Rice is not grown on the Nilgiris excepting in plains where Paniyas are

Table 2: Average daily diet composition of Nilgiris tribes (in grams)

Details of food	Toda		Kota		Kurumba		Irula		Paniya	
	M	F	M	F	M	F	M	F	M	F
<i>Cereals:</i>										
Rice	460	380	445	405	320	300	350	305	335	320
Ragi	-	-	-	-	55	45	65	53	-	-
Others	-	-	70	58	-	-	-	-	-	-
Pulses	66	53	62	55	35	30	52	43	38	32
Leafy Vegetables	57	52	61	53	65	45	82	65	53	48
Non-leafy Vegetables	105	85	105	98	85	71	80	66	50	43
Fruits	29	25	35	29	34	30	33	30	30	25
Milk and milk products	365	330	185	122	58	45	65	50	60	51
Fats and Oils	115	84	80	64	27	25	30	22	35	32
Flesh foods	-	-	-	-	19	15	33	31	82	74
Sugar and Jaggery	122	118	131	120	32	30	95	87	63	45
Alcoholic beverages	195	-	145	-	150	-	120	-	180	-

Table 3: Mean consumption of some important nutrients (Per day per consumption unit)

Nutrients	Toda		Kota		Kurumba		Irula		Paniya	
	M	F	M	F	M	F	M	F	M	F
Calories	2940	2320	2650	2210	2159	1950	2188	1996	2058	1900
Proteins (gm)	57.6	49.4	53.8	50.6	33.9	31.5	34.2	32.6	37.3	35.5
Fats (gm)	88	80	63	55	33	28	35	35	25	20
Calcium (gm)	0.91	0.83	0.89	0.80	0.76	0.70	0.77	0.71	0.84	0.79
Iron (mg)	49	42	45	42	27	25	28	25	32	30
Thiamine (mg)	1.80	1.62	2.11	1.76	1.26	1.18	1.42	1.20	1.22	1.16
Riboflavin (mg)	1.93	1.72	2.23	1.86	1.57	1.36	1.60	1.42	1.42	1.31
Ascorbic acid (mg)	180	150	125	120	128	120	122	115	90	75

inhabited. All of them buy rice invariably in the market. This marks their complete change in food habits from millet eating to rice eating.

The consumption of cereals and pulses is moderate among Todas and Kotas and less among Kurumbas, Irulas and Paniyas. This has resulted mainly in calorie deficiency more in Paniyas followed by Kurumbas and Irulas. The protective foods like leafy and non-leafy vegetables, and milk and milk products are more among Todas, moderate in Kotas and less in Kurumba, Irula and Paniya. Consumption of fruits is found to be less in all tribes. This has led to prevalence of nutrition deficiency disorders like, Vitamin-A and B and signs of different grades of Protein Energy Malnutrition in varying degrees, moderate to high among Paniyas, Kurumbas and Irulas; and in mild forms among Toda and Kota. Flesh foods are not consumed either by Todas or Kotas and are independently consumed by Kurumbas and Irulas and adequately by Paniyas through the consumption of particularly dry fish. The consumption of alcoholic beverages is high among Toda males followed by Paniya, Kurumba, Kota and Irula males. Thus, the income expenditure of all tribes especially of Toda and Paniya is more on alcoholic beverages than on other essential food

items.

The consumption of essential nutrients like calories and proteins through their diets is found more among Todas followed by Kotas, Irulas, Kurumbas and Paniyas. However, when the consumption these essential nutrients are compared with the recommended dietary and nutrient allowances only Todas and Kotas are found moderately meeting the required allowances. The tribes, Kurumba, Irula and Paniya, are on an average fall short of recommended allowances. The deficiencies of essential nutrients in food consumption patterns are reflected not only in anthropometric measurements (body build) but also in the form of Protein Energy Malnutrition (Table 4 and 5). The Toda male and female are on average tall and weigh more over other tribes. Kotas follow next to Todas. The Irula, Kurumba and Paniya are short in their stature and possess light body weights. The BMI values of these tribes show that only Toda and Kota are in normal range while the others, Irula, Kurumba and Paniya, have no appreciable values. In terms of robusticity where height, weight and chest circumferences proportions matter. Todas and Kotas have medium robusticity and all other tribes, Irula, Kurumba and Paniya fall in the category of slender body-builds. Further, Todas and

Table 4: Percentage frequency distribution of protein energy malnutrition (PEM) among Nilgiris tribes

PEM Categories	Toda		Kota		Kurumba		Irula		Paniya	
	M	F	M	F	M	F	M	F	M	F
Calorie adequacy and protein adequacy	100	92	100	94	60	58	64	66	58	54
Calorie inadequacy and protein adequacy	Nil	18	32	Nil	38	30	32	40	40	36
Calorie and protein inadequacy	Nil	Nil	Nil	Nil	22	26	30	38	28	22
Calorie adequacy and protein inadequacy	Nil	Nil	Nil	Nil	16	28	24	26	14	18

Table 5: Percentage prevalence of nutrition deficiency signs among the tribes of the Nilgiris

S. No.	Details of nutritional deficiency signs	Toda		Kota		Irula		Kurumba		Pariya	
		M	F	M	F	M	F	M	F	M	F
1	Number examined	50	50	50	50	50	50	50	50	50	50
2	Mean age in years	38	33	37	33	34	31	35	32	35	30
3	Without any deficiency signs	74.0	78.0	76.0	84.0	68.0	62.0	60.0	64.0	58.0	60.0
4	P.E.M. with two or more signs	-	-	8.0	6.0	28.0	22.0	32.0	28.0	34.0	38.0
5	Keratomalacia	-	-	-	-	4.0	-	6.0	4.0	6.0	8.0
6	Bitot spots	4.0	2.0	8.0	6.0	8.0	6.0	10.0	6.0	12.0	4.0
7	Night blindness	-	-	4.0	-	2.0	-	2.0	6.0	10.0	6.0
8	Xerosis	2.0	2.0	-	-	-	-	-	-	2.0	2.0
9	B. Complex deficiency	-	-	6.0	8.0	14.0	8.0	14.0	12.0	22.0	20.0
10	Angular stomatitis	10.0	8.0	12.0	4.0	8.0	16.0	18.0	14.0	16.0	14.0
11	Glossitis	12.0	10.0	8.0	-	10.0	8.0	6.0	6.0	-	-
12	Nasolabial dyssebacea	8.0	6.0	6.0	2.0	6.0	14.0	12.0	8.0	8.0	12.0

Table 6: Mean values of Anthropometric measurements among the tribes of the Nilgiris

Tribe	Sex	Sample size	Height (cm)	Weight(kg)	BMI	Chest circumference(cm)		Upper Arm circumference(cm)	
Toda	M	50	166.3	60.3	22.85	83.4		27.8	
	F	50	154.8	49.5	20.63	-		24.8	
Kota	M	50	159.3	56.9	22.49	80.3		26.7	
	F	50	146.8	47.7	22.08	-		24.1	
Kurumba	M	50	155.4	48.8	20.33	78.1		24.3	
	F	50	142.1	42.6	20.09	-		23.6	
Irula	M	50	159.6	50.1	19.57	78.5		25.8	
	F	50	145.9	42.4	19.91	-		23.5	
Paniya	M	50	156.7	47.2	19.18	77.6		23.8	
	F	50	143.9	41.3	19.55	-		23.0	

Kotas are not found experiencing severe grades of malnutrition, like, calorie and protein inadequacy and gross calorie inadequacy. Where as the other tribes, Paniya, Kurumba and Irula in order of severity are found to experience different grades of malnutrition in varying degrees. The prevalence of visual nutritional deficiency signs in all tribes indicate close relationship with the amount of intake of protective foods like, milk and milk products, leafy and non-leafy vegetables. Two extremes of the present study are Todas and Paniyas. Todas consume good amounts of milk and its other products as well moderate amounts of leafy and non-leafy vegetables. As such the prevalence of nutritional disorders are very much limited among Todas and are more among Paniyas. In other tribes like, Kota, Kurumba and Irula, the prevalence of nutritional deficiency signs is in varying degrees.

Thus, the present analyses on nutritional and health aspects among Toda, Kota, Kurumba, Irula and Paniya, the tribes of the Nilgiris, Tamil Nadu, help locate the present condition of their

food getting ways, food situation and food consumption patterns and their nutritional intake besides Protein Energy Malnutrition and prevalence of nutritional deficiency signs. The findings of the study highlight the maintenance of nutritional eco-systems of various tribes in a given geographical area, its changes in time and space and consequent social and biological adaptation. The findings further indicate the association of the Nilgiri tribes with forests for food and sustenance and consequent changes in their food habits with the change of environment. The results of the present study emphasize the need for suitable strategies to develop nutritional conditions of these tribes, particularly, where their natural homelands are disturbed and their movements are restricted.

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