Studies on the Nutritional Status of Rural Population in Desert Area of Rajasthan

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Abstract

The study was undertaken to assess nutritional status and dietary habits of the rural population in desert area and aimed at doing comparisons with other state's data so as to assess the percentage of variation among the states. It has been carried out in 28 villages belonging to 6 tehsils of Jodhpur district in 2005-06. Five clusters of four households in which one cluster selected from SC/ST area and remaining 4 clusters from non-SC/ST areas of each village were selected by using systematic random sampling procedure. Total covering of 560 households were selected and 3301 individuals were examined for a nthropometry, dietary intake and nutritional deficiency signs.

Under-nutrition in preschoolers observed to be very high (81 %), more in semi pucca houses and in nuclear families (Gomez classification). Scheduled caste and Scheduled tribe communities (88 and 85.7 %) suffered more from under nutrition than other communities (74.7 %). Chronic Energy Deficiency in adults was observed 55.5 %. Scheduled caste adults (68.8 %) suffered more from chronic energy deficiency than Scheduled tribes (50 %). Severe chronic energy deficiency observed higher in Scheduled caste and Scheduled tribe community (23.7 and 18.4 %) than backward castes (11.5 %). Protein Calorie Malnutrition was higher in females (7.2 %) than males (5.3 %). Consumption of green leafy vegetables in their diet was observed to be grossly deficient (4.1 %) whereas fats and oils consumption was nearly half of the recommended dietary allowances (ICMR). The comparison of present study results with NNMB and NFHS II showed higher prevalence of under nutrition and chronic energy deficiency which may be due to the harsh environmental conditions in desert areas and paucity in the consumption of daily food intake leading to protein calorie malnutrition. The results would provide information and useful guidelines not only for food policies but also to assess the impact of the nutritional programs currently in progress and for future planning in the state of Rajasthan.

Introduction

Child's health of a nation reflects the future of the country. Malnutrition is one of burning problems of the country. Nearly fifty percent of the school age children in desert areas are suffering from short and long term malnutrition as reported by Singh et al (1999; Singh and Lakshminarayana (2000). Malnourished population is more susceptible to infections and severity of illness. Also the mortality rate in them is high. Although the provision of food is the first relief priority in nutritional emergencies, it is also crucial to organize programs for prevention and treatment of major important diseases, particularly since food itself can be a vehicle for disease transmission. World Health Organisation (2000) report depicted that disease prevention through prompt attention to nutrition and to various aspects of environment health should be a priority research. Rajasthan have 12 desert districts which are exposed to typical desert climatic conditions such as scarcity of water, low rainfall, high temperature and frequently occurring draught in these areas which directly and indirectly effects the health of

population. In this direction several attempts have already been made in and outside our country (Rao et al,1980; Rao et al, 1976; Garg et al, 1982; Onis et al, 1993; Victora et al, 1986; Grummer-strawn et al, 1996; Cavelli-Sforza et al, 1996), but, sporadic work has been done in desert areas of Rajasthan (Singh et al, 1996; Haldiya et al, 1993; Singh et al, 2006; Singh et al, 2006; Singh et al, 2005; Sharma and Yadav, 1988). Therefore, the present study has been made to assess nutritional status and dietary habits of the rural population in desert area and comparing with other state's data to assess the extent of variation among the states.

Material and Methods

In India, the great Indian desert of Thar (Central Arid Zone Reaserch Institute (CAZRI, 2001), forms a part of the country's north west arid zone coverimg 69% area in Rajasthan, 21% in Gujarat and 10% in Punjab and Haryana. The desert is bordered by the irrigated plains of river Indus in the West, the Aravalli hill ranges in the east, the Rann of Kutch in the South and the plains of Punjab and Haryana in the north and northeast. The greater part of desert has remained arid to hyper arid conditions. The annual precipitation is low, ranging from less than 100 mm in the West to about 500 mm in the east. It is highly erratic and about 90 % of the rainfall is received during July and August. Delayed onset and early withdrawal of monsoon is quite common. Summer temperature remains high, reaching up to 50°C in May and June in some places. Dust storms are quite common with wind velocity above 50 km/h.

Two stages stratified random sampling method was used in which the villages in selected districts formed the first stage unit (FSU), while in the village households (HH) formed the second stage unit. For the study purpose the district has been divided in to different strata in rural areas as per the tehsils with agro-economic regions and based on the population size of the village i.e. <2000 and $\geq$ 2000 populated villages. In the urban area three wards were selected as per the census classification.

1. Selection of villages: From each stratum i.e. Tehsil, five villages were chosen randomly for the purpose of the survey viz one each from North, South, East, West and Central part, to have proper representation of the tehsils in the district.

2. Selection of Households: The households in each village have been selected by adopting cluster sampling procedure. A total of five clusters of four households were selected from each village. The SC/ST population often lives in a separate group/area in the village. One cluster was selected randomly from SC/ST group/area while the remaining 4 clusters were selected from non SC/ST communities by systematic random sampling procedure. Keeping in view the manpower and resources available at the centre, it has been decided to cover only Jodhpur district in the first phase.

During the year 2005-06, a total of 28 villages were covered from six tehsils of Jodhpur district i.e. Jodhpur, Bilara, Osian, Phalodi, Shergarh and Bhopalgarh (five villages from each tehsil), covering 560 households. All the selected households were examined for socio-demographic aspects. All the members in the household have been examined for nutritional deficiency signs, anthropometric measurements (Height and Weight) and Dietary intake (24 hours recall method). Dietary intake of the individual was recorded in alternate house i.e.10 households from each village are covered. All the measurements were taken following standard techniques (ICMR, 1977 ; Jelliffe, 1992). Anthropometric measurements were expressed as percentage of the standards available from NCHS (Nelson, 1992) for a given age and sex.

Results

Analysis of 560 households covering 3301 individuals (1731 males and 1570 females) revealed that 93.8 % populations were Hindus and 5% were Muslims. Nuclear families were more (59.5 %) compared to joint families (24.4 percent). Scheduled Caste families were 21.8 % and Scheduled Tribes were 3.2 %. Illiteracy is high in females (53.6 %) than males (29.0 %).

Table 1 : Community wise distribution of 1-5 year children according to Gomez classification

Community	Nutritional Grades*				
	N	Normal	Mild	Moderate	Severe
ST	21	14.3	38.1	14.3	33.3
SC	117	12.0	26.5	25.2	33.3
BC	139	18.7	31.7	13.6	36.0
Others	150	25.3	29.3	11.4	34.0
Pooled	427	19.0	29.7	16.9	34.4

*NCHS Standards

Table 2 : Distribution of type of house in 1-5 years children according to Gomez distribution

Type of House	N	Nutritional Grades *			
		Normal	Mild	Moderate	Severe
Kutcha	89	20.2	30.3	18.0	31.5
Semi Pucca	120	11.6	29.2	22.5	36.7
Pucca	218	22.5	29.8	13.3	34.4

* NCHS standards

The weights of pre-school children were expressed as percent of NCHS standards and categorized into different nutritional grades, based on Gomez classification (Tables-1 & 2). The overall prevalence of under nutrition was very high i.e. 81%. It was relatively higher in scheduled caste and scheduled tribe communities (85.7 to 88.0 %) in comparison to other communities (74.7 %). The high prevalence of severe grade under nutrition (34.4%) in study area needs attention. Under nutrition was higher in nuclear families (82.0%) than joint families (79.2%). Severe malnutrition was maximum in children of families in semi pucca houses (36.7%) than those from pucca houses.

Table 3 : Community wise distribution of adults ($\geq$18 years) according to BMI classification

Community	Nutritional Grades				
	N	Normal	Mild	Moderate	Severe
ST	38	50.0	13.2	18.4	18.4
SC	215	31.2	23.3	21.8	23.7
BC	356	50.3	21.3	16.9	11.5
Others	463	45.8	19.4	19.4	15.3
Pooled	1072	44.5	20.5	19.1	15.9

Table 4: Distribution of adults (≥18 years) according to BMI classification & type of house

Type of House	N	Nutritional Grades			
		Normal	Mild	Moderate	Severe
Kutcha	166	40.4	25.3	21.7	12.6
Semi Pucca	251	40.2	19.5	21.6	18.7
Pucca	655	47.2	19.8	17.4	15.6

The distribution of adults according to BMI grades have been shown in Tables 3 and 4. At the aggregate level, 44.5 percent had normal BMI (18.5-25.0), while 55.5 percent had chronic energy deficiency. Severe chronic energy deficiency was observed highest in scheduled castes and scheduled tribes (23.7 and 18.4 %) followed by others (15.3%) and backward (11.5%) communities.

Regarding nutritional deficiency signs, it is observed that discoloration and sparseness of hair, a sign of protein calorie malnutrition was observed to be high i.e. 7.1 percent which was higher in females than males. Marasmus was observed only in females (0.2%). Angular stomatitis, cheliosis and glossitis were ranging from 0.2 to 1.8 %. Vitamin A deficiency (Bitot Spot) was 0.3%, higher in males than females. Dental caries (30.4%) and dental fluorosis (25.1%) observed high in this area. Females suffered more from dental caries and dental fluorosis than males. Thyroid palpabale and visible were 0.6 %. Koilinichia, a sign of anemia, was observed higher in females (0.2%).

Dietary analysis revealed that consumption of food stuffs per day was marginally low in cereals i.e. 97% of RDA, very low in fats & oils (50% of RDA), Pulses & legumes (47.5% of RDA) & other vegetables (65% of RDA). Consumption of leafy Vegetables was extremely low (4.1%).

Discussion

Under nutrition in preschoolers was observed very high (81%) as compare to (NIN, NNMB, 1999) studies (62%) which may be due to the harsh environmental conditions of the desert area where drought and famine occurred frequently affecting the economy and thereby food intake. Scheduled caste and Scheduled tribe communities suffered more from under nutrition (88 & 86%) than other communities (75%). PCM was higher in females than males which might be due to the fact that girls were not being given proper care as reported (Singh et al, 1996; IIPS, 1998-99). Chronic Energy deficiency in Adults was high (56%) in comparison to studies of NNMB (NIN, 1999) and NFHS (IIPS, 1998-99) which is 50% and 36% respectively. Adults of scheduled caste community suffered more (69%) in comparison to other caste communities (54%). Severe grade of Chronic Energy deficiency was higher in scheduled caste community followed by scheduled tribes which may be due to their low economy and literacy level.

Diet was grossly deficient in Green leafy vegetables, fats, pulses and legumes and other vegetables. It is probably due to the commonly occurrence of drought which directly affects the agriculture and thereby daily food intake of inhabitants. This might be responsible for higher under nutrition not only in children but in adults also. There is a need to develop continuous monitoring service to study the nutritional status, dietary

habits, food availability and the effect of changing social and environmental factors on the health status of the population. The results of such studies may provide useful guidelines for planning food policies and to assess the impact of the nutritional programs.

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Referencess

Cavelli-Sforza LT, Rosman A, de Boer AS, Darnton HI. 1996. Nutritional aspects of changes in disease pattern in the western Pacific Region. WHO. Bulletin. Vol.74(3).307.

Central Arid Zone Reaserch Institute (CAZRI). 2001. Report on Symposium on Impact of Human Activities on Thar desert environment organised by Arid Zone Research Association of India, held at CAZRI from 15-17 Feb. 2001.

Garg SK, Mishra VN, Gupta SC, Bhatnagar M, Singh RB. 1982. Health profile of a rural population in Meerut district. Ind. J Comm. Med. Vol.4.41.

Grummer-strawn LM, Caceres JM, Jaimes BP, Herrera de. 1996. Trends in the nutritional status of salvadorian children: the post war experience. WHO Bulletin. Vol.74. 369.

Haldiya KR, Singh MB, Lakshminarayana J. 1993. Assessment of nutritional and immunization status of preschool children in rural area of Jaipur, Rajasthan. Raj. Med.J. Vol.32. 37.

HanumanthaRao D, Satyanarayana K, Sastry J Gowrinath. 1976. Growth of well to do Hyderabad preschool children. Indian J. Med. Res. Vol. 64. 629.

Indian Council of Medical Research. 1977. Studies on preschool children. ICMR Tech. Rep. Ser. No 26 New Delhi: 62.

Jelliffe DB. 1966. The assessment of the nutritional status of the community. Geneva: WHO.

National Nutrition Monitoring Bureau. 1999. Technical Report No. 18. NIN (ICMR), Hyderabad.

National Family Health Survey of India. 1998-99. International Institute for population Sciences, Bombay.

Nelson WE. 1992. Growth and development, In: Text book of Pediatrics, 14th ed. Philadelphia: W.B. Saunders Co. pp. 104.

Onis M de, Monteiro C, Akre J, Clugston G. 1993. The world wide magnitude of PCM: An overview from the WHO global database on child growth. WHO Bulletin. OMS, Vol.71. 703.

Sharma R S, Yadav BS. 1988. Environmental Health Status in a rural area of Rajasthan. J. Comm. Dis. Vol. 20. 147.

Singh MB, Haldiya KR, Lakshminarayana J. 2002. Morbidity Pattern and its association

with malnutrition in preschool children in desert areas of Rajasthan, India. J Arid Environm; Vol.51. 461.

Singh MB, Haldiya KR, Yadav SP, Lakshminarayana J, Mathur ML, Sachdeva R, Beniwal VK. 1996. Nutritional status of the school age children in salt workers of Rajasthan. Indian J. Med. Res. Vol. 103. 304.

Singh M B, Foteda R, Lakshminarayana J, Anand PK. 2006. Studies on the nutritional status of under five children in drought affected desert area of Western Rajasthan, India. Pub. Health Nutrition, UK. Vol. 9 (8). 961- 967.

Singh MB, Lakshminarayana J, Fotedar R, Anand PK. 2006. Childhood illnesses and malnutrition in under five children in drought affected desert area of western Rajasthan, India. Journal of Communicable Disease. Vol.38 (1): 88-96.

Singh, Madhu B, Fotedar R, Lakshminarayana, J. 2005. Occupational morbidities and their association with nutrition and environmental factors among textile workers of desert areas of Rajasthan, India. Jour. Occupational Health, Japan, Vol. 47 (5). 371–377.

Singh M B, Lakshminarayana J. 2000. Nutritional status of school age children in desert areas of Rajasthan. Annual Report. DMRC,

Singh MB, Haldiya KR, Lakshminarayana J. 1999. Nutritional status of pre-school children in desert areas of Rajasthan. Proc. Intl. Conf. Women in Science, Mumbai, 237-41.

Victora C, Vaughan C, Patrick J, Kirkwood B, Martines R, Carlos J, Lucio B. 1986. Risk factors for malnutrition in Brazilian children: The role of social and environmental variables. WHO Bulletin. Vol. 64. 299.

Visweswara Rao K, Radhaiah G, Raju SVS. 1980. Association of growth status and the prevalence of anaemia in preschool children. Indian J. Med. Res. Vol. 71. 237.

World Health Organisation. 2000. The management of nutrition in major emergencies. Geneva: WHO.