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Childhood Illnesses And Malnutrition In Under Five Children In Drought Affected Desert Area Of Western Rajasthan, India

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ABSTRACT

The study was undertaken to asses the impact of drought on childhood illnesses and nutrition in under five children of rural population using three stage sampling design.

The study has been carried out in 24 villages belonging to 6 tehsils of Jodhpur district which was a drought affected desert district of Western Rajasthan in 2003. A total of 914 under five children (0-5 years) could be examined for their childhood illnesses, malnutrition, dietary intake and clinical signs of nutritional deficiency.

Childhood illnesses observed at the time of drought were respiratory (7.5 %), gastroentrological (7.5%), and 5.6% fever (viral, malaria and jaundice), higher in males than females. Children suffered from recent and long term malnutrition were 39% and 26% respectively as per National Centre for Health Statistics (NCHS) standards. The extent of malnutrition was significantly higher in females than in males ($p<0.01$). Vitamin A & B complex deficiencies were 0.7% and 3% respectively. The protein energy malnutrition (PEM) was observed in 44.4%. Overall mean calorie and protein intake deficit was observed to be very high (76.0 & 54.0 %). The comparison of present drought results with earlier studies in normal and drought conditions showed higher prevalence of PEM and deficiencies of calories & proteins in their diet.

Respiratory, gastroentrological and fever were main childhood illnesses observed and were higher in males at the time of drought. PEM, vitamin A & B- complex deficiencies, anemia along with deficit in calories and proteins in their diet was observed higher in present study as compared to non desert areas, which may be due to the harsh environmental conditions in desert areas and paucity in the consumption of daily food intake. Due to inadequate consumption of daily food, the children were suffering from PEM resulting in several childhood illnesses. Effective measures making availability of

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adequate calories and proteins to all age groups especially to under five children through the ongoing nutrition programs needs to be ensured.

Key Words : Childhood illnesses, malnutrition, dietary, desert.

INTRODUCTION

First relief priority is the provision of food to the community and the disease prevention through prompt attention to nutrition and to various aspects of environmental health during nutritional emergencies such as drought or famine[1]. In desert areas of western Rajasthan, drought occurs quite frequently. Desert districts of Western Rajasthan had been the worst affected ones. During last century, the arid region experienced several droughts of varying intensities (47-62%)[2] . This periodic cycle of drought, attributable to geomorphology and climatic characteristics of thar desert, invariably affects food intake of this agricultural population in the desert. The locally grown cereals and millets contribute maximum intake of calories and protein (nearly 85%) of the rural residents of India[3]. However in desert residents, this proportion is more then 85% and further increases during the outbreak of drought. A survey conducted to assess health and nutrition status in drought affected areas of Rajasthan in 1987, revealed 2.9% to 17.3% grade III under-nutrition, based on weight for age in preschool children[3] and male and females were equally affected. Calorie intake was significantly low in all age groups in all districts in comparison to ICMR recommended dietary allowances (RDA)[4] . The clinical cases of PEM (3 to 17.8%) were frequently seen in all six desert districts and incidence of Vitamin A deficiency was high in Barmer, Jodhpur, Jalore and Jaisalmer.

With this backdrop, a survey was planned to study the impact of drought on childhood illnesses and nutrition in under five children of rural population experiencing drought conditions very frequently, the results of which should help in assessing the magnitude and extent of malnutrition in children (under 5).

MATERIAL AND METHODS

Within India the great Indian desert of Thar, as it is commonly called, forms a part of the country's north west arid zone lies (69%) in Rajasthan, 21% in Gujarat ,Punjab and Haryana (10%) each respectively. The desert is borderded 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 50C in May and June in some places. Dust storms are quite common with wind velocity above 50 km/h. The desert dwellers for centuries have lived under such harsh conditions with bare minimum of potable water fetched from far off places and stored as a precious treasure. Although plenty of milk & milk products were available but drinking water was in scarcity. The succulent vegetation was also utilized to quench the thirst. In the years of good rainfall, ponds, tanks and rivers turned into water reservoirs, serving the human and livestock requirement. The dominant land use in the Thar had traditionally been grazing for livestock, supplemented by rain-fed agriculture, producing millets, pulses and oil seed crops[2] hence millet and wheat constituted their main food. Moong, chana dal and moth were main pulses consumed by children, mostly locally available vegetables are such as Sangri, Ker, Kachariya, Kakra, Potato, Gwar beans, onion, etc.

The sampling design for assessment of health and nutritional status a three stage sampling technique was adopted. At the first stage Jodhpur district was selected which was found worst affected district during 1987 drought[3]. At the second stage the villages within each tahsil and at third stage children were selected. All the tehsils were selected to avoid the intra district variation as the tehsils are considered as population-wise homogeneous for the sampling purpose. From each tehsil four villages were selected in different directions by simple random sampling criteria, by using random number tables available. This sampling gave complete picture of the district. From each village, 40 preschool children were covered randomly. The sample size has been calculated, based on the prevalence rates, considering more than 1% prevalence in case of public health problem. Considering this and using the standard procedure for determining the sample size (n) by the formula, with 20% error and 10% non response, 95% Confidence Interval (C.I) using ± 2 S.D. limits, a sample of 960 was calculated to be covered from 6 tahsils of Jodhpur district[5,6].

Data on demography and socio-economic aspects could be collected on a total of 914 preschool children i.e. 0-5 years (complete in all respects) available in 24 villages during May, 2003, using interview technique on pre tested schedules. Childhood illnesses at the time of survey were recorded (on the day of survey). Each individual was examined for clinically for nutritional deficiency signs and data on anthropometry, dietary intake (Calories from cereals & Millet intake) collected to assess the nutritional status. All the measurements were taken following standard techniques[4,7]. Anthropometric measurements were expressed as percentage of the standards available from NCHS[8] for a given age and sex and classified for malnutrition [9,10] using height percentage and weight percentage as mentioned above. Recent and long term

malnutrition have been calculated with reference to NCHS standards[8].

The results of the present study were compared with the earlier surveys conducted in Jodhpur district during drought3 conditions of 1987 and normal conditions[11] (Baseline health survey, 1986), besides, the normal non-desert conditions[11]. The difference between male and female was done by Proportion Test and the mean calorie and protein intakes were compared with DMRC drought survey and baseline health survey by applying t-test for difference of means[12].

RESULTS

Data of 914 (95.2%) preschool children could be collected. It revealed that 96.3% of children were Hindus and 85.7% belonged to lower and middle income groups mainly involved in labour and agriculture work who also work on drought relief under special schemes.

The main childhood illnesses observed during drought were respiratory (7.5%), gastroentrological (7.5%), and fevers (viral, malaria and jaundice), 5.6%. Male children were reported to have significantly higher illness (28.5%) than (18.7%) in females ($p<0.01$) (Table 1). Other illnesses observed were ear disease (2.1%), skin problems (0.5 %) and eye diseases (0.2%) All the childhood illnesses (pooled) showed increasing trend with age i.e. 13 % in infants to 26.0 % in 4-5 years age group.

Table 1: *Distribution of childhood illnesses according to gender*

Illness	Male N = 470		Female N = 444		Total N = 914	
	N	%	N	%	N	%
Gastroentrological	44	9.4	25	5.6	69	7.5
Respiratory	42	8.9	27	6.1	69	7.5
Fever	31	6.6	20	4.5	51	5.6
Ear disease	12	2.6	7	1.6	19	2.1
Skin problems	4	0.9	1	0.2	5	0.5
Eye disease	1	0.2	1	0.2	2	0.2
All	134	28.5	83	18.7	217	23.7

*$p<0.05$

Anthrpometrically the growth retardation was observed in children. Recent malnutrition (weight for age) was observed to be 38.5. Highest level of recent malnutrition was observed in 1-2 years age group. The girls were found suffering more (40.8 % vs. 36.1 %) from recent malnutrition than boys ($p<0.05$) (Table 2). Overall 25.8% children were suffering from chronic malnutrition i.e. long term malnutrition. Chronic malnutrition was also higher (31.2 % vs. 20.4 %, $p<0.01$) in girls than in boys, particularly children aged 1-2 years suffered more (Table 3).

The overall prevalence of anemia was observed to be 30.5%, diagnosed on the basis of conjunctival pallor and Platynichia and Koilonichia. Prevalence of various signs related to Protein calorie malnutrition was observed to be high i.e. Dispigmentation (20.2%), dryness of hair (21.6%), and others accounted for 2.6% only. Prevalence of Marasmus was 1.7 percent (2.3 % in boys and 1.1 % in girls). All the signs associated with PCM were observed to be higher (46.3 % vs. 42.8 %) in girls than boys. Vitamin A deficiency sign (Bitot spot) was just in 0.2% and no night blindness was observed. The overall

Table 2.Prevalence of malnutrition by Weight for age in Jodhpur district

Age in years	Weight as % standard, NCHS					
	Male			Female		
	Normal	Mild & Mod.	Severe	Normal	Mild & Mod.	Severe
	(75+)	(65-75)	(65-75)	(<65)	(75+)	(<65)
<1	67.9	8.9	23.2	61.1	20.4	18.5
1+	53.6	20.3	26.1	39.1	28.1	32.8
2+	50.0	23.8	26.2	47.8	20.7	31.5
3+	61.9	23.7	14.4	63.6	19.3	17.0
4+	75.6	16.9	7.5	72.0	16.8	11.2
0 - 4	**63.9**	**19.1**	**17.0**	**59.2**	**20.2***	**20.6***

*P<0.05 between M & F

Table 3. Prevalence of malnutrition by Height for age in Jodhpur district

Age in years	Height as % standard, NCHS			
	Male		Female	
	Normal	Chronic malnutrition	Normal	Chronic malnutrition
	(90+)	(<90)	(90+)	(<90)
<1	82.1	17.9	73.1	26.9
1	76.8	23.2	70.3	29.7
2	57.1	42.9	52.2	47.8
3	91.8	8.2	62.5	37.5
4	84.4	15.6	81.1	18.9
0 - 4	**79.6**	**20.4**	**68.8****	**31.2****

**P< 0.01 between M & F

prevalence of Vitamin B complex deficiency was seen in 3 % of children (Angular stomatitis in 0.5%, cheliosis 0.9% and glossitis 1.6% respectively). The Vitamin C deficiency was observed in 0.1 % Children; teeth caries 2.7% and mottling of enamel in 3.9% respectively (Table 4).

DISCUSSION

Respiratory, gastroentrological, and fever were main childhood illnesses observed higher in males than females at the time of drought. It was reported[13] that respiratory and gastroentrological illnesses in preschool children of desert areas of Rajasthan were 3.5% and 2.6% in

Table 4. *Prevalence of Nutritional Deficiency Signs*

Nutritional Deficiency Signs	Present Study (%)			Desert drought 1987(%),n= 311	Non desert (%) n= 326
	0-5 years			< 5 yr.	< 5 yr.
	M	F	M+F		
Protein calorie Malnutrition					
Dispig..of hair	18.0	22.5	20.2	NA	NA
Dryness of hair	21.9	21.4	21.6	NA	NA
Sparseness hair	0.4	1.1	0.7	NA	NA
Easy pluckability	0.2	0.2	0.2	NA	NA
Muscle Wasting	2.3	1.1	1.7	9.4	NA
Total (Any sign)	42.8	46.3	44.4	NA	NA
Vitamin A Deficiency					
Night Blindness	0.0	0.0	0.0	10.8	0.0
Bitot Spot	0.2	0.2	0.2	17.6	0.0
Total (Any sign)	0.2	0.2	0.2	28.4	0.0
Vit. B Complex deficiency					
Angular Stomatitis	0.8	0.2	0.5	NA	0.6
Cheliosis	0.8	1.1	0.9	NA	0.3
Glossitis	1.4	1.8	1.6	NA	0.0
Total (Any sign)	3.0	3.1	3.0	80.2	0.9
Vitamin C deficiency	0.2	0.0	0.1	NA	NA
Anemia: pallor conjuctiva	33.4	27.7	30.5	73.5	0.3

**P< 0.05

normal conditions which are almost half of the present illnesses (7.5 %) during 2003 drought. This may be due to the fact that during drought there is scarcity of food leading to under nutrition in children due to which they become more susceptible to diseases resulting in higher morbidities.

Recent malnutrition (weight for age) was observed 39% and long term malnutrition (height for age) 26%. Long term malnutrition as well as recent malnutrition were significantly higher in females than males (P<0.01), which might be due to the fact that girls were not being given proper care as

Table 5: Comparison of mean calorie and mean protein intakes between different surveys

Surveys	Mean calorie intakes (n)		Mean protein intakes (n)	
	Males	**Females**	**Males**	**Females**
Present drought study, 2003	339.6*±311.2 (381)	343.6*±383.9 (365)	11.9*±10.9 (381)	12.1*±13.5 (365)
Desert drought 1987	982±464.9 (136)	870±436.1 (93)	32.3±14.9 (136)	29.0±14.5 (93)
Desert Normal 1986	800 (39)	953 (37)	25.3 (39)	29.4 (37)
Non Desert 1986	1258 (18)	839 (20)	38.7 (18)	26.7 (20)
RDA	**1460**	**1460**	**22.3**	**22.3**

reported[13,14]. Extant of malnutrition in preschoolers was highest in 1-2 years age group, which may be due to the fact that women in desert areas were in traditional phase according to WHO typology of infant feeding pattern as observed[15].

The comparison of current results with earlier drought survey of Jodhpur district in 1987, it was observed that prevalence of various signs of protein calorie malnutrition was high (44.4 %) in this study in comparison to (9.4 %) in 1987. Vitamin A & B complex deficiencies were found very little; Bitot spot declined from 17.6 % to 0.2%, Vitamin B complex deficiency from 80.2 % to 3.0 %, also prevalence of anemia reduced to 30.5% from 73.5 % in 1987.

The comparison of nutritional deficiency signs in study population with non desert population of Jaipur district shows that Vitamin A and B complex deficiencies along with anemia have been significantly higher (3% vs. 0.9%, P< 0.05). This may be due to harsh environmental conditions and related socio-economic factors.

In India nearly 85% calories of the total daily calorie intake of the rural population is supplemented from the cereals and Millets[3] and in desert residents this proportion is even more. Therefore instead of carrying conventional diet survey to assess calories and protein intake, it was decided to carry out only cereal and millets consumption survey. Table 5 shows that mean calorie intake was very poor 339.6 for males and 343.6 for females respectively in comparison to 1460 as recommended[4] for normal conditions, resulting in significant ($p<0.05$) calorie deficit of about 77%.

Intake of the mean protein levels were also in deficit; 11.9 gm in males and 12.1 gm in females respectively in comparison to 22.3 gms as recommended by ICMR[4] resulting in deficit of about 46 % ($p<0.01$) in the present study while mean proteins levels were high significantly ($p< 0.01$) in

earlier studies of non-desert in 1986[11], desert-normal[11] and desert-drought[3] conditions (Table 5).

The conditions in draught become crucial for survival especially when it occurs years after years. To sustain life, under such harsh environmental conditions of desert areas, becomes totally dependent on outside supports mainly from Governments. The health of children has been affected badly during the 2003 draught than the earlier ones and there is need to assess if the necessary governments supplies etc were not resorted/provided to meet their daily intake. Since the state of Rajasthan population conservatively, male dominated, ignore female children for their basic needs the health of children in general affected by draught conditions are badly hit and more so in female children. These conditions can enhance the child mortality too in years to come, thus necessary efforts to protect these children are the need of time.

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