

NUTRITION

3.5 Estimation of Zinc deficiency, under nutrition and morbidities especially ARI, Diarrhoea and Fever in school children of Rajasthan

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OBJECTIVES

1. Estimation of extant of Zinc deficiency in school children of Rajasthan
2. Estimate the prevalence of under nutrition and morbidities especially ARI, Diarrhoea and Fever
3. To facilitate the health functionaries in the reduction of the Zinc deficiency Disorders in school children of Rajasthan

PROGRESS

This project has been initiated recently. Keeping in view the operational feasibility, 15 clusters (schools) have been adopted to cover 450 school children i.e. 30 children per cluster for the identification of the problem in this area. At first step, listings of all the government and private schools with children 6-11 years of age from both rural and urban areas were listed from district education office of Jodhpur. Secondly cumulative enrollment was determined. Finally schools were selected using PPS sampling technique as recommended by WHO. In the selected schools, children were selected randomly using Tippets random number table. Equal proportion of boys and girls from 6-11 years were covered from the selected schools.

All children have been interviewed / examined for Socio-demographic profile, nutritional deficiency signs, morbidity for last 15 days and anthropometry (Height, Weight and FFT) using standard WHO techniques.

Blood samples have been collected for estimation of Zn deficiency along with anemia and Urine samples for estimation of UIE in laboratory. Blood samples have been collected from school children, for that, collection tubes and the cryotubes (in which serum was stored) was labeled. Each child was given a code number that was also the same on the collection tube, cryotube and prescribed form. The blood collected in the tube was allowed to clot at room temperature in dark for 15 minutes. After, 15 minutes, tubes with clotted material were kept in the rotor of a battery operated centrifuge machine and spinned @ 1,500 to 2,000 rpm for 5 minutes. After centrifuging the clotted material, serum that was separated from the clot, and was removed very carefully with the help of a micropipette and

immediately transferred to cryotubes. Precaution was taken at the time of separating the serum from the clot, so that the tip of micropipette should not come in contact with the clot. For each sample, a new micropipette tip was used to avoid contamination. A casual urine sample was also collected. Zn deficiency was assessed by AOAC method using flame mode of Atomic Absorption Spectrophotometer. Anemia was assessed by Hemoglobin levels (Cyanmethaemoglobin technique), and was classified as per WHO classification. Iodine deficiency disorders was assessed by clinical examination of thyroid gland using the standard method as recommended by the joint WHO / UNICEF / ICCIDD consultation. A casual urine sample was also collected for estimation of Urinary Iodine Excretion (UIE) levels to assess the Iodine nutriture status. UIE was determined by Ammonium Persulphate Digestion on Microplate method (APDM) using standard laboratory technique. UIE level less than 10 mcg/dl have been considered as indicator of iodine deficient nutriture.

Analysis of 465 school children has been done. Table 1 showed age and sex wise distribution of study population (241 males and 224 females). Stunting (Height for age) was 17.4 percent in school age children with the prevalence of severe stunting 4.5 %. Underweight (Weight for age) in school age children observed 24.9 % and wasting 8.4 %. Both stunting and wasting were observed higher in females (17.9% & 11.2%) than males (17.0% & 5.8%).

Table 1. Age and sex wise distribution of school children covered

Age group	Males	%	Females	%	Total	%
6+	35	7.5	36	7.7	71	15.3
7+	30	6.5	53	11.4	83	17.8
8+	54	11.6	36	7.7	90	19.4
9+	36	7.7	35	7.5	71	15.3
10+	48	10.3	43	9.2	91	19.6
11+	38	8.2	21	4.5	59	12.7
Total	241	51.8	224	48.2	465	100.0

Analysis of the serum zinc has been done for 410 school children. It is observed that 76.1 percent school children were normal and 23.9 percent children were deficient in serum zinc i.e. serum Zn level was less than 0.65 mg/l (Table 2). It was observed that serum zinc deficiency was more in early age group i.e. 60.1 percent in 6 to 7 years age group than 11 years age group (12%). It was observed that serum zinc deficiency was 22.1 percent in boys whereas 25.6 percent in girls.

Table 2. Age wise distribution of school children according to Serum Zinc

Age Years	Normal Serum Zn level \geq 0.65 mg/l (less than 10 years)		Deficient Serum Zn level < 0.65 mg/l (less than 10 years)	
	N	%	N	%
6+ N=64	45	70.3	19	29.7
7+ N=69	48	69.6	21	30.4
8+ N=79	59	74.7	20	25.3
9+ N=63	50	79.4	13	20.6
10+ N=85	66	77.6	19	22.4
11+ N=50	44	88.0	6	12.0
Total N=410	312	76.1	98	23.9

Cut offs for 10 years and above: Ref. IZiNCG, 2004

Male- Normal: Serum Zn level \geq 0.70 mg/l; Deficient: Serum Zn level < 0.70 mg/l

Female- Normal: Serum Zn level \geq 0.66 mg/l; Deficient: Serum Zn level < 0.66 mg/l

Analysis of 393 school age children according to Hb estimation revealed that only 26.5 percent children were non anemic ($Hb \geq 11.5$ g/dl) where as 55 percent children belong to mild category (10-11.5 g/dl) and 18.3 percent to moderate category (7-10 g/dl) of anemia.

Epidemiological criteria, as prescribed by WHO, for assessing iodine nutrition is based on median urinary iodine concentrations / levels. Analysis of 289 urine samples has been done. Median urinary iodine value was 150 mcg/l. It was observed that proportion of school children less than 100 $\mu\text{g/L}$ were 25.6 percent, whereas, proportion of school children less than 50 $\mu\text{g/L}$ were 5.9 percent. Iodine content of 113 salt samples has been estimated using standard iodometric titration method. 69 percent children consumed salt adequately iodized i.e. 15 ppm or more. Overall high proportion of children (31%) consumed salt having inadequate iodine content i.e. less than 15 ppm. 2.7 percent children consumed salt having negligible iodine content (Less than 7 ppm).

This study revealed that school children are not only suffering from anemia but also with Zinc deficiency (23.9%) along with Stunting (17.4%), Underweight (24.9%) and Wasting (8.4%). Both stunting and wasting were observed higher in females (17.9% & 11.2%) than males (17.0% & 5.8%) though statistically insignificant.