

A Cross-Sectional Comparative Study on the Basis of Signs of Nutritional Deficiency of Anganwadi Children of Urban, Rural and Tribal Area of Udaipur District

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Abstract:

Background: Micronutrients such as vitamins and minerals are required in small amounts which is essential to our health, development and growth. As tiny the amounts are, the consequences of their absence are severe. Micronutrients such as iodine, vitamin A and iron are the most important for global public health; their deficiencies represent a major threat to the health and development specially for children and pregnant women in developing countries.

Methodology: Facility based cross sectional study was carried out to compare the status of signs and symptoms of micronutrient deficiencies among children attending Anganwadi centers in urban, rural and tribal areas of Udaipur district through two stage sampling technique.

Result: 95.4% urban respondents had normal eyes followed by rural (78.8%) and tribal (60.8%). Most common sign was pale conjunctiva and dry conjunctiva, and these were maximum in tribal children as 19.3% and 18.3% respectively. Chielosis was most common (13.8%) sign of undernutrition followed by dental carries (13.1%). Pale tongue, angular stomatitis and dental carries were more common in tribal children.

Conclusion: Poor status of nutritional status is more in tribal and rural children than urban children.

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Introduction

Health is the most precious possession and fundamental human right, the key to success in life which has to be earned by individual efforts[1]. "Nutrition is defined as science of food and its relationship to health"[2].

Children are the backbone of any country & their health is a prime concern of the country[3]. Pre-school children constitute the most vulnerable segment of any community. Despite numerous advances and improvements in child health, malnutrition still remains as one of the main public health challenges of the 21st century, particularly in developing countries[4,5]. It undermines the survival, growth and development of children and is associated with almost 35% of all deaths in children under the age of 5 years worldwide[6]. Globally, more than 2 billion persons have micronutrient deficiencies, most of them from

developing countries. More than 70% of pre-school children consume less than 50% of the RDAs for vitamin A, iron, folic acid and riboflavin[7].

Micronutrient deficiencies impair intelligence, strength and energy, sapping individuals of much of the needed vitality, productivity and initiative for economic development[8]. Micronutrient deficiencies affect child survival, growth, brain development, educational achievement and resistance to illness[9]. Micronutrient deficiencies result from inadequate dietary intake, poor absorption of nutrients, excessive losses, increased requirement or a combination of these factors. Correcting micronutrient deficiencies in vulnerable populations can improve population-wide IQ by 10-15 IQ points; reduce maternal deaths by one-third, decrease infant and childhood mortality by 40% and increase strength and work capacity by

40%. It eliminates nutritional blindness and endemic cretinism and significantly reduces birth defects, stillbirths and congenital deafness[8].

We thus aim to clinically evaluate micronutrient deficiencies among children among children attending Anganwadi centers in urban, rural and tribal areas of Udaipur district

Objective

To compare the status of signs and symptoms of micronutrient deficiencies among children attending Anganwadi centers in urban, rural and tribal areas of Udaipur district

Materials and Methods

Study Design and Area

Facility based cross sectional study which was conducted at Anganwadi centers of Udaipur district which has total 3175 Anganwadi centers, out of which 2805 are main and 370 are mini Anganwadi centers. Study was conducted in main Anganwadi centres.

Sample size

Where the population is unknown, the sample size can be derived by computing the minimum sample size required for accuracy in estimating proportions by considering the standard normal derivation set at 95% confidence level (1.96), picking a choice or response (50%=0.5) and the confidence interval (0.05=±5). The formula is:

$$n = Z^2 pq / e^2$$

$$\begin{aligned} &= (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2 \\ &= 0.9604 / 0.0025 \\ &= 384.16 \approx 385 \end{aligned}$$

$Z = 1.96$, $p = 0.5$ (50%) , $q = 1-p = 0.5$, $e = 0.05$
 Z = standard normal deviation set at 95% confidence interval

p = percentage picking a choice or response
 e = the desired level of precision (i. e. the margin of error)

From our calculation, our sample size is 385 but for reducing error total sample taken were 450.

Study Participants

All the children present at selected Anganwadi centre on the day of visit were included in the study.

Inclusion Criteria

All children from 6 months to 6 years present on visit day of selected urban, rural and tribal Anganwadi centers of Udaipur district.

Exclusion Criteria

Children absent on visit day.

Study Period

6 months from February 2019 to July 2019.

Sampling Method

Two stage sampling technique was used for the selection of Anganwadi centers for the study.

Sampling Technique

There are 12 blocks in Udaipur district. Out of which there are 3 Rural blocks, 1 urban block and 8 tribal blocks.

1. In first stage, after line listing and by lottery method, one each from rural & tribal block were chosen. Since there was only one block in urban area which was chosen.
2. In second stage, all the Anganwadi centers under these selected blocks were line listed and by systemic random sampling, every 5th Anganwadi centers was chosen.

So, 28 Anganwadi centers out of 138 in Udaipur city block (Urban), 25 out of 126 Anganwadi centers in Badagaon block (Rural) and 28 Anganwadi centers out of 138 were selected from Kherwara block (Tribal) so a total of 81 Anganwadi centers were selected.

In the next step information was gathered from all the children attending Anganwadi on that particular day.

Children were examined in the day light for clinical signs of nutritional deficiency. The clinical signs looked for in this age-group were: sparse hair, hyper or hypo pigmented hair, flag sign, pallor, cheilosis, angular stomatitis and glossitis etc.

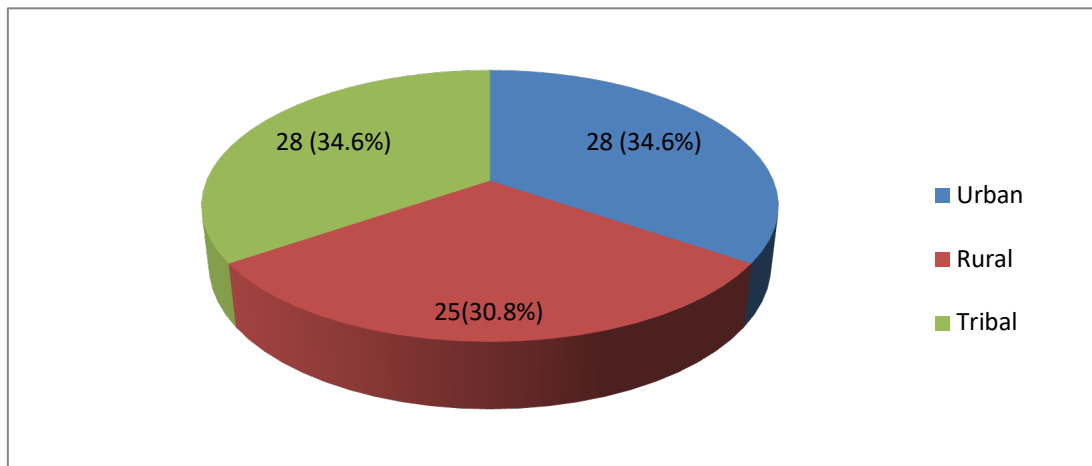
Data Analysis

- a) Data was entered in Microsoft excel and data analysis was done on SPSS version 16. The plan was submitted to the Ethical Committee of the Institute and study was initiated only after ethical approval.
- b) Data was expressed in percentages.
- c) Appropriate test of significance was applied.
- d) $P < 0.05$ was considered significant.

Ethical Issues

1. A written and informed consent was taken from all concerned competent authority/study subjects.
2. No pressure or coercion was exerted on subjects for participation in the study.
3. Confidentiality and privacy was ensured at all stages.
4. Data was used for research purpose only.

Results



From above figure, 34.6 % Anganwadis are from urban area followed by tribal area (34.6%) and rural areas (30.8%) which shows near equal representation of whole different group of population.

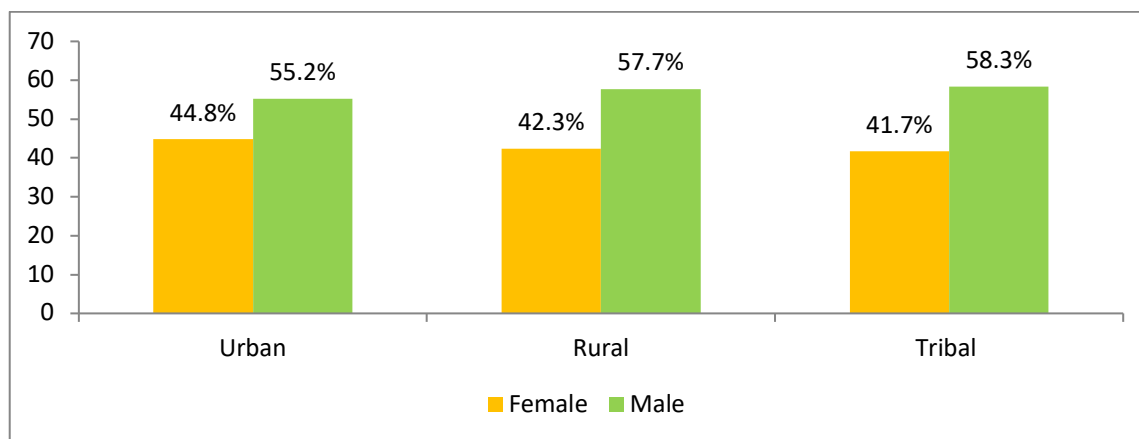


Figure 2: Distribution of children according to gender with type of location of Anganwadi

Above graph reveals that more number of the respondents (56.9%) are from male category and rest were females (43.1%). In urban (55.2%), rural (57.7%) and tribal (58.3%) areas male predominance was maintained equally.

Table 1: Distribution of children according to scalp hair sign with type of location

Scalp hair	Location			Total (%)	Chi-square value	P value
	Urban (%)	Rural (%)	Tribal (%)			
Lack of luster	13(7.5)	17(10.9)	18(15)	48(10.7)	12.4188	0.133
Sparse	10(5.7)	28(17.9)	25(20.8)	63(14)		
Depigmentation	6(3.5)	25(16.1)	24(20)	55(12.2)		
Flag Signs	8(4.6)	13(8.3)	18(15)	39(8.7)		
Easy Pluckability	19(10.9)	19(12.2)	17(14.2)	55(12.2)		
Normal	118(67.8)	54(34.6)	18(15)	190(42.2)		
Total	174(100)	156(100)	120(100)	450(100)		

Above table reveals that 42.2% respondents had normal hair, among the abnormalities 14% had sparse hair followed by easy pluckability and depigmentation (12.2% each), lack of luster (10.7%) than flag sign was present in 8.7% of respondents. In tribal respondents only 15% were having normal hairs, among the abnormalities sparse hair (20.8%) and depigmentation (20%) was common followed by flag sign (15%), lack of luster

(15%) and easy pluckability (14.2%). In urban area most respondents were having normal hairs (67.8%), easy pluggability (10.9%) was most common hair abnormality noticed, lack of lusture (7.5%), flag sign (4.6%), and depigmentation (3.5%) was present in few respondents. In rural respondents, major abnormality was sparse hair (17.9%) followed by depigmentation (16.1%), easy pluckability (12.2%), lack of lusture (10.9%) and

flag sign (8.3%). This difference was found statistically non-significant. (Chi-square value =

12.4188, P value = 0.133).

Table 2: Distribution of children according to eye changes with type of location of Anganwadi

Eyes	Location			Total	Chi-square value	P value
	Urban (%)	Rural (%)	Tribal (%)			
Night blindness	0(0)	1(0.6)	1(0.8)	2(0.5)	52.26	0.001
Dry conjunctiva	5(2.9)	13(8.3)	22(18.3)	40(8.9)		
Pale conjunctiva	3(1.7)	19(12.3)	23(19.3)	45(10)		
Bitot spots	0(0)	1(0.6)	1(0.8)	2(0.4)		
Normal	166(95.4)	122(78.2)	73(60.8)	361(80.2)		
Total	174(100)	156(100)	120(100)	450(100)		

Above table shows that 80.2% respondents had normal eyes, among abnormalities pale conjunctiva present in 10% followed by dry conjunctiva (8.9%), night blindness (0.5%) and bitot spots (0.4%). In tribal area pale conjunctiva(19.3%) and dry conjunctiva (18.3%) was noticed as major abnormalities. In urban areas mostly eyes were

normal, some abnormalities i.e. dry (2.9%) and pale (1.7%) conjunctiva was noticed in few subjects. Also in rural area dry (8.3%) and pale(12.3%) conjunctiva was noticed as major abnormalities. This difference was found statistically significant. (Chi-square value = 52.26, P value = 0.001).

Table 3: Distribution of children according to oral manifestation of nutritional deficiency changes with type of location of Anganwadi

Mouth	Location				Chi-square value	P value
	Urban (%)	Rural (%)	Tribal (%)	Total		
Bleeding gums	7(4.1)	24(15.4)	4(3.3)	35(7.8)	92.141	0.000
Spongy gums	18(10.3)	20(12.8)	11(9.2)	49(10.9)		
Mottled Enamel	22(12.6)	0(0)	7(5.8)	29(6.4)		
Dental caries	18(10.3)	14(8.9)	27(22.5)	59(13.1)		
Cheilosis	38(21.8)	14(8.9)	10(8.3)	62(13.8)		
Angular Stomatitis	20(11.5)	7(4.5)	19(15.8)	46(10.2)		
Pale tongue	4(2.3)	19(12.2)	16(13.4)	39(8.7)		
Normal	47(27.1)	58(37.3)	26(21.7)	131(29.1)		
Total	174(100)	156(100)	120(100)	450(100)		

Above table shows that 29.1% respondents no signs of nutritional deficiency, among the abnormalities cheilosis (13.8%) was common followed by dental caries (13.1%), spongy gum (10.9%), angular stomatitis (10.2%), pale tongue (8.7%) and bleeding gums (7.8%). In urban, cheilosis (21.8%)

was most common sign of nutritional deficiency while dental carries (22.5%) was common in tribal area and bleeding gum (15.4%) was most common in rural areas. This difference was found statistically significant. (Chi-square value = 92.141, P value = 0.000).

Table 4: Distribution of children according to nail changes with type of location of Anganwadi

Nails	Location				Chi-square value	P value
	Urban (%)	Rural (%)	Tribal (%)	Total (%)		
Pale	34(19.5)	39(25)	45(37.6)	118(26.3)	24.69	0.000
Koilonychias	10(5.8)	12(7.7)	7(5.8)	29(6.4)		
Brittle	21(12.1)	32(20.5)	25(20.8)	78(17.3)		
Normal	109(62.6)	73(46.8)	43(35.8)	225(50)		
Total	174(100)	156(100)	120(100)	450(100)		

Above table shows that 50% of respondents were normal in total, among abnormalities pale nails (26.3%) was most common followed by brittle nails (17.3%) and koilonychias (6.4%). In urban abnormalities was present in 37.4% subjects in which pail nails (19.5%) was most common. In

rural area, 46.8% had normal nails and maximum abnormalities noticed was pail nails (25%). Similarly maximum abnormality in tribal area was pail nails (37.6%). This difference was found statistically significant. (Chi-square value = 24.69, P value = 0.0).

Table 5: Distribution of children according to skin signs with type of location of Anganwadi

Skin	Location				Chi-square value	P value
	Urban (%)	Rural (%)	Tribal (%)	Total (%)		
Dry	21(12.1)	31(19.9)	28(23.3)	80(17.8)	26.0501	0.000
Depigmentation	28(16.1)	12(7.7)	27(22.5)	67(14.9)		
Oedema	9(5.2)	3(1.9)	8(6.7)	20(4.4)		
Normal	116(66.6)	110(70.5)	57(47.5)	283(62.9)		
Total	174(100)	156(100)	120(100)	450(100)		

Above table shows that 62.9% respondents had normal skin followed by dry skin (17.8%), depigmentation (14.9%) and oedema (4.4%) In rural and tribal area maximum respondents had dry skin while in urban area was depigmentation. This difference was found statistically significant. (Chi-square value = 26.0501, P value = 0.0).

Discussion

A total of 81 Anganwadis children were evaluated in this study over a period of 6 months. In this study a higher proportion of male children (56.9%) as compared to female children (43.1%) were observed at Anganwadi centers. In the study by Mandal GC et al 49.20% of children were male and 50.79% were female[10]. In the study conducted by Deshmukh PR et al in under six children 52% were male and 48% were female[11]. In the study Halappa et al, shows, the male to female ratio was 47.4 :52.5 (150:166), respectively[12]. In all three categories of rural, urban and tribal Anganwadis, proportion of male children (55.2% to 58.3%) was higher than female children (41.7% to 44.8%).

In current study, 67.8% respondents from urban area had normal hair followed by rural (34.6%) and tribal (15%). Signs of undernutrition in hairs (i.e. lack of luster, sparse, depigmentation, flag signs, easy pluckable) were maximum in tribal children followed by rural and least in urban area. There is statistically no significant relationship between scalp hairs of the children with location (p= 0.13). Study done by Sachithanathan et al, in Chennai city revealed that sparse hair in 28.40% of children[13]. In this study it was found that chielosis was most common (13.8%) sign of undernutrition followed by dental carries (13.1%), spongy gums (10.9%), angular stomatitis (10.2%), pale tongue (8.7%), bleeding gums (7.8%) and mottled enamel (6.4%). Pale tongue, angular stomatitis and dental carries were more common in tribal children. Bleeding gums and spongy gums were more common in rural children. Mottled enamel and chielosis were more common in urban children. The difference in proportions of children with mouth signs of undernutrition was found significant as per location (p <0.001). In our study it was revealed that pale nails was most common symptom (26.3%) among undernourished children followed by brittle nails (17.3%) and koilonychias (6.4%). Pale nails were more common in tribal children (37.6%) koilonychias was more common

in rural children (7.7%) and brittle nails were also more common in tribal children (20.8%). There was statistically significant relationship between nails signs of undernourished children with type of location (p <0.001). According to Suman Kumari studies Vitamin B- complex deficiency was noted in 11% of angular stomatitis, 7% of glossitis and Iron deficiency were noted in 49% of anaemia in children.[1]

In this study it was found that 94.8% urban respondents had normal eyes followed by rural (78.8%) and tribal (60.8%). Most common sign was pale conjunctiva and dry conjunctiva and these were maximum in tribal children as 19.3% and 18.3% respectively. There is statistically significant relationship between eyes of the children with type of location (p= 0.001). These findings are higher than another study of Garg, S.K. et al. (1997)[14] which showed that xerophthalmia cases were present in 1.6% children.

In Mitashree et al study[15], it was found that the maximum percentages (53.33%) of Gond girls were suffered by paleness of eye, dental carries and bleeding gums. Prevalence of angular stomatitis among Gond boys and girls were 42.10% and 33.33%, respectively and in case of Kawar, it was 40.01% and 41.17% among boys and girls, respectively.

Conclusion

The study concludes micronutrient deficiencies are prevalent among tribal children as compared to rural and urban children more. This appeals effective implementation of national health programmes, which can play a crucial role in addressing the hidden hunger. Correcting micronutrient deficiencies can significantly reduce childhood mortality and morbidity.

Limitations

- Only qualitative assessment of micronutrient deficiency was done.
- Biochemical assessment could not be done.

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