



## **Study of Nutritional Status of Pre-school Children in Auraiya District of Uttar Pradesh**

**Phool Kumari<sup>1\*</sup> and Tripti Dhawan<sup>2</sup>**

<sup>1</sup>*Krishi Vigyan Kendra, Hamirpur, Uttar Pradesh, India.*

<sup>2</sup>*MJP Combined District Hospital, Ambedkar Nagar, Uttar Pradesh, India.*

### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author PK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author TD managed the analyses of the study. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

Malnutrition is a complex issue for India. It is an example of how India is a nation of extremes. Many among the population live in poverty and are not able to obtain as much food as they need. Assessment of the nutritional status of community clinical examination is one of the first steps in the formation of any public health strategy to overcome malnutrition. Pre-school children undoubtedly are the most crucial segment of our population. Undernutrition is a critical determinant of mortality and morbidity in young children worldwide and it is associated with 45 per cent of all deaths in children under five years of age. The major forms of malnutrition are kwashiorkor (edematous) and marasmus (wasting) with or without associated stunting. In a view to know the nutritional deficiency among the rural children, the present study was conducted to assess the clinical status of preschool children of Auraiya district of Uttar Pradesh. The study involved a total of 100 preschool children. Twenty children selected randomly from each of the 5 villages of Bhagyanagar block of Auraiya district of Uttar Pradesh. The study showed that 58 children fall between 1-3 years of age while 42 children came under the 4-6 year of age. Physical examination results are as presented in Tables 2-6. On the basis of general appearance it was reported that 54 per cent of the children were

\*Corresponding author: E-mail: [phool\\_15@reddiffmail.com](mailto:phool_15@reddiffmail.com);

normal in terms of body weight and 45 per cent were thin and 1% were obese from the village of Bhagyanagar Block of Auraiya district. Sign of Fluorosis namely mottling of enamel in teeth was observed most of the elder children (4-6 years) ie. 27 per cent as compared to the age group of 1-3 years ie, 15 per cent. Anaemia was observed as pale conjunctiva (28%) and Koilnychia (16%). Conjunctival xerosis was found to be very common among younger children group and Bitot's spot was more common in older children. Magnitude of Anaemia also shows the health status of children. The findings revealed a poor health status of preschool children in the study area. There is also a need of proper food availability, clean & fresh water and hygiene and sanitation. There is a urgent need for health counselling of the mother/ caretaker to improve the health status of rural preschool children.

**Keywords:** *Clinical assessment; pre-school children; Protein-Energy Malnutrition (PEM); vitamins deficiency; fluorosis; anemia; immunization.*

## 1. INTRODUCTION

Malnutrition in India has become a situation that haunts the lives of millions of children. Among the 472 million children (2011 census), a whopping 97 million are anaemic and undernourished. For children five years or younger, close to 40% (actually 38.7%) are stunted (below normal height for the age), 19.8% are wasted (underweight and short) and 42.4% are underweight.

Malnutrition is one of the major public health problems in most of the developing countries, including India. More than 45% of deaths in 0-5 years of children are associated with malnutrition. In the country, the highest percentage of the child population was found in Bihar (40.8%) and Uttar Pradesh (40.1%). Nearly two out of three pre-school children in India are malnourished [1].

India has the highest population in the world and pre-school children (1-6 years) undoubtedly are the most crucial segment of our population. Malnutrition is one of the major health problems in children [2]. Clinical examination is an important indicator which reveals nutritional deficiency sign for the assessment of the nutritional status of communities [3]. Assessment of the nutritional status of the community is one of the first steps in the formation of any public health strategy to combat malnutrition [4]. Gupta and Bhandari [5] found, in order of occurrence, Vitamin A deficiency as first, second and B complex deficiency as a third. Among the Vitamin A deficiency sign, xerosis was more prevalent than Bitot's spot and phrynoderma while in case of Vitamin B complex deficiency sign, Angular stomatitis was more common. Kumar et al. [6] studied clinical signs of nutritional deficiency diseases among children and reported Anaemia

is the most common followed by PEM, Vitamin A and B deficiency. They also reported that the prevalence of malnutrition showed a significant increase [7] with an increase in the age of children and was highest in children between 3-4 years. Approximately 48.7 per cent of children were identified as children at risk.

Specific nutrient deficiencies may cause symptoms such as vitamin B12 (Cyanocobalamin) deficiency can lead to tingling, numbness, and burning in the hands and feet (due to nerve damage); a lack of vitamin A may cause night blindness and increased sensitivity to light; and a lack of vitamin D can cause bone pain, osteomalacia or malformation. The severity of symptoms depends on the intensity and duration of the deficiency of nutrition in the body. Some changes, such as to bone and nerves, may be irreversible.

Undernutrition is a critical determinant of mortality and morbidity in young children worldwide and it is associated with 45 per cent of all deaths in children under five years of age. The major forms of malnutrition are kwashiorkor (edematous) and marasmus (wasting) with or without associated stunting. Assessment of the nutritional status of community clinical examination is one of the first steps in the formation of any public health strategy to overcome malnutrition. In a view to know the nutritional deficiency among the rural children, the present study was conducted to assess the clinical status of preschool children of Auraiya district of Uttar Pradesh.

## 2. RESEARCH METHODS

In the present study preschool children were selected randomly from 5 villages



**Fig. 1. Physical examination of selected children**

(Parwaha, Sigampur, Kutubpur, Khanpur and Banke purwa) of Bhagyanagar block of Auraiya district of Uttar Pradesh in 2016-17. The 20 children were selected from each village under two age groups viz., 1-3 years and 4-6 years. Thus the study involved a total of 100 preschool children. Structured and pre-coded interview schedule was designed based on objectives. Mother/ caretaker of the children was purposely selected for interview to know the information regarding the present study. The clinical deficiencies were examined by the general appearance of the children. Immunization status was recorded based on the card provided by the hospital / ASHA worker Fig. 1.

**Age distribution of children:** Table 1 reveals that 58 children fall between 1-3 years of age while 42 children came under the 4-6 year of age were clinically assessed in the present study.

### 3.1 Physical Examination

Physical examination results are as presented in Tables 2-6. It was found that based on their general appearance, 54 per cent were normal and 45 per cent were thin and obese 1% in a different village of Bhagyanagar Block of Auraiya district.

**Table 1. Age-wise distribution of the children**

S.no.	Age( years)	No. of pre-school children (n=100)
1	1-3	58
2	4-6	42

### 3. RESEARCH FINDINGS AND DISCUSSION

The results of the study were discussed as follows.

### 3.2 Mother/Care Taker Interview

The World Health Organization estimates that 50 percent of malnutrition is associated with repeated diarrhea or intestinal worm infections from unsafe water or poor sanitation or hygiene. Many organizations have adopted an integrated approach to improve water, sanitation and hygiene, known as WASH programs.

**Table 2. Toilet availability in home**

Sample	Yes	No
1 -3 year	49	9
4 - 6 year	31	11
Total	80	20

**Table 3. Drinking water availability**

Sample	Hand pump	Home supply	Well
1 -3 year	50	8	-
4 -6 year	41	1	-
Total	91	9	-

Breastfeeding is the normal way of providing young infants with the nutrients they need for healthy growth and development. Virtually all mothers can breastfeed, provided they have accurate information and the support of their family, the health care system and society at large.

Breastfeeding is recommended up to 6 months of age, with continued breastfeeding along with appropriate complementary foods up to two years of age or beyond.

Malnutrition is a condition that results from eating a diet in which one or more nutrients are either not enough or are too much such that the diet causes health problems.

The best way to prevent malnutrition is to eat a healthy, balanced diet. Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients.

Hair changes related to PEM were more commonly observed among younger children (23%) in comparison with their older children (13%). The most common deficiencies among children were Anemia (44%), Protein-energy malnutrition (43%) and vitamin C deficiency (40%). Also, deficiency of vitamin B (33%) and Vitamin D (16%) was observed but to a lesser extent in Table 1.

Sign of Fluorosis namely mottling of enamel in teeth was observed most of the elder children (4-6 years) ie. 27 per cent as compare to the children belongs the age group of 1-3 years ie, 15 per cent.

**Table 4. Breastfeeding duration of children (In past)**

Sample	Birth to 6 month	Birth to 1 year	Cont. after 1 yr	Never
1 -3 year	18	25	5	10
4 - 6 year	20	12	4	6
Total	38	37	9	16

**Table 5. Complementary feeding starting time of children (In past)**

Sample	After 6 month	After 7 month	After 8 month	After 9 month	After 10 month	After 11 month	After 1 year
1 - 3 year	30	15	-	1	4	-	8
4 - 6 year	33	1	1	-	-	2	5
Total	63	16	1	1	4	2	13

**Table 6. Food groups provide to children**

Sample	Cereal & millets	Legumes & pulses	Green Veg / GLVs	Milk & Milk products	Egg /Poultry/ Meat	Fruits	Fat / Oil seeds / Nuts
1 - 3 year	58	50	50	48	12	18	40
4 - 6 year	42	32	38	20	6	10	27
Total	100	82	88	68	18	28	67

Table 7. Incidence of clinical deficiencies and excesses

S.no.	Clinical signs	Preschool children		
		1-3 years (n=58)	4-6 years (n=42)	Total (n=100)
<b>A</b>	<b>General appearance</b>			
i	Normal	31	23	54
ii	thin	27	18	45
iii	Obese	00	01	01
<b>B</b>	<b>PEM</b>			
I	Absent	35	22	57
ii	Present	23	20	43
iii	Hair changes	15	13	28
iv	Marasmus	04	03	07
V	Odema	01	02	03
vi	Moonface	03	02	05
<b>C</b>	<b>Anaemia</b>			
i	Absent	34	22	56
ii	Present	24	20	44
iii	Pale conjunctiva	15	13	28
iv	Koilonychia	09	07	16
<b>D</b>	<b>Vitamin A deficiency</b>			
i	Absent	57	37	91
ii	Present	00	05	05
iii	Night blindness	00	00	00
iv	Bitot's Spot	01	02	03
v	Conjunctival xerosis	01	03	04
<b>E</b>	<b>Vitamin B deficiency</b>			
I	Absent	47	20	67
ii	Present	11	22	33
iii	Angular stomatitis	02	07	09
iv	Magenta tongue	01	03	04
v	Dermatitis	08	12	20
<b>F</b>	<b>Vitamin D deficiency</b>			
i	Absent	51	33	84
ii	Present	07	09	16
iii	Knock knee and Bowleg	01	02	03
iv	Pigeon chest	03	04	07
v	Breeding of ribs	03	03	06
<b>G</b>	<b>Vitamin C deficiency</b>			
i	Absent	42	18	60
ii	Present	16	24	40
iii	Bleeding of gums	14	16	30
iv	Spongy gums	02	08	10
<b>H</b>	<b>Fluorosis</b>			
i	Absent	43	15	58
ii	Present	15	27	42
iii	Mottled enamels	15	27	42

Anaemia was observed as pale conjunctiva (28%) and Koilonychia (16%). Conjunctival xerosis being common among younger children and Bitot's spot more in older children. The study was supported by Indu et al. [8] also found that prevalence of nutritional deficiency of Nutritional Anemia 27%, followed by Protein Energy Malnutrition(PEM) 8%. fluorosis 2%, conjunctival

xerosis 1%, Bitot's Spot 1% and Vitamin D 3% among children in Bihar.

The findings are showed the poor health status of preschool children. There is a need for health counselling to the mother/ caretaker to improve the health status of rural preschool children.

Immunization Status of pre School Children: Vaccines have reduced and, in some cases, eliminated many diseases that killed or severely disabled people just a few generations ago. For example, smallpox vaccination eradicated that disease worldwide. In the present study, children were considered to have received immunization if they had received even a single dose of an antigen. As per this criterion, immunization coverage of the children was abysmally low. In the present study, Immunization status was recorded based on the card provided by the hospital / ASHA worker.

It is evident from Table 8, that 69 per cent of the children were immunized whereas 31 per cent of children were not immunized in the rural area. Most of the children immunized at the time of birth (69%) by BCG and Polio. Forty-seven per cent of children were immunized by measles and 41 per cent MMR (15-18 month) whereas very few children (2%) very immunized by Typhoid at the age of two years.

The World Health Organization (WHO) criteria for anemia in children indicate anemia in children as the hemoglobin level <11 g/dl in children below 6 years of age and hemoglobin <12 g/dl in children above 6 years old.

Finger prick blood sampling from each subject was done. Hemoglobin (g/dl) was estimated by acid hematin (Sahlis) method using the hemoglobinometer. Based on the hemoglobin level, the magnitude of anemia were categorized into mild (10 to <11.5 g/dl), moderate (7 to <10 g/dl), and severe (<7 g/dl) anemia.

Mild anemia was present in 30% of children, and only 5 % were severely anemic. Mild anemia was common in both age group children; the reason could be due to worm infestation and inadequate supply of iron rich food in the diet of a growing child. In a study by Mills and Meadows, they found that anemia detection using hemoglobinometer has 85% sensitivity with 94% specificity and recommended as an acceptable tool for the screening of anemia where the prevalence is more than 20%.

**Table 8. Immunization status of pre-school children**

S. no.	Age	Details of immunization Prevents		No. of children
1.		Not immunized		31
2.		immunized		69
A	(At birth)	BCG	TB & bladder cancer	69
		Poliovirus	Polio	69
		HepB	Hepatitis B	34
B	4-6 Week	DTP	Diphtheria, Tetanus & Pertussis	08
		HepB	Hepatitis B	01
		Poliovirus	Polio	08
C	10 Week	Poliovirus	Polio	18
		HepB	Hepatitis B	03
		DTP	Diphtheria, Tetanus & Pertussis	03
D	14 Week	DTP	Diphtheria, Tetanus & Pertussis	00
		HepB	Hepatitis B	00
		Poliovirus	Polio	18
E	06 Month	HepB	Hepatitis B	02
F	9-12	Measles	Measles	47
		Polio	Polio	47
G	15-18 month	MMR	Measles, Mumps, Rubella	41
H	18 month	DTP	Diphtheria, Tetanus & Pertussis	28
		Polio	Hepatitis B	28
i	2 year	Typhoid	Fever, Diarrhoea	02
j	4 year	MMR	Measles, Mumps, Rubella	00
k	5 year	DTP	Hepatitis B	00
		Polio	Polio	12

**Table 9. Magnitude of anaemia**

Magnitude of anaemia	1 to 3 year	4 to 6 year	Total
Mild	18	12	30
Moderate	4	5	9
Severe	2	3	5
Total	24	20	44

#### 4. CONCLUSIONS

India has the highest population in the world and pre-school children (1-6 years) undoubtedly are the most crucial segment of our population. On the basis of general appearance it was reported that 54 per cent of the children were normal in terms of body weight and 45 per cent were thin and 1% were obese from the village of Bhagyanagar Block of Auraiya district. And improper food supply to children represents a major threat to the health and development of populations.

A lack of toilets further exacerbates the problem as feces on the ground contribute to contaminated drinking water and water resources.

The findings showed that there is prevalence of poor health status in preschool children. There is a urgent need for health counselling to the mother/caretaker to improve the health status of rural preschool children and need to improve hygiene and sanitation.

#### ETHICAL APPROVAL

As per international standard or university standard ethical approval has been collected and preserved by the authors.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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