

## Original Article

### Assessment of Micronutrient deficiency in School Children- A Clinical Study

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#### ABSTRACT:

**Background:** Micronutrients are needed in minute amounts. They are required in the production of enzymes, hormones and other substances. The present study was conducted in the department of Pediatrics to assess micronutrients deficiency in school children. **Materials & Methods:** It included 540 school children of both gender. Height and weight of each children were recorded in case history performa. Blood sample was obtained under standardized aseptic condition. Blood estimation of zinc, copper, Ferritin, folate and vitamin B12, vitamin D, A and C etc. was done. **Results:** Out of 540 children, boys were 210 and girls were 330. The difference was significant (P- 0.05). The mean (SD) of zinc was 68.5µg/dL, copper 0.86 µg/dL, Serum folate 9.4nmol/L, Vit A 0.69 µmol/L, Vit D 72nmol/l, Vit C 11.2 µmol/L, Vit B<sub>12</sub> 148.6pmol/L, Ferritin 13 µg/L, HGB 125g/l and MCV 84.4fl. **Conclusion:** Micronutrients play a necessary role in growth and development of children. Adequate intake is essential to meet normal daily requirement and to prevent developing deficiencies.

**Key words:** Copper, Micronutrients, Zinc

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## INTRODUCTION

Nutrition is required for normal growth of the body. Insufficient nutrition leads to wasting and deficiencies of essential vitamins and minerals. There are numerous nutrients called micronutrients, needed in minute amounts. They are required in the production of enzymes, hormones and other substances. They also help to regulate growth activity, cognitive development and functioning, and the activity of the immune and reproductive system. Besides, micronutrient deficiencies (MD) and especially iron deficiency, is believed to be one of the main underlying causes of anaemia.<sup>1</sup>

Children are more prone to develop deficiency as in today's life the inadequate intake of food is the biggest challenge among mothers. Inadequate dietary intakes, increased losses from the body, and/or increased requirements are the key causes of micronutrient deficiencies. Zinc, iodine, iron, selenium, copper, vitamins A, E, C, D, B2, B6, B12 and folate are important micronutrients. MD play a vital role in children as there appropriate growth and development is require sufficient intake of micronutrients.<sup>2</sup>

MD affects children and pregnant women predominantly. It has been observed that > 2 billion population is suffering

from vitamin A, iodine and zinc deficiency. The deficiency is more in developing countries as they have not adopted community health programme. Recent studies have shown that micronutrient malnutrition is very widespread, probably one of the main nutritional problems in the world and a major contributor to childhood morbidity and mortality.<sup>3</sup> The present study was conducted in the department of Pediatrics to assess micronutrients deficiency in school children.

## MATERIALS & METHODS

The present study was conducted in the department of Pediatrics. It included 540 school children of both gender. School were informed regarding the study and written consent was obtained from parents. Ethical clearance was taken from institutional ethical committee.

General information such as name, age, gender etc was recorded. Height and weight of each children were recorded in case history performa. Blood sample was obtained under standardized aseptic condition. For estimation of zinc and copper, atomic absorption spectroscopy method was used. Ferritin, folate and vitamin B12 were determined by electrochemiluminescence immunoassay, vitamin D by chemiluminescent immunoassay, and vitamins A and C by

high-performance liquid chromatography. Results were square test. P value less than 0.05 was considered tabulated and subjected to statistical analysis using chi significant.

**RESULTS**

**Table I** Distribution of subjects

Total- 540		
Boys	Girls	P value
210	330	0.05

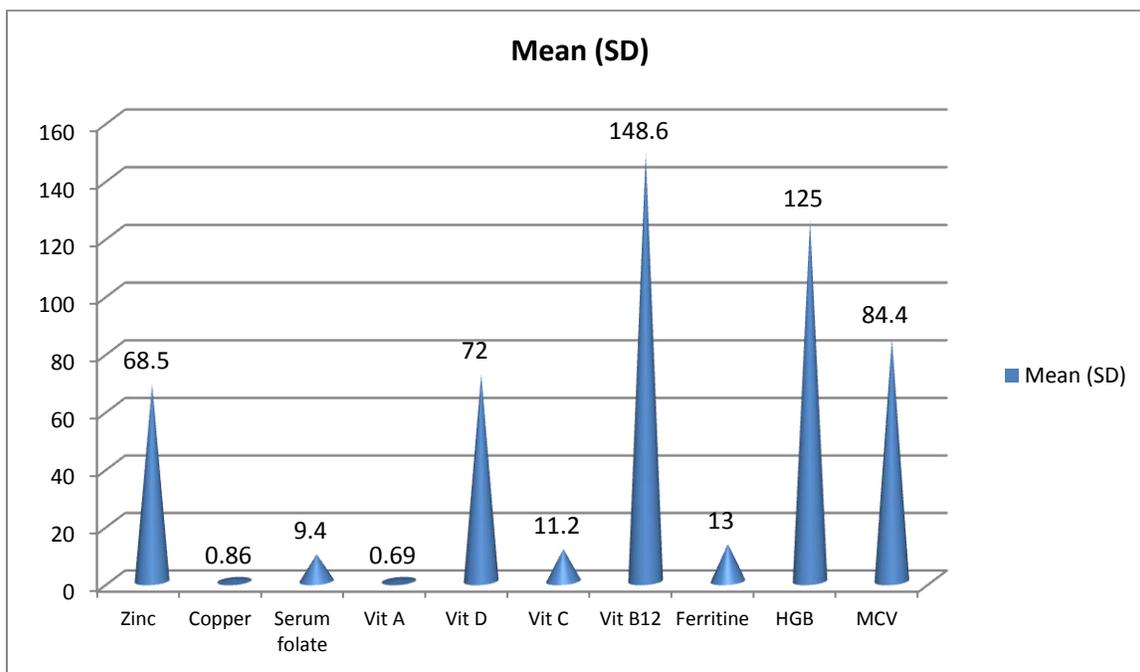
Table I shows that out of 540 children, boys were 210 and girls were 330. The difference was significant (P- 0.05).

**Table II** Normal range of micronutrients

Micronutrient	Cut off value
Zinc	<70µg/dL
Copper	<0.90 µg/dL
Serum folate	<10nmol/L
Vit A	<0.70 µmol/L
Vit D	<75nmol/l
Vit C	11.4 µmol/L
Vit B <sub>12</sub>	<150pmol/L
Ferritine	12-15 µg/L
HGB	118-128g/l
MCV	82-86fl

Table II shows normal value of Zinc (<70µg/dL), copper <0.90 µg/dL, Serum folate (<10nmol/L), Vit A (<0.70 µmol/L), Vit D (<75nmol/l), Vit C (11.4 µmol/L), Vit B<sub>12</sub> (<150pmol/L), Ferritine (12-15 µg/L), HGB (118-128g/l) and MCV (82-86fl).

**Graph I** Value of micronutrients in school children



Graph I shows that mean (SD) of zinc was 68.5µg/dL, copper 0.86 µg/dL, Serum folate 9.4nmol/L, Vit A 0.69 µmol/L, Vit D 72nmol/l, Vit C 11.2 µmol/L, Vit B<sub>12</sub> 148.6pmol/L, Ferritine 13 µg/L, HGB 125g/l and MCV 84.4fl.

## DISCUSSION

Micronutrients are required for normal development of the body. The deficiency of either of these can lead to underdevelopment especially in children. The etiology of anemia include nutritional deficiencies of iron, vitamin B12 and folic acid, but also malaria, intestinal parasites and some chronic disorders secondary to AIDS and tuberculosis. The development of anaemia in children may be caused by poor diet. Recent study found that the proportion of women having anemia was significantly lower in the palm oil-supplemented group. The benefits of the consumption of these types of oil may be mediated through other key elements, considering that palm oil is a rich source of micronutrients like vitamin A.<sup>4</sup>

In this study, out of 540 children, boys were 210 and girls were 330. We found that mean value of zinc was 68.5µg/dL, copper 0.86 µg/dL, Serum folate 9.4nmol/L, Vit A 0.69 µmol/L, Vit D 72nmol/l, Vit C 11.2 µmol/L, Vit B<sub>12</sub> 148.6pmol/L, Ferritin 13 µg/L, HGB 125g/l and MCV 84.4fl. Micronutrient deficiencies and infectious diseases often coexist and exhibit complex interactions. Several micronutrients have immunomodulating functions and thus influence the susceptibility of a host to infectious diseases and the course and outcome of such diseases. Moreover, changes in levels of acute phase proteins such as C - reactive protein (CRP) are associated with increased plasma levels of some micronutrients, such as ferritin, and decrease of others, such as retinol.<sup>5</sup>

In areas with vitamin A deficiency, it is recommended that children aged 6–59 months receive two doses annually. In many countries, vitamin A supplementation is combined with immunization and campaign-style health events. Global vitamin A supplementation efforts have targeted 103 priority countries. In 1999, 16 per cent of children in these countries received two annual doses of vitamin A.<sup>6</sup> By 2007, the rate increased to 62 per cent. Various deficiencies has been observed such as iron deficiency, iodine Deficiency, vitamin D deficiency, vitamin B12 deficiency, calcium deficiency, vitamin A deficiency, magnesium deficiency. The significance of micronutrients is well documented by Alen et al.<sup>7</sup> Zinc deficiency is defined as a serum zinc level below the normal range. Common symptoms include increased rates of diarrhea, pneumonia, and malaria. The deficiency in copper can cause myelodysplasia, anemia, low white blood cell count, and low count of neutrophils.

Vitamin A deficiency (VAD) or hypovitaminosis A leads to nyctalopia (night blindness) is one of the first signs of VAD. Xerophthalmia, keratomalacia, and complete blindness can also occur since vitamin A has a major role in phototransduction.<sup>8</sup>

## CONCLUSION

Micronutrients play a necessary role in growth and development of children. Adequate intake is essential to meet normal daily requirement and to prevent developing deficiencies.

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