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Original Research Article

Assessment of Nutritional Deficiencies Among Paediatric Subjects of Known Population

Shivaji Ramchandra Karad

Assistant Professor, Department of Community Medicine,
Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh, India.

ABSTRACT

Background: In India, malnutrition is in a state of silent emergency and thereby demands greater priority than ever before. Approximately half of all the new-borns are malnourished, whereas almost thirty per cent are born underweight making them more vulnerable to further malnutrition and diseases. Hence; we planned the present study to evaluate various factors associated with nutritional deficiencies in paediatric subjects of primary school.

Materials & Methods: The present study included assessment of nutritional deficiency status of primary school children. A total of 5 schools were selected for the present study and by random sampling, a total of 42 students were selected from each school. All the students were grouped into various groups depending upon the age of the subjects. All the details of the students were taken from the record rooms of the schools. Complete anthropometric details of all the subjects were noted along with nutritional status. Based on the parameters previously given in the literature, provisional diagnosis of vitamin deficiency and anemia was given in the subjects.

Results: 210 school-going subjects were included. Among them, 40 subejcts were of 7 to 8 years of age. Normal height was present in 189 students. Vitamin deficiency was observed in 34 subjects while anemia was detected in 38 subjects.

Conclusion: Proper periodic check-up of all the subjects should be done as considerable number of paediatric subjects are affected by nutritional deficiencies.

Key words: Deficiency, Nutritional, Paediatric.

***Correspondence to:**

Dr. Shivaji Ramchandra Karad
Assistant Professor,
Department of Community Medicine,
Rajshree Medical Research Institute & Hospital,
Bareilly, Uttar Pradesh, India.

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INTRODUCTION

Substantial progress has been in the field of nutrition and diet, ever since India has gained independence. In India, approximately 19 per cent of world's children live. India is a home to more than one billion people, of which 42 per cent are children.[1,2] More broadly, malnutrition in India is in a state of silent emergency and thereby demands greater priority than ever before. The nutritional status of population is therefore critical to the development and well-being of the nation. School going children of different age groups form a vulnerable population, where studies in respect of nutritional deficiencies, could be easily carried with respect to the income groups of the parents.[3,4] In India, approximately half of all the new-borns are malnourished, whereas almost thirty percent are born underweight making them more vulnerable to further malnutrition and diseases.[5,6] Under the light of above data, we planned the present study to evaluate various factors associated with nutritional deficiencies in paediatric subjects of primary school.

MATERIALS & METHODS

The present study was conducted in the department of community medicine Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh (India) and included assessment of nutritional deficiency status of primary school children. Ethical approval was taken from institutional ethical committee and written consent was obtained from guardians of all the subjects after explaining in detail the entire research protocol. All the children belonged to age group of 7 years to 11 years. All the students were grouped into various groups depending upon the age of the subjects. All the details of the students were taken from the record rooms of the schools. Complete anthropometric details of all the subjects were noted along with nutritional status. Recording of the body mass index (BMI) of all the subjects was done by calculating the height of the individuals with the help of stadiometer. Height was determined by asking the student to stand erect without wearing shoes. During the measurement of the height of the subjects, care

was taken that the inferior orbital margin of the subject lied parallel to the floor. Firm placement of the machine on the ground was done followed by instructing the subjects to stand on the weighing machine and the weights were recorded in the nearest of 100 grams.

Height and weight were used for measuring the BMI of each subject. Recording of the signs and symptoms of various nutritional disorders in all the subjects was done. Based on the parameters previously given in the literature, provisional diagnosis of vitamin deficiency and anemia was given in the subjects.[7] In subjects who were affected by more than one type of vitamin deficiency, provisional diagnosis of vitamin deficiency was given.

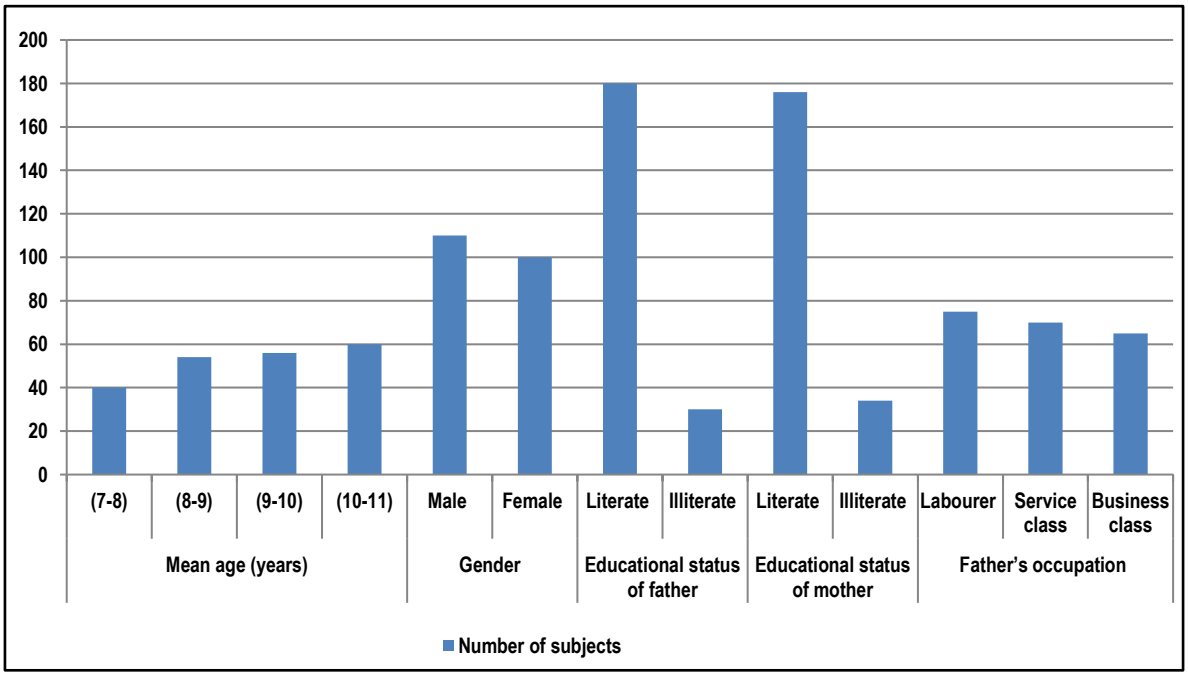
Table 1: Demographic details of the subjects

Parameter		Number of subjects
Mean age (years)	**7- 8**	40
	8- 9	54
	9- 10	56
	10- 11	60
Gender	**Male**	110
	Female	100
Educational status of father	**Literate**	180
	Illiterate	30
Educational status of mother	**Literate**	176
	Illiterate	34
Father's occupation	**Labourer**	75
	Service class	70
	Business class	65

Table 2: Values of various nutritional parameters of all the subjects

Parameter		Number of subjects
Weight	**Under-weight**	35
	Normal- weight	135
	Over-weight	40
Height	**Normal**	189
	Stunted	21
Vitamin deficiency		34
Anemia		38

Graph 1: Descriptive values of demographic details of all the paediatric subjects



RESULTS

In the present study, a total of 210 school going subjects were included. Among them, 40 subjects were of 7 to 8 years of age. Among all the students, 54 and 56 students belonged to the age group of 8 to 9 years and 9 to 10 years respectively (Table 1, Graph 1). Among them, 110 were males and 100 were females. Illiterate parents were present in approximately 15 percent of the cases. 135 students had normal weight while 35 students were under-weight (Table 2). In 40 students, weight was reported to be above the normal limit. Normal height was present in 189 students. Vitamin deficiency was observed in 34 subjects while anemia was detected in 38 subjects.

DISCUSSION

Active growing phase of childhood is School age. Primary school age is a dynamic period of physical growth as well as of mental development of the child. Research indicates that health problems due to miserable nutritional status in primary school-age children are among the most common causes of low school enrolment, high absenteeism, early dropout and unsatisfactory classroom performance.[8-10] Hence, we planned the present study to evaluate various factors associated with nutritional deficiencies in paediatric subjects of primary school.

In the present study, we observed nutritional deficiencies were observed in approximately sixteen percent of the subjects (Table 2). Srivastava A et al analyzed factors associated with malnutrition with the help of a pre-designed and pre-tested questionnaire, anthropometric measurements and clinical examination in school going slum children. The mean height and weight of boys and girls in the study group was lower than the CDC 2000 (Centers for Disease Control and Prevention) standards in all age groups. Regarding nutritional status, prevalence of stunting and underweight was highest in age group 11 yrs to 13 yrs whereas prevalence of wasting was highest in age group 5 yrs to 7 yrs. Except refractive errors all illnesses are more common among girls, but this gender difference is statistically significant only for anemia and rickets. The risk of malnutrition was significantly higher among children living in joint families, children whose mother's education was [less than or equal to] 6th standard and children with working mothers. Most of the school-age slum children in our study had a poor nutritional status. Interventions such as skills-based nutrition education, fortification of food items, effective infection control, training of public healthcare workers and delivery of integrated programs are recommended.[11] Herrador Z et al described the distribution of selected micronutrients and anaemia among school-aged children living in Libo Kemkem and Fogera (Amhara State, Ethiopia), assessing differences by socio-demographic characteristics, health status and dietary habits. A cross-sectional survey was carried out during May–December 2009. Socio-demographic characteristics, health status and dietary habits were collected. Biomarkers were determined for 764 children. Bivariate and multivariable statistical methods were employed to assess micronutrient deficiencies (MD), anaemia, and their association with different factors. More than two thirds of the school-aged children (79.5%) had at least one MD and 40.5% had two or more coexisting micronutrient deficiencies. The most prevalent deficiencies were of zinc (12.5%), folate (13.9%), vit A (29.3%) and vit D (49%). Anaemia occurred in 30.9% of the children. Children living in rural areas were more likely to have vit D insufficiency [OR: 5.9 (3.7–9.5)] but less likely to have folate deficiency [OR: 0.2 (0.1–0.4)] and anaemia [OR: 0.58 (0.35–0.97)]. Splenomegaly was positively associated with folate deficiency and anaemia [OR: 2.77 (1.19–6.48) and 4.91 (2.47–9.75)]. Meat and fish consumption were inversely correlated with zinc and ferritin deficiencies [OR: 0.2 (0.1–0.8) and 0.2 (0.1–0.9)], while oil consumption showed a negative association with anaemia and deficiencies of folate and vitamin A. Serum ferritin levels were inversely correlated to the presence of anaemia ($p<0.005$). There is a high prevalence of vitamin A deficiency and vitamin D insufficiency and a moderate prevalence of zinc and folate deficiencies in school-aged children in this area. The inverse association of anaemia and serum ferritin levels may be due to the presence of infectious diseases in the area. To effectively tackle malnutrition, strategies should target not only isolated micronutrient supplementation but also diet diversification.[12]

Anderson VP et al determined the prevalence of anaemia, as well as iron, zinc, and vitamin A deficiency and their co-existence among stunted children (77 females; 110 males) aged 6-36 mos. Non-fasting morning venipuncture blood samples were taken and analyzed for haemoglobin (Hb), serum ferritin (via IMx system), retinol (via HPLC), and Zn (via AAS), C-reactive protein (CRP) (via turbidimetry) and Hb type (AA, AE, or EE) (via Hb gel electrophoresis). Children with CRP>or=5.0 mg/L (n=34) were excluded. Zinc deficiency defined as serum Zn<9.9 micromol/L had the highest prevalence (73.2%), followed by anaemia (71%) (Hb<110 g/L), and then vitamin A deficiency (28.4%) (serum retinol<0.70 micromol/L). Of the anaemic children, only 21% had iron deficiency anaemia, and 6% had depleted iron stores. Age, log serum ferritin, and Hb type were significant predictors of Hb in the AA and AE children. Serum retinol was unrelated to haemoglobin or serum zinc. The prevalence of two or more micronutrient deficiencies (low Hb, serum retinol, and/or serum zinc) was 44%. Nearly 10% had low values for all three indices, and 18% had just one low value. In conclusion, anaemia, and deficiencies of iron, zinc, and vitamin A are severe public health problems among these stunted Cambodian children. Intervention strategies addressing multiple micronutrient deficiencies are needed.[13]

CONCLUSION

From the above results, the authors concluded that proper periodic check-up of all the subjects should be done as considerable number of paediatric subjects are affected by nutritional deficiencies.

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