Assessment of Nutritional Status and its Determinants among Students of Army Public School, Okara, Pakistan

Salahuddin Bari[1*], Ehsan Qadir [2], Muhammad Adeel[3] and Saad Bahussein[4]

1. POF Hospital, Wah Cantt, Pakistan
2. National University of Medical Sciences, Rawalpindi, Pakistan
3. DHQ Hospital, Layyah, Pakistan
4. Galway University, Ireland

*Correspondence:
drbari70@gmail.com

Significance:

School age is a dynamic period of physical growth as well as of mental development of the child. The nutritional status of school-aged children impacts their health, cognition and subsequently their educational achievement. Children in the age group of 5-14 years are often considered as school-age. Current study focused to assess the prevalence of undernutrition, malnutrition and establishing their relationship with prevailing socio-demographic and environmental factors.

ABSTRACT

Background: Malnutrition is a health problem affecting growth and development of young children. Children under 15 years of age are the main victims of malnutrition. Malnutrition is attributed to a series of diverse etiological factors.

Objective: To determine the nutritional status of the children of various age groups of school going children of Army Public School and to find out the association of socio-demographic variables and dietary habits with nutritional status.

Methodology: It was a descriptive cross-sectional study conducted at Army Public School, Okara. Sample was selected through non-probability consecutive sampling. Duration of study was 6 months (Dec 2017 to May 2018). The study was conducted after getting formal approval from Institutional Ethical Review Board AFPGMI. The children were randomly selected for study from the enrollment register available in the principal's office. Participation in the study was voluntary with guaranteed confidentiality. The participants were given full right to quit study without mentioning reason at any time during data collection. After ruling out the exclusion criteria, 500 children fulfilling inclusion criteria were selected for study. An informed written consent was obtained from all selected children and their parents to take part in the study. Data for the assessment of nutritional status was obtained using anthropometry, biochemical laboratory test and eating habits / food preferences of the children.

Results: In our study, mean age of children included in the study was 9.58±1.72 years. Out of 500 children, 252 (50.2%) were male while 248 (49.8%) female. The mean height of children was 134.88±11.69 cm. The mean weight of children was 30.25±8.47 kg. The mean OFC of children was 51.43±1.75 cm. Out of total 500 children, 85 (17%) were having BMI less than 18.5, 338 (67.6%) were having BMI within 18.5–24.9 while 77 (15.4%) children having BMI within 25-29.9. None of child was observed with BMI of ≥30. Among 85 children with below normal BMI, 63 had mild malnutrition (BMI between 17-18.4), 19 had moderate malnutrition (BMI 16-16.9) while 3 had severe malnutrition (BMI < 16)

Conclusion: Malnutrition is a significant public health problem among preschool and school going children. And improving socio-economic condition along with literacy of mothers and preventing infections through personal hygiene might help in improving the nutritional status of children.

Introduction

The combination of the food, fuel and financial crises coming together is threatening the livelihoods and food security of millions of people in developing countries which has enhanced the interest of researchers in under nutrition. Under nutrition continues to be an important cause of ill-health and premature mortality and morbidity among children. (1) Nutritional deprivation is rampant in children of school age. Since deficient physical growth is naturally reflected in their suboptimal mental achievement, the assessment of nutritional status is essential for making development towards improving overall health of the school age children. (2) Organization plays a chief role in conveying knowledge and prevention of nutritional deficiencies and several other diseases which provides an ideal setting for promoting good health behavior. The most significant period of a student's life is spent at school and colleges and it is here that their lifetime beliefs and habits develop. (3,4) Schools are considered as perfect settings for health promotion among children and school staffs. (5,6) School age is a dynamic period of physical growth as well as of mental development of the child. The nutritional status of school-aged children impacts their health, cognition and subsequently their educational achievement. Children in the age group of 5-14 years are often considered as school-age.

The aim of the study was to assess the prevalence of undernutrition and establishing the relationship

between prevailing socio-demographic and environmental factor and undernourishment of children aged 5-14 years.

Materials and Methods

It was a descriptive cross-sectional study conducted at Army Public School, Okara. Sample was selected through non-probability consecutive sampling. Duration of study was 6 months (December 2017 to May 2018). The study was conducted after getting formal approval from Institutional Ethical Review Board of Armed Forces Postgraduate Medical Institute, National University of Medical Sciences, Rawalpindi. The children were randomly selected for study from the enrollment register available in the principal's office. Participation in the study was voluntary with guaranteed confidentiality. The participants were given full right to quit study without mentioning reason at any time during data collection. Children of both genders aged between 5-14 years, children of both military and civil background studying in Army Public School were included in this study. Children who have received phenytoin treatment for ≥4 weeks in the preceding 6 months period, children with history of congenital diseases including coeliac disease, malabsorption syndrome, down syndrome, developmentally delayed or mentally disabled children, children suffering from chronic illness/infection. (It was assessed by detailed clinical examination, children with disturbed hepatic (Serum ALT≥40U/L, AST≥75U/L, Total Bilirubin≥1.2 mg/dl) or renal (Blood Urea≥40mg/dl, Creatinine≥1.2mg/dl) function were excluded from study. After ruling out the exclusion criteria, 500 children fulfilling inclusion criteria were selected for study. An informed written consent was obtained from all selected children and their parents to take part in the study. Data for the assessment of nutritional status was obtained using anthropometry, biochemical laboratory test and eating habits / food preferences of the children.

Results

The mean age of children included in the study was 9.58±1.72 years. There were 9 (1.8%) children age ranged 5-7 years, 235 (47%) were 8-10 years old, 253 (50.6%) were 11-13 years old while, 3 (0.6%) were ≥ 14 years of age. (Table.1) Out of 500 children, 252 (50.2%) were male while 248 (49.8%) female. In children aged 5-7 years, there were 4 males and 5 females, in aged 8-10 years, 126 males and 109 females, in aged 11-13 years, there were 121 males and 132 females while in aged ≥ 14 years, there was 1 male and 2 female (Table.1). The mean height of

children was 134.88±11.69 cm. The mean weight of children was 30.25±8.47 kg. The mean OFC of children was 51.43±1.75 cm. Out of total 500 children, 85 (17%) were having BMI less than 18.5 (malnourished), 338 (67.6%) were having BMI within 18.5–24.9 (normal BMI) while 77 (15.4%) children having BMI within 25-29.9 (over-weight). None of child was observed with BMI of ≥30. Among 85 children with below normal BMI, 63 had mild malnutrition (BMI between 17-18.4), 19 had moderate malnutrition (BMI 16-16.9) while 3 had severe malnutrition (BMI < 16). Complete blood count was done in all children and level of CBC indicators was ranged normal in all subjects. No child had abnormal value for TLC, RBC, Hb, PCV, MCV, MCH, MCHC, platelets, neutrophils, lymphocytes, monocytes eosinophils. (Table.2)

Table 1: mean age and age wise gender distribution			
Different age groups of children			
Mean Age(years)	Age Group (years)	Frequency	Percent
9.58 ± 1.72	5-7	9	1.8
	8-10	235	47.0
	11-13	253	50.6
	≥ 14	3	0.6
Age wise distribution of gender			

Gender	Age (years)				Total
	5-7	8-10	11-13	≥14	
Male	4	126	121	1	252
Female	5	109	132	2	248
Total	9	235	253	3	500

Association of socio-demographic variables and dietary habits with nutritional status was analyzed through Pearson's correlation coefficient (r). Due to diversity of different occupations, no positive/negative correlation was found between nutritional status of children and father's occupation. There were 63 (12.6%) mothers had less than primary education, 140 (28%) had education from primary to matric while 297 (59.4%) had education above matric. Our study found that mother's educations had positive correlation (r=0.432; p=0.017) with nutritional status of the child. Among 85 malnourished children, 53 (62%) belong to

Table 2: body mass index (BMI) and complete blood count of children				
Body mass index (BMI) of children				
		Frequency	Percent	Nutritional Status
BMI	< 16	3	0.6	Severe cc
	Between 16 – 16.9	19	3.8	Moderate
	Between 17 – 18.4	63	12.6	Mild
	Between 18.5 – 24.9	338	67.6	Normal
	Between 25 – 29.9	77	15.4	Over-weight
	≥ 30	0	0	Obese
Complete blood count				
Parameter	Mean	SD	Minimum	Maximum
TLC	8.51	2.10	3.4	16.3
RBC	4.80	0.47	3.55	8.24
Hb	12.00	0.99	7.7	15.6
PCV	0.36	0.03	0.26	0.49
MCV	77.11	6.22	52	96
MCH	25.16	2.52	14.3	32.7
MCHC	32.62	1.16	27.6	35.2
PLATELET	333.02	71.56	148	712
NEUTROPHIL	50.91	8.33	26	78

Table 3: mother's education status and monthly income of family			
		Frequency	Percent
Mother's Education	Less than five years schooling	63	12.6
	Five to ten years of schooling	140	28.0
	More than ten years of schooling	297	59.4
Correlation with nutritional status (r=0.432; p=0.017) significant			
Monthly income of family			
	Less than Rs. 10,000(64.62$)	4	0.8
	Between Rs. 10,000-20,000(64.62-129.25$)	49	9.8
	Between Rs. 20,000-50,000(129.25-323.12$)	244	48.8
	More than 50,000 (323.12$)	203	40.6
Correlation with nutritional status (r =0.943; p=0.001) significant			

the families having less than 5 years of mother education.

Family income of children under study is mentioned in table 3. Out of 500 children, only 4 children (0.8%) belongs to families having less than Rs.10, 000/month income, and 49 (9.8%) belongs to families having Rs. 10,000-20,000/month income. Our results revealed that there is a strong positive correlation between family income and nutritional status of a child (r =0.943; p=0.001). No child w found malnourished among the families having income > Rs. 50,000/month while only 32 (38%) malnourished children out of total 85 belong to the families having income between Rs. 20,000-50,000/month. Rest of 53 (62%) malnourished children were belongs to the families having monthly income less than Rs. 20,000/month.

Food preferences of children for intake of different types of food at various timings are observed. Our analysis revealed that about 30.2% children were taking bread and egg while 38.8% were taking egg with paratha in breakfast. Similarly, about 45.2% children were taking sandwich while 18.4% were taking different food items in lunch break, about 95.6% children take whatever cooked at home in the lunch. There were about 45.6% children who were taking nothing in evening snacks while 31.4% preferred to take snacks and chips and 16.4% take cookies with tea. There were about 93.2% children who were taking dinner same as lunch. There were about 49.6% children take milk only while 49.8% take nothing in midnight snacks. We observed positive correlation (r=0.312; p=0.037) between malnourishment and skipping of meal. Out of 85 malnourished children, 47 (9.4%) were those who were frequently skipping meals either lunch or dinner. These differences were found to be statistically insignificant. (Supplementary table S1 and S2)

Discussion

Pakistan is facing a "double burden of disease" where undernutrition coexists with overweight and related chronic diseases. 22% and 37% obesity rates have

been found in rural Pakistani men and women respectively. 41% Pakistani women were expected to become overweight by 2015. Being overweight is related to several co-morbidities; cardiovascular disease, type 2 diabetes, certain cancers, osteoarthritis, and gall bladder disease, all of which seriously inflict on the quality of life. More than one-half of the 9.7 million child deaths worldwide are linked to undernutrition. Malnutrition alone not only kills, but also exacerbates the burden of infectious diseases. World Health Organization in 2002 estimated that more than 3.7 million deaths could be attributed to underweight. Since deaths from under nutrition occur among young children, the loss of healthy life years is even more substantial. (7,8)

Our results revealed that there is a strong positive correlation between family income and nutritional status of a child (r=0.943; p=0.001). Across the developing world, children from the poorest household are twice as likely to be underweight as children from the richest household. The disparity is more dramatic in regions with a high prevalence of underweight children. This is the situation in southern Asia, where as many as 60 % of the children in the poorest families are underweight, compared to about 25 % in the richest households. (9)

In Pakistan, 38% children of below five years of age are undernourished and 14% are wasted yearly (WHO). The prevalence of stunting appears to be associated with the overall level of development of the provinces, lowest in Punjab and highest in Baluchistan. Ifrah MH, et al reported that anthropometric deficits are systematically higher in rural areas probably due to the lower socioeconomic condition and to very poor access to fundamental health services. Malnutrition is responsible as underlying factor for 55% of deaths in children under 5 years of age. Ifrah MH, et al reported after an exploratory survey in slums of Lahore, Pakistan that father education, health of child at time of birth, breast feeding, starvation, and sanitary condition of environment are the major risk factor contributing toward malnutrition Non-breastfeeding children have 11.

double the risk of developing malnutrition. (10) This also matches the results of our study.

Conclusion

Undernutrition and malnutrition are significant public health problems among preschool and school going children. And improving socio-economic condition along with literacy of mothers and preventing infections through personal hygiene might help in improving the nutritional status of children.

Conflict of interest: Authors do not have any conflict of interest to declare.
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