Review Article

Assessment of Nutritional Status of School Going Girls in Sargodha

Tusneem Kausar*, Asma Naz

Department of Food Science and Nutrition, University of Sargodha, Sargodha, Pakistan

*Corresponding author: Tusneem Kausar, Associate Professor, Institute of Food Science and Nutrition, University of Sargodha, Sargodha 40100, Pakistan, Tel: 92-322-6274773; E-mail: tusneemft@yahoo.com

Abstract

Malnutrition is one of the major public health problems of developing countries. Poor financial status, large family size and poor knowledge about health and nutrition lead towards poor growth and mental development of children. Present study was conducted to assess the nutritional status of school going girls (12-15 years) of Sargodha, Punjab, Pakistan. A total of 200 girls were assessed for nutritional and physical health status by socio-demographic data, anthropometric measurements, clinical assessment and dietary assessment in a cross sectional study. The results depicts that most of the girls were malnourished and belong to poor socio-economic status (74.5%) with uneducated parent. Measurement of BMI revealed a higher number of malnutrition in these girls. The prevalence of underweight was 80% in 12 year, 58% in 13 year, 52% in 14 years old girls. Most of the girls have rough hairs, pale eyes and plaque on teeth.Intake of different fruit groups was below its RDA. It is suggested to plan and launch awareness program regarding balance diet, nutritional status and to introduce nutrient rich recipes for school children.

Introduction

Children are the country's biggest human investment for development. Nutritional status during school age is an important determinant of nutritional and health status in adult life because this is the prime time when body store nutrient for adolescence growth period[1]. Nutritional status is the condition of an individual's health affected by intake of nutrient and their utilization in the body. Diets deficient in protein/calorie in children results in underweight, lowered resistance toinfection, wasting, stunted growth and also affect learning and cognitive development[2]. In developing countries, mortality rate in children are high and one of the reasons is under nutrition. Health of children depends of food consumption which provides energy and nutrients for growth and development both physically and mentally[3,4]. Thus, understanding of the nutritional status of children is important for better development. Most of the child health programs are planned and focus on children under five and age groups (5-15 years) remain neglected or over looked by policy makers and program managers[5].

In Pakistan, 43.7% children are stunted and 15% suffer from wasting according to National Nutritional Survey[6]. It was observed greater family size, low income of families and illiterate mother are directly related to malnutrition in children in Pakistan[7]. Socioeconomic status also contributes in nutritional life of children especially in their school going phase[8]. Nutritional and health assessment of children by anthropometric examination is an important and mandatory tool in any research. For this body weight, circumference of arm and calf, height, skin fold of children are used to define their status. Nutritional and health status of children also depict family's socioeconomic status and wellbeing of the community[9,10].

Therefore, it becomes very important to know the nutritional status of the most important segment of the society, the building blocks of country and hence present study was carried out to assess the nutritional status of school going children using anthropometric status, clinical assessment and dietary assessment in Sargodha District, Pakistan. Furthermore, their dietary intake was also assessed by Food Frequency Questionnaires (FFQ).

Materials and Methods

A cross-sectional study design was used to assess nutritional health status of school going girls of Sargodha, Pakistan. Girls of 12-15 years were included in this study and those who are seriously ill and unwilling for anthropometric measurement were

excluded from the study. Ethical approval was obtained from competent authorities of Institute of Food Science and Nutrition, University of Sargodha, Sargodha, Pakistan. Parents/guardians/caregivers of study objects were informed about the study objectives and gave informed written consent prior to inclusion in the study.

A questionnaire was used to interview the study participant to elicit information about socio-demographic assessment including parent's education, occupation, family income, family system and number of family members and physical activity level. The nutritional status of school going girls was assessed by anthropometric measurement i.e. height (cm), weight (kg), BMI (kg/m2), mid upper arm circumference (cm) and head circumference (cm).

Clinical signs and symptoms related to the general health were assessed[11]. These clinical examination include general appearance (good, fair, poor), eyes (pale, clear, watery), teeth (clean, cavities, plaque), gums (normal, swollen, bleeding),tongue (clear, reddish, swollen), skin (fresh/glowing, depigmentation, pimples), nails (normal, cracked, brittle), hairs (rough, easily pluck able, shiny), bones (normal, rickets) and thyroid gland (normal, enlarged).

The dietary assessment of school going girls was assessed by Food Frequency Questionnaire (FFQ). Data collected about the food intake was used for assessment of nutrients and daily calories consumed[12].

The data was analyzed statistically by using appropriate statistical tools such as mean, standard deviation and percentage.

Results and Discussion

Socio-demographic assessment

Parent's education is a key determinant towards the good health status of child. In the present study 125 (62.5%) school going girls have their father education up to middle class, 30(15%) girls up to matriculation, 10(5%) girls have their fathers graduated and 35(17.5%) have illiterate fathers. In case of mother's education 132 (66%) girls have their mother educated up to middle, 22 (11%) have matriculation and 46(22%) have illiterate mothers. The illiteracy in the mothers was more than fathers. This may be due to lower, middle socioeconomic status of the under study population area. The results are summarized in Table 1.

It was observed that the 58% of the fathers were doing government job, 6% have their own business, 30% were industry worker and 6% have other occupations like carpenter, painter or laborer. In case of mothers, data revealed that 79% of the mothers were house wives, 6% were involved in government jobs and 15% have other occupations like tailors, maid or servant. Results showed that 78% of the families have income between 5000-10000, 15.5% between 10000-20000 and only 6.5% between 20,000-30,000. The overall income level is very low and this ultimately had a great impact on girl's health status. It was stated that poverty during childhood effect the health in adult life[13].

Number of family members had a great impact on health status. According to survey[14], crowded homes have low cleanliness level which lead to disease. In the present study, 13% girls were found to have 1-5 family members, 68% 5-8 family members and 19% have above 8 family members.In Pakistan,

joint family system is most common. Present study also revealed that about 73% girls have joint family system. In a study[15], it was reported that 54.8% children living in joint family system which lead towards several problems and diseases due to unhygienic conditions and domestic issues.

Table 1 demonstrates that 4% girls have sedentary life style while 9.5% were slightly active, 36.5% were moderately active, 31% were very active, 12.5% were extremely active and 6.5% have some other activity level. Physical activity is actually the movement of the body that utilizes energy. Now-a-days physical activity of children decreased due to video games and television. This trend leads to increase obesity in children[16].

Table 1: Distribution of school going girls according to socio-demographic assessment (n=200)

Socio-demographic parameters	Categories	Distribution	
		Frequency (f)	Percentage (%)
Father's education	Illiterate	35	17.5
	Middle	125	62.5
	Matric	30	15
	Graduation	10	5
Mother's education	Illiterate	46	22
	Middle	132	66
	Matric	22	11
	Graduation	0	0
Father's occupation	Government job	116	58
	Business	12	6
	Industry worker	60	30
	Others	12	6
Mother's occupation	House wife	158	79
	Government job	12	6
	Industry worker	0	0
	Others	30	15
Socio-economic status	Low	149	74.5
	Middle	42	21
	High	9	4.5
Income level	5000-10,000	156	78
	10,000-20,000	31	15.5
	20,000-30,000	13	6.5
Family members	1-5	26	13
	5-8	136	68
	Above 8	38	19
Family system	Joint	146	73
	Nuclear	22	11
	Others	32	16
Physical activity	Sedentary	8	4
	Slightly active	19	9.5
	Moderately active	73	36.5
	Very active	62	31
	Extremely active	25	12.5
	Others	13	6.5

Anthropometric assessment

Table 2 show the mean and standard deviation values of weight, height, BMI, mid-upper arm circumference and head circumference. Majority of the girls from all age group were under weight and also had less mid-upper-arm circumference and head circumference. According to the National Longitudinal Survey in Youth in United States, it is also estimated that the children belonging from poor families have high percentage of underweight and malnourished children[17].

Table 2: Anthropometric assessment of school going girls

Anthropometric parameters	School going girls			
	12 years	13 years	14 years	15 years
Weight (Kg)	37.77±6.37	41.97±9.28	43.42±6.08	48.87±7.28
Height (cm)	152.38±6.86	152.90±7.82	154.22±5.96	156.33±3.55
BMI (Kg/m²)	16.22±2.37	17.93±3.60	18.26±2.39	20.05±3.22
Mid-upper arm circumference (cm)	21.27±2.09	21.59±3.18	22.97±2.82	24.84±2.20
Head circumference	52.70±1.85	53.06±2.06	54.58±1.50	54.40±1.41

BMI classification

Most of the school going children that belong from poor families or low socioeconomic status has poor body mass index status. Table 3 showed that 80% of the 12 year old girls were underweight and only 20% fall under normal category. Similarly, in 13 year old girls, 58% girls were underweight, 36% normal, 4% overweight and 2% obese. At age 14 years, 52% girls were found underweight while at age 15 years, 24% girls were underweight and 76% follow their normal weight. The overall results of anthropometric measurements indicated that majority of the girls were underweight and malnourished. As, majority of the girls belong to low socio-economic status, insufficient diet and poor diet quality lead to poor health status.

Table 3: Percent distribution of girls according to BMI classification

BMI categories	School going girls			
	12 years	13 years	14 years	15 years
Underweight	80	58	52	24
Normal	20	36	48	76
Over weight	0	4	0	0
Obese	0	2	0	0

Clinical signs

Table 4 shows the percentage distribution of the nutritional deficiency signs among school going girls of 12-15 years. Majority of girls were classified as good and fair (40% fair at 12 years of age, 36% fair at 13 year and 60% fair at 15 year), whereas at 14

years of age 50% were poor in their general appearance.

Table 4: Clinical Nutritional Survey Chart of School going Girls

Clinical Signs	Category	Age of School Going Girls			
		12 Years	13 Years	14 Years	15 Years
General appearance	Good	30	20	32	60
	Fair	40	36	18	30
	Poor	30	44	50	10
Hairs	Rough	44	40	30	18
	Easily pluck able	22	38	14	16
	Shiny	34	22	56	66
Skin	Fresh/Glowing	52	50	24	36
	Depigmentation	34	42	44	22
	Pimples	14	8	32	42
Eyes	Pale	54	46	62	24
	Clear	42	54	36	76
	Watery	4	0	2	0
Teeth	Clean	20	16	18	42
	Cavities	34	22	48	26
	Plaque	46	62	34	32
Gums	Normal	66	82	88	94
	Swollen	34	18	12	6
	Bleeding	0	0	0	0
Tongue	Clear	98	96	100	100
	Reddish	2	4	0	0
	Swollen	0	0	0	0
Nails	Normal	62	66	74	82
	Cracked	4	6	12	8
	Brittle	34	28	14	10
Bones	Normal	100	100	100	100
	Rickets	0	0	0	0
Thyroid glands	Normal	100	100	100	100
	Enlarged	0	0	0	0

56% girls at the age of 14 years and 66% at 15 years have normal shiny hairs. At age 12, 44% girls and at 13, 40% girls have rough hairs. 38% girls of 13 year have easily pluck able hairs. Presence of rough and pluck able hair assume that it is due to the deficiency of nutrients. Skin appearance was fresh and glowing in 52 and 50% girls at 12 and 13 years, 44% having pigmentation at 14 years and 42% girls at age 15 years are having pimples. Eyes of the girls were assessed on the categories of pale, clear and watery. 54% girls at 12 year old and 62% girls of 14 years old were having pale eyes. 54% girls at 13 years and 76% girls at 15 years found to have clear eyes. Majority of girls (46% and 62%) at 12 and 13 years have plaque while 48% at 14 years have cavities and 42% girls of 15 years have clean teeth. Presence of plague and cavities can be related to calcium deficiency and poor dental care. Gums were observed normal in most of the girls. Only 34% girls at the age of 12 years show 34% swollen gums. Tongue of girls was assessed as clear, red-

dish and swollen. Almost all the girls were found to have clear tongue. School going girls have 62, 66, 74 and 82% normal nails at 12-15 years of age respectively. Brittle nails were found in 34% girls at 12 years and 28% girls at 13 years of age. None of the girl was discovered with rickets. All the girls are having normal bones. Thyroid glands were also found normal in all girls under study. None of them have enlarged thyroid glands.

Dietary intake

Table 5 show the values of different food group i.e. cereals or legumes, fruits or vegetables, meat or poultry, milk or dairy consumed by school going girls. Majority of girls had inadequate dietary intake and take less than the recommended dietary intake (RDA). In Pakistan, diet of people with low socio-economic status comprised of cereals. Fruits, meat and dairy product are unaffordable. It affects the quality of diet resulting in underweight children. Increased in intake of fats and was found by increasing the trend of fast food.

Table 5: Distribution of school going girls according to food group intake

Food Group		School going girls			
		12 years	13 Years	14 Years	15 Years
Cereals/ Legumes	Consumption	122.18±8.60	129.74±4.83	130.80±4.18	154.82±9.48
	RDA	300	320	340	360
	Deficiency	178	191	210	206
Fruits and vegetables	Consumption	57.62±11.84	51.25±5.84	55.00±7.97	67.22±6.28
	RDA	240	270	290	310
	Deficiency	183	219	235	243
Meat/ poultry	Consumption	37.18±5.00	43.34±5.98	46.98±5.14	45.90±4.82
	RDA	53	55	57	63
	Deficiency	16	12	11	18
Dairy/ Milk	Consumption	105.08±33.49	126.82±54.83	136.34±43.84	135.50±33.00
	RDA	450	470	490	500
	Deficiency	345	344	354	365
Fats/Oils	Consumption	21.20±3.21	25.60±4.25	26.00±3.19	23.20±2.23
	RDA	20	23	25	27
	Deficiency	-1	-2	-1	4

Dietary Assessment

Table 6 shows the dietary assessment of girls. According to a survey[18], children who take breakfast daily have high nutritional profile, better cognitive development and showed better academic performance and the children who skip breakfast had impair mental development and likely to be overweight. In present study, 65.5% girls always take their breakfast. According to dietary assessment, 71.5% take mid-morning snack, 93.5% always ate lunch and 55.5% always ate dinner. Skipping of lunch can affect the physical health status of children. The excessive consumption of tea inhibited the absorption of non-haem iron and lead to anemia. Skipping of dinner can affect mental and skeletal development in children[19].

Table 6: Food intake pattern of school going girls

Meal	Distribution	Eating pattern			
		Always	Sometimes	Rarely	Never
Breakfast	Frequency (*f*)	131	43	17	9
	Percentage (%)	65.5	21.5	8.5	4.5
Mid-morning snack	Frequency (*f*)	143	33	13	11
	Percentage (%)	71.5	16.5	6.5	5.5
Lunch	Frequency (*f*)	187	9	4	0
	Percentage (%)	93.5	4.5	2	0
Mid-evening tea	Frequency (*f*)	67	44	21	68
	Percentage (%)	33.5	22	10.5	34
Dinner	Frequency (*f*)	111	43	27	19
	Percentage (%)	55.5	21.5	13.5	9.5

References

1. Kumari, S., Jain, R. Assessment of school children from rural Bihar.(2005) Ind J Nutr Dietet 42: 326-334.
   Pubmed | Crossref | Others

2. Gowri, A.R., Sangunam, H.J. Assessment of mental and motor abilities of school going children with anemia. (2005) Ind J NutrDietet: 42: 99-105.
   Pubmed | Crossref | Others

3. Thatcher, R.W. Maturation of the human frontal lobes. Physiological evidence for taging. (1998) Dev Neuropsychol 7: 397-419.
   Pubmed | Crossref | Others

4. Amerithaveni, M., Barikor, C.W. Nutritional status of Meghalayan pre-school children. (2002) Ind J Nutr Dietet: 32: 262.
   Pubmed | Crossref | Others

5. Bundy, D.A.P., Guyatt, H.L. The health of school age children: Report of a workshop Parasitology. (2005)Today: 11: 166-167.
   Pubmed | Crossref | Others

6. Bhutta, Z., Soofi, S., Zaidi, S., et al. Pakistan National Nutritional Survey. (2011)
   Pubmed | Crossref | Others

7. Shah, S.M., Selwyn, B.J., Luby, S., et al. Prevalence and correlates of stunting among children in rural Pakistan. (2003) Pediatr Int 45(3): 49-53.
   Pubmed | Crossref | Others

8. Iram, U., Butt, S.M. Understanding the health and nutritional status of children in Pakistan: a study of the interaction of socioeconomic and environmental factors. (2006) Int J Social Eco 33 (2): 111-131.
   Pubmed | Crossref | Others

9. Ahmed, I.F., Gilani, A.H. Effect of protein energy malnutrition on serum protein levels in school boys. (1998) Pak J Med Res: 27: 192-195.
   Pubmed | Crossref | Others

10. Wahab, N., Paracha, P.I., Hussain. T., et al. Prevalence of malnutrition in male school children in a rural area of district Peshawar: a study of demographic and socio-economic characteristics. (1993) Pak J Med Res 32: 192-196.
    Pubmed | Crossref | Others

11. Monika, A., Santosh, A., Veenu, N. Nutritional health status of primary school children: a study in Bareilly district. (2011) Ind Educ Rev: 48(1): 33-39.
    Pubmed | Crossref | Others

12. Gibson, R.S. Principles of nutritional assessment. (2005) 2nd Ed. Oxford University Press, New York.
    Pubmed | Crossref | Others

13. Gupta, R.P., de Wit, M.L., McKeowon, D. The impact of poverty on the current and future health status of children. (2007) Paediatr Child Health: 12 (8): 667-672.
    Pubmed | Crossref | Others

14. Hatton, T.J., Martin, R.M. The effects on stature of poverty, family size, and birth order: British children in the 1930s". (2010) Oxford Econ Paper 62(1): 157-184.
    Pubmed | Crossref | Others

15. Kaushik, A., Richa, Mishra C.P., et al. Nutritional status of rural primary school children and their socio-demographic co-relates: A cross-sectional study from Varanasi. (2012) Ind J Comm Health: 24(4): 35-39.
    Pubmed | Crossref | Others

16. Bowman, S.A., Gortmaker, S.L., Ebbeling, C.B., et al. Effects of fast food consumption on energy intake and diet quality among children in a national household survey. (2004) Pediatrics 113(1): 112-118.
    Pubmed | Crossref | Others

17. Miller, J.E., Korenman, S. Poverty and children's Nutritional Status in the United States. (1994) Am J Epidemol 140(3): 233-243.
    Pubmed | Crossref | Others

18. Rampersaud, G.C., Pereira, M.A., Girard, B.L. et al. Breakfast habits, nutritional status, body weight and academic performance in children and adolescents. (2005) J Am Diet Assoc 105(5): 743-760.
    Pubmed | Crossref | Others

19. Washi, S.A., Ageib, M.B. Poor diet quality and food habits are related to impaired nutritional status in 13-18 year old adolescents in Jeddah. (2010) Nutr Res 30(8): 527-534.
    Pubmed | Crossref | Others