Comparison of Nutritional Status among 2-5 years Children between an Urban and a Rural area of Bangladesh

Sakina Akther, Safi Rezawana, Fatema Khatun, Sabina Sultana[1]
and AMM Mokarram Hossain[2*]

College of Home Economics[1] and
Institute of Nutrition and Food Science, University of Dhaka, Dhaka[2]

Abstract

A cross sectional comparative study was conducted to observe the nutritional status of children of age range from 2 to 5 years in an urban and a rural area of Bangladesh. The study was conducted on 400 children dividing 200 in rural area and 200 in urban area. The objectives of the study were to identify the clinical status in relation to anemia, vitamin A deficiency (Night blindness, Bitotspot), vitamin B deficiency (Cheilosis, Glossitis, Angular Stomatitis), scabies, dental caries, otitis media, upper respiratory tract infection (U.R.T.I.), Urinary Tract Infection (U.T.I.) and Enlargement of thyroid gland. Special attention was given to observe the anthropometric measurements. Nutritional status of children was assessed by using Z score, mid arm circumference and skin fold thickness. To assess the growth performance, we used three indicators-weight for age Z score (WAZ), height for age Z score (HAZ) and weight for height Z score (WHZ) and compared them between urban and rural area. The other objectives were to assess the bio-chemical parameters of children in terms of hemoglobin level in blood, parasitological presence of Ascaris Lumbricoides (AL), Ancylostoma Duodenale (AD) and Trichuris Trichura (TT) in stool.

According to skin fold thickness, the mean biceps of urban children were different than that of rural children, with established significant test. The triceps (Urban 7.76 ± 2.29, Rural 8.50 ± 5.80) and sub scapula (Urban 7.00 ± 2.89, Rural 6.57 ± 3.66) measurements of children in urban and rural areas were not significantly different. Again 92.5% children were found normal and 7.5% were moderately under nutrition in respect of MAC measurements. Dental caries, vitamin deficiency and otitis media were seen among a large number of children in urban and rural areas. Flaky hair, enlargement of thyroid gland, Bow-legs were seen only among rural children.

The results of the present study revealed that in urban area 49.0% and in rural area 49.5% children were anemic (Hb level ≤ 11 gm/dl). The AL, TT and AD presence in stool of children were not significantly different between urban and rural areas.

Key words: Nutritional status, Anthropometry, Skin fold thickness, Mid arm circumference (MAC), Clinical examination, Hemoglobin level, Ancylostoma Duodenale (AD), Ascaris Lumbricoids (AL), Trichuris Trichura (TT).

* Author for Correspondence

Introduction

In Bangladesh, widespread malnutrition throughout the country is a significant public health problem which hinders the national development. Under 5 years children are the worst victims of hunger and malnutrition and this situation is mainly attributed to poverty, ignorance, superstition and other social factors as revealed by national nutrition suveys[1,2,3]. Malnutrition, specially in children, is largely by product of insufficient education, lack of knowledge regarding the nutritive value of foods, inadequate sanitary environment, large family size, etc. These factors bear effects directly or indirectly on the quality of life and are the true determinants of malnutrition in the society. They have made the malnutrition problem more difficult. In short, the causes of malnutrition are found into the very deep of society, in the socio-economic and political structures both nationally and internationally[4]. In Bangladesh infants, smaller at birth, are suffering from malnutrition, die more readily, and mortality in infants and children are inversely related to socio-economic status. The growth and development of the children continues to be a major public health problem in Bangladesh[5], and the problem is directly or indirectly related to high child mortality in our country[6]. The interaction of malnutrition and infection is also well recognised[7]. The adverse environmental conditions exist in our country, which results in an increased under nutrition in under two to five years children. The current study will reveal the comparative nutritional status of children of 2-5 years of age between an urban and a rural area.

Materials and methods:

This is a cross sectional comparative study. The study was carried out at Shadhapur village of Savar, which is 30 k.m. from the Dhaka city. The village is 5 k.m. from Savar Upazila. The urban area was situated near the center of Dhaka city, at BUET campus. The study was done between June 2003 to November 2003. The study populations were 200 children in rural area and 200 children in urban area. They were of both sexes with a age range from 2 to 5 years and were selected from each family.

The questionnaire was formulated, pretested, modified and finalized in accordance with the study objectives and suitability. The respondents' responses were recorded on questionnaires by interviewing. For assessing malnutrition, combined anthropometric measurements such as weight for age (W/A), height for age (H/A) and weight for height (W/H) were computed using Z – score[8]. Cyanmethemoglobin methods[9] was used to observe hemoglobin level of children. Normal saline solution procedure[9] was used to observe worm infestation of the children. Skin fold thickness and Mid arm circumference were also assessed. Data were analyzed, tabulated, compared and different tests of significance were done where necessary. Statistical difference was tested at 5% level of significance.

Results

Table 1. Nutritional status of the children according to Z-score classification by sex and location.

Nutritional indicators	Location	Sex	N	Mean	Std. Deviation
WAZ	Urban	Male	90	-0.8760	1.5305
		Female	110	-1.2016	1.3860
		Total	200	-1.0551	1.4582
	Rural	Male	88	-1.9027	1.4562
		Female	112	-2.0018	1.2058
		Total	200	-1.9582	1.3193
	Total	Male	178	-1.3836	1.5764
		Female	222	-1.6053	1.3559
		Total	400	-1.5067	1.4604
HAZ	Urban	Male	90	-0.2709	1.7066
		Female	110	-0.6571	1.4972
		Total	200	-0.4833	1.6024
	Rural	Male	88	-0.7220	1.5061
		Female	112	-0.8396	1.5732
		Total	200	-0.7879	1.5413
	Total	Male	178	-0.4939	16219
		Female	222	-0.7492	1.5353
		Total	400	-0.6356	1.5775
WHZ	Urban	Male	90	-0.8067	1.5842
		Female	110	-0.8864	1.4285
		Total	200	-0.8505	1.4973
	Rural	Male	88	-1.6977	1.2453
		Female	112	-1.7507	1.0643
		Total	200	-1.7274	1.1448
	Total	Male	178	-1.2472	1.4912
		Female	222	-1.3224	1.3278
		Total	400	-1.2889	1.4016

The table 1 shows the growth performance of the children using the indicator WAZ-score, HAZ-score and WHZ-score. The mean weight for age of combined male and female in urban area was -1.0551±1.4582 and that for rural area was -1.9582±1.3193. The mean height for age of combined male and female children in urban and rural area were -0.4833±1.6024 and -0.7879±1.5413 respectively. Table 1 also shows the distribution of children according to weight for height. In urban area the mean weight for height of combined male and female children was -0.8505±1.4973 and in rural area it was -1.7274±1.448.

Table 2. Comparison of Biceps, Triceps and Sub scapula measurements of children by Urban and Rural areas

Variables	Urban		Rural		Sig. (2-tailed)
	No	Mean±SD	No	Mean±SD	
Biceps of child	200	4.89±1.59	200	4.51±1.65	0.02 significant at 5%
Triceps of child	200	7.76±2.29	200	8.50±5.80	0.09 not significant at 5%
Sub scapula of child	200	7.00±2.89	200	6.57±3.66	0.19 not significant at 5%

The mean Biceps of children were 4.89±1.59 in urban area and 4.51±1.65 in rural area. The difference is significant at 5%. On the other hand the measurements of triceps and subscapula of children were not significantly different at 5%.

Table 3. Comparison of Mid arm circumference of children by Urban and Rural areas

MAC Distribution	Number % of Total	Location		Total
		Urban	Rural	
MAC < 13.4	Number	18	12	30
	% of total	4.5%	3.0%	7.5%
MAC ≥ 13.4	Number	182	188	370
	% total	45.5%	47.0%	92.5%
Total	Number	200	200	400
	% of total	50.0%	50.0%	100.0%
Mean±SD	Mean±SD	15.87±1.80	15.25±2.40	
				Significant at 5% level

Table 3. Shows the nutritional status of children by MAC. In urban area 4.5% children and in rural area 3.0% children were moderately unernourished having MAC ≤ 13.4. In urban area 45.5% children and in rural area 47.0% children were normal having MAC ≥ 13.4. The mean MAC of children was 15.87±1.80 in rural area, which is significant at 5% by location.

Table 4. Clinical examination (%) among children by Urban and Rural areas.

Variables	Urban	Rural
Anemia	24.0	39.0
Cheilosis	4.0	11.0
Angular stomatitis	0.0	0.0
Glossitis	1.0	2.0
Night blindness	0.0	0.0
Bitots spot	0.0	0.0
Leg/body swelling (oedema)	0.0	0.0
Bow-leg	0.0	10.0
Enlargements of rib-cartilage junctions	0.0	0.0
Skin disease (scabies)	13.0	17.0
Dermatitis	2.0	4.0
Dental caries	16.0	22.0
Otitis media	0.0	4.0
U.R.T.I	3.0	4.0
Enlargement of thyroid gland	0.0	3.0
Flaky hair	0.0	6.0
U.T.I.	5.0	1.0

The results of clinical signs are presented in table 4. It shows that children were suffering from anemia, the prevalence being 24.0% in urban and 39.0% in rural area. The prevalence of cheilosis in rural area (11.0%) was higher than that of urban area (4.0%). A large number of children were suffering from scabies (13.0% & 17.0%) and dental caries (16.0% & 22.0%) in urban and rural area. The signs of Bow-leg (10%), otitis media (4.0%), enlargement of thyroid gland (3.0%), flaky hair (6.0%) were seen only in rural children.

Table 5. Nutritional status by hemoglobin level of children

Hemoglobin level (gm/dl)	Number, % of Total	Location		Total
		Urban	Rural	
Hb ≤ 11	Number	196	198	394
	% of Total	49.0%	49.5%	98.5%
Hb ≥ 11	Number	4	2	6
	% of Total	1.0%	0.5%	1.5%
Total	Number	200	200	400
	% of Total	50.0%	50.0%	100.0%
Average age (Mean ± SD)		9.47±1.18	7.93±2.19	8.66±1.93

Table 5 shows the percentage of hemoglobin level of children by location. Among 400 children in urban and rural area 98.5% children are anemic [Hb level ≤ 11 (gm/dl)]. In urban area the Hemoglobin (Hb) level of 49.0% children was ≤ 11 (gm/dl) whereas in the rural area the percentage was 49.5%. Normal Hb level (>11gm/dl) was found among 1% of children in urban and 0.5% in rural area.

Table 6. AL, TT, AD in stool of children by Urban and Rural area.

Presence of AL in stool	Count % of column	Urban	Rural	Total
Yes	Count	67	40	107
	% of column	58.8%	45.5%	53.0%
No	Count	47	48	95
	% of column	41.2%	54.5%	47.0%
Total	Count	114	88	202
	% of column	100.0%	100.0%	100.0%
Chi-square=3.02	P=0.08			
Presence of TT in stool	Count % of column	Urban	Rural	Total
Yes	Count	79	54	133
	% of column	68.7%	61.4%	65.5%
No	Count	36	34	70
	% of column	31.3%	38.6%	34.5%
Total	Count	115	88	203
	% of column	100.0%	100.0%	100.0%
Chi-square=0.88	P=0.34			
Presence of AD on stool	Count % of column	Urban	Rural	Total
Yes	Count	11	11	22
	% of column	9.6%	12.5%	10.8%
No	Count	104	77	181
	% of column	90.4%	87.5%	89.2%
Total	Count	115	88	203
	% of column	100.0%	100.0%	100.0%
Chi-square=0.19	P=0.66			

Table 6 shows the distribution of Ascaris Lumbricoides (AL) present in stool of children by urban and rural area. In urban area 58.8% children and 45.5% children in rural area were free from AL infestation. In urban area 68.7% and 61.4% children in rural area were infested with TT. Children, about 31.3% in urban and 38.6% in rural area, were free from TT infestation. In urban area 9.9% children and 12.5% children in rural area were infested with AD. About 90.4% children in urban area and 87.5% in rural area were free from AD infestation.

Discussion:

The study was carried out to assess and to compare the nutritional status of 2 to 5 years of children in an urban and a rural area. In this study investigations were made about their anthropometric measurements. Clinical examinations, determination of hemoglobin level and worm infestation of the children of those areas were also carried out.

Table-1 shows the mean and standard deviation of the anthropometric measurements for children belonging to both sex and both areas. The mean weight for age Z-score (WAZ) is -1.05 in urban and -1.95 in rural area. Jahan and Hossain (1998)[10] in their study reported the mean WAZ value to be –2.13 for urban children and, -2.09 for rural children. The mean height for age Z-score (HAZ) was -0.48 and -0.78 in urban and in rural area respectively. The mean weight for height Z-score was -0.85 in urban and -1.72 in rural area. Jahan and Hossain (1998)[10] found the mean of WHZ in their study to be -1.20 and -1.20 for urban and rural children respectively.

Comparison of skinfold thikness of children is shown in table-2 by location. According to Biceps of children in urban and rural area the difference is significant. The mean Biceps of urban children was 4.89±1.59 and that for rural children was 4.51±1.65. The mean Triceps (P=0.19) and subscapula (P=0.19) measurements of children in both area were not significantly different.

Nutritional status of children was measured by Mid arm circumference (table-3). We have taken > 13.4 cm of MAC as the normal limit though > 13.4 cm is the normal cut off point as advocated on the BBS child Nutrition survey[11]. Less than 13.4 cm MAC has been found for 4.5% and 3.0% of children in urban and rural area respectively. In urban area 45.5% and in rural area 47.0% children were found having > 13.4 cm MAC. These findings are similar to 95-96 survey[10] of rural Bangladesh (Average MAC for male of 0-5 years was 13.7 cm and that for female was 13.5 cm).

Our investigation reveals that many children in urban and rural areas suffer from many nutritional deficiency disorders such as Night blindness, Bitot's spot, Angular stomatitis, Cheiliosis, Skin disease, Dental caries, Otitis media, Goiter, Flaky hair etc. Table-4 shows the kind and extent of nutritional deficiency disorders among urban and rural children. Most of the children in urban and rural areas were clinically anemic. The prevalence rate of skin disease (Scabies) was higher in both urban and rural area (13% and 17%). Kamal (1996)[9] revealed that about 14.7% children in slum area of Dhaka city

had Scabies but Jahan and Hossain (1998)[10] had shown in their study that 5.9% and 2.2% children in urban and rural area respectively suffer from scabies, which did not correspond with our study. Evidence of vitamin `B' deficiency[11] specially Riboflavin deficiency such as Cheilosis, Glossitis and Dermatitis were 4.0%, 1.0% and 2.0% respectively in urban children and 11.0%, 2.0% and 4.0% respectively in rural children. In this study, 0.0% children in urban area and 4.0% children in rural area had Otitis media. Jahan and Hossain (1998)[10] revealed that 0.8% and 1.3% children in urban and rural area had otitis media respectively, which is similar to our study.

As regards blood hemoglobin level, most of the children in both areas were anemic (table-3). Ali, Paramanik, Samad, Razzak, Mustafa, Hussain, and Ataher (1989-90)[12] revealed that 95.02% children were anemic in slum area of Dhaka city, which corresponds to our study.

Young children need iron for their growth[13]. Due to inadequate absorption of iron, during weaning period children are suffering from anemia. In our country most of the supplementary food for the children were of low nutrient content and insufficient to fulfill their demand.

The prevalence of warm infestation in children is shown in table-6. Children in urban and rural area were infested with ascaris lumbricoides (A.L), Trichuris Trichura (T.T) and Ancylostoma Duodenale (A.D), the prevalence being 53.0%, 65.0% and 10.8% respectively. Muttalib (1979)[13] reported that 27.61% of urban children were infested with AL, 14.54% with T.T and 0.26% with A.D.

The present study reveals that nutritional status of children in urban and rural areas are not different and comparable in terms of Anthropometric, Clinical and Bio-chemical indices and we found that the nutritional status of the both areas were below the acceptable level. We need to enhance the nutritional status of the Children in both urban and rural areas to have nutritionally sound children for the benefit of our country.

Conclusion:

In Bangladesh most of the women remain malnourished during different stages of their life. As a result their babies are of low birth weight (LBW) and suffer from many infectious diseases. The infant morbidity and mortality rate is high. Policy makers can resolve the problems of malnutrition in Bangladesh by designing and implementing policies and programmes to overcome malnutrition among children in urban and rural areas.

The results of the study indicate that the nutritional intervention programes can be implemented in all vulnerable groups, including children. Initiatives for increasing food and nutrient intake in all sectors of children of rural and urban areas have to be taken for eradication of malnutrition in Bangladesh.

References

1. Nutrition survey of Rural Bangladesh 1962-64, Institute of Nutrition and Food Science (INFS), university of Dhaka (D.U).

2. Nutrition survey of Rural Bangladesh 1975-76, INFS, D.U.

3. Nutrition survey of Rural Bangladesh, 1981-92, INFS, D.U.

4. Jellife, D.B. 1966, The Assessment of the nutritional Status of the community.

5. Nutrition survey of Rural Bangladesh, University of Dhaka, 1982.

6. Chen LC, Chowdhury AKMA, Huffman S, Anthropometric assessment of energy protein malnutrition and subsequent risk of mortality among pre-school age children. Am. J, Clinical Nutrition, 1980, 33: 1836-45.

7. Black RE, Brown KH, Becker S, Alim ATMA, Haque A, Longitudinal studies of infections disease and physical growth of children in rural Bangladesh Am. J. Epidemiol, 1982, 115: 35-44.

8. Measuring change in nutritional status; Guide lines for assessing of Nutritional, P 21-28.

9. Kamal M. Nutritional status of 2-5 years children in a slum of Dhaka city, Institute of Nutrition and Food Science, University of Dhaka, December 1977.

10. Jahan K and Hossain M. Nature and extent of malnutrition in Bangladesh, Bangladesh National Nutrition survey, 1995-96, July 1998.

11. Child nutrition survey Bangladesh Bureau of Statistics, 1994.

12. Ali SMK, Paramanik MMA, Samad MA, Razzak A, Mustafa G. Hussain M. and Ataher. Prevalence of morbidity among normal and malnurished children of a slum area of Dhaka city, Bangladesh journal of Nutrition, Institute of Nutrition and Food Science. University of Dhaka 1989-1990, Vol. -3(1-2), P 20-24.

13. Nahar L and Sultana W, Nutrition profile of Pre-school children of Dhaka University Employee, Bangladesh journal of Nutrition, Vol. 16, December 2003, P 47.

14. Muttalib MA Impact of parasitic infection and nutritional status of children in Bangladesh, 1st National nutritional conference 1979, P 12-20.