Dietary pattern of the elderly people: a comparison between urban and rural communities

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Abstract

This is a cross sectional study conducted amongst 200 randomly selected urban and rural elderly people of age 60 to 90 years. The group of urban sample was selected randomly in Dhaka city. The rural group was randomly selected from villages of Sonargaon thana under Narayanganj district. The location was selected purposively. The purpose of this study was to investigate the dietary pattern of the elderly people. Dietary data was collected by a 24-hour recall method along with a seven days food consumption frequency. All urban and rural participants were found to consume rice, cooking oil and iodized salt every day. More than half (51%) of the urban elderly people were found to take pulse or legumes 3-6 days per week. On the other hand, half (50%) of the rural elderly people were found to take pulse or legumes only 1-2 days per week. Majority of the urban (74%) and rural (73%) elderly people were found to take small fish 1-2 days per week. A good percentage of urban (68%) and rural (62%) elderly people were found to take big fish 1-2 days per week. About 33% of urban and 31% of rural elderly people were found never to take milk in a week. Twenty nine percent urban and 19% rural elderly people were found to take milk everyday in a week. A higher proportion of the urban (71%) and rural (69%) elderly people were found to take Green leafy vegetables (GLV) only 1-2 days per week. A higher proportion of the urban (66%) and 56% rural elderly people were found to take citrus fruits only 1-2 days per week. Rice ($p<0.01$) and potato ($p<0.05$) intake was found to be significantly higher for rural elderly people as compared to their urban counterpart. In contrast wheat, milk and milk product, oil, pulse and nuts ($p<0.01$), sugar and meat intake ($p<0.05$) was found to be significantly higher for urban elderly people as compared to their rural counterpart. Energy, protein, fat, iron, thiamine, riboflavin and zinc intake was found to be significantiy ($p<0.01$) higher for urban elderly people as compared to the rural one. Carotene intake was found to be in a higher trend for rural elderly people as compared to their urban counterpart. Energy intake was found to be lower than the RDA for both urban and rural elderly people. Protein intake was found to be higher than the RDA for urban elderly and lower than the RDA for rural elderly people. However, the urban elderly people are better off in terms of their energy and nutrients intake as compared to their rural counterpart.

Key words: Elderly people, 24-hour dietary recall method, Food frequency, Carbohydrate, Protein, Fat, Rural, Urban

Introduction

Elderly are known to be easily subjected to inanition and avitaminosis resulting in multiple nutritional deficiencies[1]. Nicolas et al.[2] found the association between nutritional intake and morbidity and they also reported that reduced energy intake preceded frailty, illness or death. Protein-energy malnutrition is associated with impaired muscle function, decreased bone mass, immune dysfunction, anemia, reduced cognitive function, poor wound healing, delayed recovery from surgery, and ultimately increased morbidity and mortality. Sullivan et al.[3] found that protein-energy undernutrition is very influential in predicting death among frail geriatric patients, both in the hospital and after hospital discharge. Calcium and vitamin D, in particular, are the two elements that take part in bone metabolism and support bone mineral density, thereby age-related bone loss is minimized[4-6]. Elderly people with anemia may complain of fatigue, weakness, dyspnoea on exertion and edema. In some cases, anemia can lead to congestive heart failure[7]. Very few information is available about dietary habit of the elderly people in Bangladesh. With a view to fill in this data gap, the present study was undertaken to investigate the dietary pattern of the elderly people belonging to both urban and rural community and to make a comparison between the two groups.

Materials and methods

A cross-sectional study was carried out among 100

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elderly persons in rural and 100 elderly persons in urban community. A simple random sampling method was used for sample collection. The location was selected purposively. The group of urban sample was selected in Dhaka city. The rural group was selected from villages of Sonargaon thana under Narayanganj district. Subjects, who gave full consent to participate, were included in the study. In order to serve a comprehensive picture various socio-demographic, clinical complications, morbidity, anthropometry, haematological and biochemical measurements were diligently explored and incorporated. However, for the purpose of the current article only relevant data and information were presented. Dietary data was collected by a 24-hour dietary recall along with a seven days food consumption frequency. Standard methods[8], employing pretested questionnaire was used for this purpose.

The participants were shown various standards of utensils, such as measuring cups, spoons, glasses, plates and models of different foods to get nearest possible serving sizes of the food consumed. From this

Table 1: Distribution of urban and rural elderly people by their consumption frequencies of selected food items

Food items	Consumption frequencies (days/week)							
	Never		1-2 days		3-6 days		7 days	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)	Urban (%)	Rural (%)	Urban (%)	Rural (%)
Rice	-	-	-	-	-	-	100.0	100.0
Wheat bread	16.0	75.0	17.0	11.0	11.0	3.0	56.0	11.0
Loaf	65.0	89.0	31.0	11.0	2.0	-	2.0	-
Muri	45.0	13.0	45.0	54.0	8.0	31.0	2.0	2.0
Pulse/ legumes	-	5.0	19.0	50.0	51.0	31.0	30.0	14.0
Potato	6.0	2.0	32.0	45.0	55.0	40.0	7.0	13.0
Sweet potato	77.0	70.0	23.0	26.0	-	3.0	-	1.0
Oil	-	-	-	-	-	-	100.0	100.0
Ghee	55.0	68.0	45.0	32.0	-	-	-	-
Small fish	9.0	2.0	74.0	73.0	16.0	25.0	1.0	-
Big fish	26.0	36.0	68.0	62.0	5.0	2.0	1.0	-
Dry fish	59.0	37.0	41.0	61.0	-	2.0	-	-
Beef /mutton	59.0	76.0	41.0	24.0	-	-	-	-
Poultry	40.0	65.0	58.0	34.0	1.0	1.0	1.0	-
Egg	30.0	53.0	55.0	38.0	8.0	8.0	7.0	1.0
Milk	33.0	31.0	22.0	31.0	16.0	19.0	29.0	19.0
Milk products	27.0	85.0	71.0	14.0	1.0	1.0	1.0	-
GLV	7.0	1.0	71.0	69.0	19.0	28.0	3.0	2.0
Others veg.	-	-	-	1.0	11.0	7.0	89.0	92.0
Citrus fruits	29.0	37.0	66.0	56.0	5.0	6.0	-	1.0
other fruits	21.0	33.0	63.0	59.0	12.0	7.0	4.0	1.0
Sugar	18.0	34.0	6.0	25.0	5.0	7.0	71.0	34.0
Molasses	84.0	90.0	12.0	9.0	1.0	-	3.0	1.0
Iodized salt	-	-	-	-	-	-	100.0	100.0

%-Percentage of subjects.

Table 2: Daily food consumption (g/day) by the urban and rural elderly people

Food items	Urban(n=100)	Rural (n=100)	p value
Rice	236.3 ± 77.8	282.9 ± 68.6	0.000
Wheat	53.1 ± 60.0	15.6 ± 42.5	0.000
Potato	35.6 ± 39.8	50.3 ± 53.1	0.028
Sugar	9.0 ± 20.9	3.8 ± 5.0	0.018
Pulse & nut	25.2 ± 31.3	12.5 ± 26.3	0.002
GLV[a]	12.9 ± 25.7	15.6 ± 24.2	0.452
GYV[b]	27.3 ± 35.2	36.8 ± 42.1	0.083
NLV[c]	45.8 ± 47.0	38.2 ± 42.7	0.233
Fruits	34.0 ± 59.9	35.1 ± 60.0	0.891
Meat	38.1 ± 72.9	19.1 ± 53.0	0.035
Egg	9.2 ± 19.1	4.8 ± 13.1	0.056
Fish	37.9 ± 42.8	36.6 ± 37.7	0.815
Milk & milk product	58.8 ± 83.3	23.0 ± 43.8	0.000
Fats & oil	22.4 ± 5.6	19.6 ± 5.6	0.000
Total wt.	694.7 ± 172.3	626.3±144.0	0.003

Values are expressed as mean ± standard deviation, n=number of subjects, p=values calculated by independent samples t test..
[a]GLV=Green leafy vegetables, [b]GYV= Green yellow vegetables, [c]NLV=Non leafy vegetables.

Table 3: Daily food consumption (g/day) for the urban and rural elderly people by sex

Food items	Male		P value	Female		p value
	Urban (n=59)	Rural (n=44)		Urban (n= 41)	Rural (n=56)	
Rice	244.2 ± 84.6	314.3 ± 69.4	.000	224.9 ± 66.2	258.2 ± 57.4	0.011
Wheat	64.0 ± 69.1	21.5 ± 54.7	.001	37.3 ± 39.5	10.9 ± 29.4	0.001
Potato	39.2 ± 41.3	59.3 ± 49.9	.033	30.5 ± 37.5	43.2 ± 54.9	0.177
Sugar	8.7 ± 19.9	6.2 ± 5.0	.354	9.4 ± 22.4	2.0 ± 4.1	0.042
Pulse & nut	22.0 ± 32.1	12.7 ± 25.8	.107	29.9 ± 29.9	12.3 ± 27.0	0.004
GLV[a]	14.5 ± 29.0	14.6 ± 23.3	.987	10.7 ± 20.1	16.4 ± 25.1	0.217
GYV[b]	31.7 ± 38.7	37.8 ± 39.9	.441	20.9 ± 28.7	36.1 ± 44.1	0.042
NLV[c]	44.2 ± 42.4	32.5 ± 44.6	.182	48.0 ± 53.5	42.6 ± 41.0	0.589
Fruits	39.6 ± 70.0	36.7 ± 67.1	.828	25.8 ± 40.8	33.9 ± 54.4	0.404
Meat	48.6 ± 80.3	23.1 ± 58.5	.065	23.1 ± 58.3	15.9 ± 48.6	0.519
Egg	10.5 ± 20.5	6.8 ± 14.9	.292	7.4 ± 16.9	3.2 ± 11.3	0.172
Fish	36.5 ± 46.7	38.3 ± 45.9	.843	39.9 ± 37.0	35.2 ± 30.2	0.503
Milk & milk product	71.2 ± 94.4	25.2 ± 48.4	.002	40.8 ± 60.7	21.2 ± 40.2	0.078
Fats & oil	22.7 ± 5.8	20.3 ± 6.4	.049	22.0 ± 5.3	19.0 ± 4.8	0.006
Total wt.	751.8±176.6	689.1±153.6	.057	612.6±128.4	577.0±115.0	0.0163

Values are expressed as mean ± standard deviation, n=number of subjects, p=values calculated by independent samples t test..
[a]GLV=Green leafy vegetables, [b]GYV= Green yellow vegetables, [c]NLV=Non leafy vegetables.

information the serving weight of different food items were calculated. Equivalent raw food weight was calculated by using a conversion table for Bangladeshi foods formulated in the Institute of Nutrition and Food science[9]. A food composition table[10] was used to calculate the intake of nutrients from foods on the basis of raw weight. The adequacy of the intake of nutrients was assessed by comparing it with the recommended dietary allowance (RDA)[11-14]. A 7-day food frequency questionnaire on selected traditional food items was used to obtain information on the habitual dietary pattern of each participant. After rechecking all data, a PC SPSS software package (version 12.0 SPSS Inc. Chicago, IL, USA) was used to analyze it. Difference between means was established using independent sample t-test.

Results

Wheat, milk and milk product, fats and oil, pulse and nut ($p<0.01$), sugar and meat ($p<0.05$) intake was found to be significantly higher for urban elderly people as compared to their rural counterparts. In contrast rice ($p<0.01$) and potato ($p<0.05$) intake was found to be significantly higher for rural elderly people as compared to their urban counterpart (Table 2). Energy, protein, fat, iron, thiamine, riboflavin, copper (Cu), zinc ($p<0.01$) and folic acid ($p<0.05$) intake was found to be significantly higher for urban elderly people as compared to rural ones (Table 4). The percent deviation from RDA for nutrient intake of urban and rural elderly people is shown in table 6. Energy, riboflavin, vitamin C and zinc intake was found to be lower than the RDA for both urban and rural population.

Table 4: Daily energy and other nutrients intakes for the urban and rural elderly people

Nutrients	Urban (n=100)	Rural (n=100)	p value
Energy (Kcal)	1742.4±296.4	1574.8±338.0	0.000
Protein(g)	55.5±25.9	43.4±24.0	0.001
Fat (g)	35.5±11.9	28.0±10.3	0.000
Carbohydrate (g)	300.3±54.8	286.5± 59.1	0.090
Fiber (g)	3.7±1.9	3.2±2.1	0.078
Ca (mg)	411.8±52.04	391.7±48.69	0.778
Mg (mg)	330.6±89.9	324.6±75.9	0.576
Iron (mg)	16.2±9.1	11.3±8.1	0.000
Carotene (µg)	2375.8±317.38	3449.5±487.48	0.067
Vit.A (µg)	634.4±96.49	651.3±83.24	0.895
Thiamine (mg)	1.16±0.33	0.98±0.31	0.000
Riboflavin (mg)	0.63 ±0.30	0.47±0.27	0.000
Niacin (mg)	16.4±5.7	15.2 ±4.9	0.103
Folic acid (µg)	74.0±32.2	63.2±30.8	0.017
Vit. C (mg)	40.7±34.4	43.6±5.29	0.645
Copper (mg)	1.1±0.4	0.9±0.4	0.001
Zinc (mg)	7.2±2.6	5.7±2.1	0.000

Values are expressed as mean ± standard deviation, n=number of subjects, p=values calculated by independent samples t test.

Table 5: Daily energy and other nutrients intakes for the urban and rural elderly people by sex

Food items	Male		P value	Female		p value
	Urban (n=59)	Rural (n=44)		Urban (n= 41)	Rural (n=56)	
Energy (Kcal)	1835.4±294.8	1782.7±323.9	0.398	1608.5±245.5	1411.5±248.7	0.000
Protein (g)	60.9±29.4	51.9±30.5	0.134	47.8±17.3	36.7±14.3	0.001
Fat (g)	36.1±12.5	29.3±9.8	0.003	34.6±11.0	26.9±10.7	0.001
CHO (g)	317.1±54.4	326.2±50.9	0.387	276.1±46.1	255.4±44.8	0.030
Fiber (g)	4.1±2.1	3.5±2.6	0.213	3.1±1.4	2.9±1.6	0.594
Ca (mg)	448.5±65.46	499.3±69.00	0.706	358.9±209.8	307.0±194.8	0.219
Mg (mg)	354.2±100.9	364.3±66.4	0.542	296.7±57.1	292.4±67.9	0.735
Iron (mg)	18.2±10.4	13.8±10.5	0.034	13.2±5.9	9.4±4.7	0.001
Carotene (µg)	2775.5±368.67	3492.5±489.26	0.418	1800.8±215.60	3415.8±490.49	0.031
Vit.A (µg)	717.7±94.94	684.2±87.18	0.853	514.6±98.62	625.5±80.71	0.557
Thiamine (mg)	1.2±0.4	1.1±0.3	0.068	1.0±0.2	0.9±0.2	0.001
Riboflavin (mg)	0.7±0.3	0.5±0.3	0.027	0.5±0.2	0.4±0.2	0.005
Niacin (mg)	18.0±5.8	17.5±5.3	0.630	14.1±4.5	13.4±3.5	0.420
Folic acid (µg)	82.4 ±34.1	69.8 ±30.9	0.054	61.9±25.0	58.0±30.0	0.494
Vit. C (mg)	47.5±38.5	48.1±5.45	0.950	30.9±24.7	40.1±5.18	0.250
Copper (mg)	1.2±0.5	1.0±0.5	0.126	1.0±0.4	0.8±0.4	0.005
Zinc (mg)	7.8±2.6	6.5±2.3	0.008	6.3±2.4	5.1±1.6	0.006

Values are expressed as mean ± standard deviation, n=number of subjects, p=values calculated by independent samples t test.

Table 6: Percent deviation from RDA for nutrient intakes of urban and rural elderly people

Nutrients	Consumption /day		RDA			Consumption/day		RDA		
	Male			Percent deviation		Female			Percent deviation	
	Urban (n=59)	Rural (n=44)		Urban	Rural	Urban (n=41)	Rural (n=56)		Urban	Rural
Energy (Kcal)[11]	1835	1783	1910	-3.9	-6.7	1609	1412	1683	-4.4	-16.1
Protein (g)[11]	60.9	51.9	53.7	+13.4	-3.4	47.8	36.7	43.2	+10.7	-15.1
Fat (g)[12]	36.1	29.3	20	+80.5	+46.5	34.6	26.9	20	+73	+34.5
Ca (mg)[11]	449	499	450	-0.2	+10.9	359	307	450	-20.2	-31.8
Iron (mg)[11]	18.2	13.8	18	+1.1	-23.3	13	9.4	15	-13.3	-37.3
Vit. A (µg)[13]	717.7	684.2	600	+19.6	+14.0	514.6	625.5	500	+2.9	+25
Thiamin (mg)[11]	1.2	1.1	1.0	+20	+10	1.0	0.9	1.0	0	-10
Riboflavin (mg)[11]	0.7	0.5	1.2	-41.7	-58.3	0.5	0.4	1.2	-58.3	-66.7
Niacin (mg)[11]	18	17.5	13	+38.5	+34.6	14.1	13.4	13	+8.5	+3.1
Vit. C (mg)[11]	47.5	48.1	50	-5	-3.8	30.9	40.1	50	-38.2	-19.8
Zinc (mg)[14]	7.8	6.5	15	-48	-56.7	6.3	5.1	12	-47.5	-57.5

Discussion

In present study, average energy intake was found to be lower than the RDA though the average fat intake was adequate for both urban and rural elderly people (Table 6). Average protein intake was found to be higher than RDA for urban but lower than RDA for rural elderly people (Table 6). It may be due to the fact that average intake of meat, pulse, milk and milk product was lower among the rural elderly people as compared to urban ones (Table 2). In addition, a higher percentage of the rural elderly people were found never to consume meat, egg, milk and milk product in a week as compared to urban ones (Table 1). Average intake of vitamin C was found to be lower than the RDA for both urban and rural elderly people (Table 6). In agreement to this fact, a higher percentage of both urban and rural elderly people were found to take GLV and fruits (citrus and others) only 1-2 days per week (Table 1). This may attribute to the possibility of developing vitamin C deficiency as well as to the risk of many chronic diseases among the elderly population. In present study, carotene intake was found to be higher for rural female and total rural elderly population than that for their urban counterpart (Table 4, 5). It may be due to the fact that GYV intake was found to be higher for rural female and total rural elderly people than that for their urban counterpart (Table 2,3). Average riboflavin intake was found to be lower than the RDA for both urban and rural elderly people (Table 6). A previous study[1] also reported that riboflavin was deficient in the diets of elderly people. Average riboflavin intake was found to be higher for urban elderly people as compared to rural ones (Table 4,5). It is to be noted that the average intake of egg, meat, milk and milk product which are rich sources of riboflavin was found to be higher for urban elderly people as compared to rural ones. In addition, food frequency data reveals a higher percentage of the rural elderly people who were found never to consume poultry, egg and milk product in a week (Table 1). This might be another reason for lower intake of riboflavin among the rural elderly population. The average calcium intake was found to be lower than the RDA for both urban male and female elderly people. On the other hand, in case of rural elderly population, average calcium intake was found to be lower than the RDA for female elderly and higher than the RDA for male elderly people (Table 6). Lower intake of calcium among the female elderly was also reported in a previous study in Bangladesh[10]. Milk is the outstanding source of calcium in the diet. Amongst the study population, only 29% urban and 19% rural elderly people were found to take milk regularly (Table 1). A higher proportion of both urban and rural elderly people were found to take green leafy vegetables and fish (small and big) that are also good source of calcium only 1-2 days per week (Table 1). Among the rural elderly people, average intake of iron was found to be lower than the RDA for both sexes (Table 6) and average iron intake was found to be lower for rural elderly people as compared to urban counterpart (Table 4,5). There is a study[15] with rural elderly population which reported the fact that about 92% of male and 95% of female were sustaining on an iron intake lower than RDA. In present study, average intake of zinc was found to be higher for urban elderly people than that for their rural counterpart (Table 4), but the average intake of zinc was found to be lower than the RDA for both urban and rural elderly population (Table 6). Higher average intake of iron and zinc among the urban elderly people might be due to their higher intake of foods such as wheat, meat, egg, pulse and nut which are rich sources of these nutrients (Table 2). In conclusion, it deserves to be stressed that the dietary intake information as derived in present study will certainly play an important role as the reference data that may be needed for further research on elderly people of Bangladesh. This study holds promise to provide information potential in making a meaningful planning for geriatric nutrition in Bangladesh.

References:

1. Wadhwa A., Sabharwal M., Sharma S. Nutritional status of the elderly. Indian J Med Res, 1997:Oct.106:340-8.
2. Nicolas A.S., Faisant C., Nourhashemi F., Lanzmann-Petithory D., Vellas B. Association Between Nutritional Intake and Morbidity After Four Years in a French Elderly Population. Journal of Nutrition For the Elderly, 2000:19, Issue 4:19-30
3. Sullivan D.H., Walls R.C., Lipschitz, D.A. Protein-energy undernutrition and the risk of mortality within 1 y of hospital discharge in a select population of geriatric rehabilitation patients. Am J Clin Nutr, 1991:53(3):599-605.
4. Cashman K.D. Calcium intake, calcium bioavailability and bone health. Brit. J of Nutr, 2002:87(suppl 2), S169-S177.
5. Jensen C., Holloway L., Block G.,Spiller G., Gildengorin G., Gunderson E., Butterfield G.,Marcus R. Long-term effects of nutrient intervention on markers of bone remodeling and calciotropic hormones in late-postmenopausal women. Am J of Cln Nutr, 2002:75(6),1114-1120.
6. Schaafsma A, de Vries PJF, Saris WHM. Delay of natural bone loss by higher intakes of specific minerals and vitamins. Critical Rev Food Sci and Nutr 2001:41 (4): 225-249.
7. Lipschitz D.A."Anemia", in Principles of Geriatric Medicine and Gerontology, WR Hazzard et al, eds, New York : Mcgrew Hill,1994: third ed,741-747.
8. Gibson R.S. Principles of Nutritional Assessment. 1990: Chap-3,24, Oxford University Press, New York.
9. Ali S.M.K., Pramanik M.M.A. Conversion factors and dietary calculations. 1991: Institute of Nutrition and Food Science, University of Dhaka, Dhaka.
10. Ali S.M.K., Malek M.A., Salamatullah Q., Jahan K. Deshio Khadyadrabyer pustiman [original in Bengali]. 1992: Institute of Nutrition and Food Science, University of Dhaka, Dhaka.
11. Jahan K., Hossain M. Nature and Extent of Malnutrition in Bangladesh: Bangladesh National Nutrition Survey Report, 1995/96. 1998: INFS, University of Dhaka, Dhaka.
12. Gopalan C., Rama sastri B.V., Balasubramanian S.C. Nutritive value of Indian foods. National Institute of Nutrition, Indian Council of Medical Research 1993 (revised edition).
13. Machlin L.J. Hand Book of Vitamins. 1991:p-33, Second edition, rev. USA.
14. National Research Council. Recommended dietary allowance. 1989, Washington D.C, National Academy Press, 10th ed.
15. Natarajan V.S., Ravindran S., Krishnaswamy B.,Kumar V., Muthukrishnan J., Prabhu P. High prevalence of nutritional disorders and nutrient deficits in elderly people in a rural community in Tamilnadu, India. HK Geriatr Soc.1995: 6: 40-43.