

Dietary Intake of Hyperglycaemics of Rupganj-a Rural Area of Bangladesh

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Introduction

Diet is one of the basic factors that govern the proper management of Diabetes Mellitus, because vast majority of diabetic patients can be treated by diet alone. Cases needing drugs also need some form of diet adjustment. Diet therapy is perhaps the oldest form of treatment for diabetes mellitus. There is evidence that as early as 3500 B.C. diet was used in the treatment of diabetes mellitus in Egypt¹.

Unfortunately there is no detail study on 'facts and factors' in diabetics and their diets in Bangladesh. In 1985, Ibrahim et al² studied the characteristics of Diabetes at BIRDEM. In their study, they found that 19.7% of total diabetics were treated with insulin, 55.35% with tablets and 24.95% with diet alone. That data indicated that 80% of cases could be properly controlled if strict advices were followed. Shane Ara et al³ studied Diets in Diabetes Mellitus with and without pancreatic calcification. Per capita total calorie intake per day in diabetes with pancreatic calcification (DPC) group was 1909 ± 476.1 and in diabetes without calcification (D) group was 1913 ± 430.5 . Per capita carbohydrate intake per day in DPC group was 71.9% of the total calorie ($278.5\text{gm} \pm 52.5$), and in D group 77.4% ($377.7 \pm 108.9\text{gm}$). Per capita total protein

intake per day in DPC group was 11.9% of the total calorie (51gm, animal protein 5.31gm). In the D group, it was 12.1% (57.59gm, animal protein 5.11gm). Per capita fat intake in DPC group was 16.2% of the total calorie (29.71gm) and in D group, it was 10.5% (17.92gm).

Methodology

Study Area

Bulta Union of Rupganj Upazila under Narayanganj district was selected for the study, because the area was known to the investigators and communications within and from outside was satisfactory and the health subcentre of the union could be used as operational headquarters. The area is about 5 sq. km. with a total population of about 12000. The area is 30 km. from Dhaka and is situated by the side of the Dhaka-Sylhet Highway.

Weaving and cultivation are the main profession of the villagers. But some are engaged in business and jobs in the nearby textile mills. Electric power supply is present in all the villages. During the study period most of the male members of the family were found engaged in weaving and the females were their helping hands. On the economic conditions the villagers were distinctly divided into two classes—rich and

poor. Literacy rate was also above national average. There is a good bazar, one high school, one madrasa and two primary schools in the area. For catering health needs there is a Union Health Centre in the middle of the area.

Sample Size

A prevalence survey was conducted in this area by Ali et al⁴, among people aged above 15 years and thus a group of hyperglycaemics were indentified. The subjects of that study who had fasting blood glucose more than 8 mmol/litre were interviewed. Sixteen diabetes mellitus and 94 IGT (impaired glucose tolerance) thus constituted the study subjects. Study was conducted during February and March, 1986.

Materials

For the collection of data following materials were used:-

An interview schedule, height measuring scale, weight measuring scale, a measuring tape (flexible), skinfold thickness measuring calipers, blood pressure measuring instrument, stethoscope and haemoglobinometer.

Study Design

Informed consent was obtained from the subjects. The interviewers contacted the subjects at their homes as early as possible in the morning.

An interview schedule was prepared to record the interviews which contained: age, sex, dietary history, source of water used for drinking and household purposes, physical activity, personal habits, family history, drug history, anthropometry and clinical examinations.

Dietary investigation was based on '24 hours recall' method. The other related

questions asked were on storage of food, spices used in food, food fads, smoking habit, betel nut chewing practice. Height was measured by height measuring scales in cm., weight was measured in kg by spring balances with minimum clothing and in empty bladder and stomach.

WHO criteria⁵ for diagnosis of diabetes and IGT were followed. In fasting condition 75g glucose load was given in 350 ml of water and a drop of blood was collected by autoclick finger pulp prick on haemogluco test strips, after 2 hours of glucose drink. Reflolux II spectrophotometer of Boehringer was used for estimation of plasma glucose. Data collected from the study area were compiled and analysed manually. The results are presented in the tabular form.

Results

2760 people from eighteen villages of Bulta Union in Rupganj Upazila, aged 15 years and above were included in this study.

Table 1 shows the distribution of diabetes mellitus in relation to age and sex. Sixteen subjects were found to have diabetes, of whom 14 (0.98%) were male and 2 (0.15%) were female. Prevalence of diabetes was 0.57%. Highest prevalence was found 1.7% in the age group of 50-59. Ninety four subjects (3.41%) were detected as having IGT, (Table II) of whom fifty eight (4.04%) were male and 36 (2.71%) were female. In male age group 60-69 IGT was 12.05% and in female age group 50-59, IGT was 5.45% (6/110). In both the sexes aged above 70 had 6.82% IGT.

Table III shows the pattern of calorie intake in DM and IGT subjects. In male maximum percentage (34.61%) consumed 2001 and above calories (Mean calorie

2058.98±586.07 which is shown in the Table V) and in female (17.3%) takes within 1501-2000 caloric (Mean caloric intake 1613.67±415.72 which is also shown in the Table No V). In male >1500 and < 1500 calories is 15.38% and in female <1500 is 13.46% and more than 2001+ is 3.85%. Overall less calories are available to the females in comparison to the males.

In Table IV distribution of average protein, fat, carbohydrate and caloric are shown. In male mean caloric intake was 2058.98±568.07 kcal and in female was

1613.67±415.72 kcal. In male and in female mean caloric intake were 1938.31±490.39 kcal. Male received a bit more protein (10.76%), fat (7.84%) and less CHO (81.45%) than female. In female protein (10.35%), fat (6.91%) and CHO (82.32%). Proportion of mean protein and fat intake in both the sexes were much lower than CHO.

Sources of protein and fat intake by the DM and IGT, subjects are shown in Table VI. Majority of protein (74.8%) and fat (74.67%) were from vegetable sources.

Table 1. *Distribution of diabetes mellitus (DM) in relation to Age and Sex (N=2760)*

Age group (yrs.)	Male			Female			Total		
	N	'D.M.'	%	N	'D.M.'	%	N	'D.M.'	%
15 - 19	269	-	0.000	205	-	0.000	474	-	0.00
20 - 29	461	1	0.22	407	-	0.000	868	1	0.12
30 - 39	278	2	0.72	303	1	0.33	581	3	0.52
40 - 49	169	4	2.57	195	1	0.51	364	5	1.37
50 - 59	125	4	3.2	110	-	0.00	235	4	1.70
60 - 69	83	2	2.41	69	-	0.00	152	2	1.32
70 +	49	1	2.0	37	-	0.00	86	1	1.16
Total	1434	14	0.98	1326	2	0.15	2760	16	0.60
%	51.94			48.06					

Table 2. *Distribution of impaired blood glucose tolerance (IGT) in relation to age and sex.*

Age group (yrs.)	Male			Female			Total		
	N	'IGT'	%	N	'IGT'	%	N	'IGT'	%
15 - 29	730	21	2.88	612	10	1.63	1342	31	2.31
30 - 39	278	18	2.88	303	7	2.31	581	15	2.58
40 - 49	169	10	5.92	195	9	4.62	364	19	5.22
50 - 59	125	5	4.00	110	6	5.45	235	11	4.68
60 - 69	83	10	12.05	69	2	2.90	152	12	7.89
70 +	49	4	8.16	37	2	3.41	86	6	6.98
Total	1434	58	4.04	1326	36	2.71	2760	94	3.41

Table 3 . *Distribution of Diabetes Mellitus (DM) and Impaired Glucose Tolerance (IGT) subjects by Age, Sex (N= 52) and mean Calorie intake*

Age gr.	Caloric												Total	%
	Male						Female							
	1500	%	1501	%	2001+	%	1500	%	1501	%	20001+	%		
	to 2000			to 2000										
15-24	1	1.92	2	3.85	4	7.69	2	3.85	1	1.92	-	-	10	19.23
25-34	1	1.92	-	-	3	5.77	-	-	4	7.69	2	3.85	10	19.23
35-44	1	1.92	2	3.85	4	7.69	-	-	2	3.85	-	-	9	17.3
45-54	1	1.92	1	1.92	1	1.92	3	5.77	2	3.85	-	-	8	15.58
55-64	2	3.85	2	3.85	4	7.69	1	1.92	-	-	-	-	9	17.3
65+	2	3.85	1	1.92	2	3.85	1	1.92	-	-	-	-	6	11.54
Total	8	15.38	8	15.38	18	34.61	7	13.46	9	17.3	2	3.85	52	100

Table 4. *Distribution of average intake of calorie and nutrients by the Diabetes Mellitus and Impaired Glucose Tolerance in 24 hrs. in relation to sex.*

Sex	No. of Cases	Protein %		Fat %		CHO %		Calorie	
		Mean	±SD	Mean	±SE	Mean	±SD	Mean	±SD
Male	33	10.76	2.21	7.84	3.98	81.45	5.2	2058.98	568.07
Female	19	10.25	2.24	6.91	2.7	82.82	3.78	1613.67	415.72
Total	52	10.59	2.19	7.5	3.56	81.7	4.73	1938.31	490.39

Table 5 . *Sources of Protein and fat intake in Diabetes Mellitus (DM) and Impaired Glucose Tolerance (IGT) (N = 52)*

Nutrient	No. of DM and IGT	Vegetables			Animal		
		Mean	%	±SD	Mean	%	±SD
Protein	52	7.94	74.8	1.38	2.66	25.2	2.31
Fat	52	5.6	74.67	2.44	1.9	25.33	2.3

Discussion

Of the total population in 18 villages in Bulta Union of Rupganj Upazila, 2760 subjects were screened for hyperglycaemia. The highest response rate was obtained in the age group 20-29 years (31.51%). The prevalence rate of DM was 0.57%. This rate was lower than 0.75% found in previous study⁴ conducted in an area adjacent to the present study area just a year before this study. This difference is difficult to explain except that the sample size is bigger in this study and possibly the people around the screening area became more conscious after the previous study.

The interesting finding in this study is that all 16 diabetics (Table I) were males (two females were detected diabetic but they could not be investigated due to non-compliance). The prevalence of diabetes 7.11 in male population was higher in the developing countries (Indian male-2.3%, female-1.4%, Kim et al 1.4% Male and 0.42% female, Bangladesh, male-10.5% and female 0.04%). In this respect this study compared well with other studies. Though the diagnostic criteria and amount of glucose used in Oral Glucose Tolerance Test (OGTT) was different.

IGT was found only in 3.41% (male-4.04%, female-2.71% Table II). The highest prevalence of impaired glucose tolerance (IGT) was detected in the age group 60-69 (male-12.05%, female-2.90%).

But in Table II, it has been shown that the impaired glucose tolerance (IGT) cases in male population were mostly in the high calorie intake group (34.61%) rather than in the low calorie intake group (only 15.38%). Contrary to this finding in female population IGT in low calorie intake group was

13.46% and in high calorie intake group 3.85%.

The average intake of carbohydrate, protein and fat in percentage were calculated and it corresponded well with the Nutrition Survey of Rural Bangladesh, 1981-1982⁷. There is no significant difference between the intake of male and female population. The difference is found only in fat intake. The fat intake in study population was 7.5% (Table VI) as against 4.5% in Nutrition Survey Study 1981-82.

As regards the intake of nutrient both the groups -impaired glucose tolerance and diabetes mellitus are having imbalanced diet. The main bulk of the calorie came from protein which was much below the standard daily allowance. The fat intake was also low. Having considered all these, nutrient intake of DM and IGT is found to be improper. Again the question remains to be answered why the other members of the same family (or community) were not equally affected with glucose intolerance having the same environment and almost same nutritional status. This needs further research.

Summary

A detailed dietary and other related investigations was performed the Diabetes Mellitus and Impaired Glucose Tolerance subjects, in the 18 (eighteen) villages of Bulta Union under Rupganj Upazila in the district of Narayanganj, to determine pattern of diet among the hyperglycaemics in a rural area of Bangladesh.

Among the patients with diabetes mellitus and impaired glucose tolerance (IGT) the mean calorie intake in male was 2058.9 ± 586.07 kcal and in female

1613.67±415.72 kcal. In both the sexes most of the calories come from carbohydrate (81.7%±4.73%). Total calorie from protein consumption was about 10% per day and that from fat was about 7% per day. Most part of the protein and fat comes from vegetables sources (protein 74.8% and fat 74.67%)

References

1. Malcolm and Nethrass: Recent advances in Diabetes. Churchill. Livingstone, Edinburgh, London, New York, p. 127-133, 1984.
2. Ibrahim, M.; Ali S.M. Keramat and Rahman, M. Characteristics of Diabetes at BIRDEM, Dhaka. Jour. Diab. Assoc. Bang., Vol. XVI. No. 1, p. 26, August, 1985.
3. Kabir, Shane Ara; Khan A.K. Azad and Ali, S.M. Keramat. Diet in Diabetes mellitus with and without pancreatic calcification. Jour. Diab. Assoc. Bang., Vol. XVI, No. 2, p. 28, August, 1985.
4. Ali, S.M.K., Ibrahim, M.; Syed, A.; Khan, A.N.G.A. and Ahmed, K. Saleh. Diabetes Mellitus in Rural Bangladesh. Journal of Statistical Studies, Vol. VI, 109, 1987.
5. WHO Study Group. Diabetes Mellitus. Technical Report Series 272, WHO, Geneva, 1985.
6. Kim, E.J.; Kim, K.S.; Lee, T.H. and Kim, D.Y. (1977). The incidence of Diabetes Mellitus in Rural and Urban Population in Korea. In Epidemiology of Diabetes Mellitus in developing countries. Edited by Ahuja Interprit. New Delhi, p. 109-112.
7. Nutrition Survey of Rural Bangladesh, 1982.
8. Jenkins. High fibre diets and diabetes. The Lancet, Feb. 21 (1981), p. 423-424.
9. Energy and protein requirement: Report of a joint FAO/WHO ad hoc Expert Committee. WHO Technical Report Series No. 522, Geneva, 1973, p. 1031-40.