Hyperglycaemia and its Association with Body Mass Index Among the Teachers of University of Dhaka

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Introduction

In Bangladesh hyperglycaemia is a growing health problem. Chronic elevation of blood glucose above normal is hyperglycaemia which is often manifested as diabetes mellitus. Precise cause of this life long abnormality is unknown. Heredity and environmental factors are often associated with the development of this condition. A number of population based studies appeared in the literature. The highest prevalence was reported from North Sweden (38 per 1000,000), next higher prevalence was reported from Finland (29 per 100,000), and lowest rate was reported from the Netherlands, Scotland, Pittsburgh, Rhode and Toronto (1). West and Kalbfleish (2) found 1.5% prevalance of hyperglycaemia in East Pakistan, now Bangladesh. In one study by Mahtab et. al. (3), hyperglycaemic state was reported to be 1.07% in rural and semi urban area of Dhaka. Ali et. al. (4) found 7.7% prevalence rate in textile mills workers near Dhaka. Ibrahim (5) found 3.98% hyperglycaemia in a rural upazilla. These studies were conducted in different population using various screening methods. However, studies on a section of professionals like teachers are scarce in the literature.

Obesity is associated with many disease states including adult onset diabetes mellitus of non-insulin dependent type (6.7). In two Japanese studies, obesity were found to be related to the occurance of diabetes, but was inconsistent in its effect in the studies in UK and Norway. Identical twin studies indicate that the genetic component of non-insulin dependent diabetes mellitus (NIDDM) acts independently of obesity (1). In order to find out the magnitude of the problem of hyperglycaemia and its association with per cent body mass index (PBMI), the present study was therefore undertaken involving professionals only.

Materials and Methods

All categories of teachers of Dhaka University were invited by a formal request letter to participate in the study. A total of 332 teachers, (Professors, Associate Professors, Assistant Professors and Lecturers) had been included in this study.

A standard questionnaire was developed in which information on age, sex, height, weight, monthly income, smoking habit, physical activity, dietary history were collected by direct interview at the Institute of Nutrition and Food Science, University of Dhaka on a pre-appointed time and date. The study was conducted between February and April, 1987.

A sample of blood was collected by vein puncture using sterile disposable syringe. Blood glucose was estimated by Peridocrom glucose GOD-PAP method as described by Trinder (8). For measuring body mass index, height and weight was taken using DECTECTO-MEDIC' weighing scale in which a height scale was also attached. The subjects were asked to stand on the platform on the weighing scale without shoes and with minimum clothings. The readings were taken in killogrammes (Kg) and centimeter (cm) for weight and height, respectively. Body mass index was calculated by dividing weight in Kg by height in metre square. The per cent body mass index (PBMI) was calculated according to the formula of West (9).

$$PBMI = \frac{BMI}{\text{Standard BMI}} \times 100$$

(Standard BMI for male was 22.1 and 20.6 for female)

Results

After collection of data the results were processed by a computer. Participants who did not adhere to the overnight fast prior to the examination and any blood sampie lost during handling were excluded from the analysis. The results were tabulated as described below :

Table I- shows the percentage of the respondents according to their professions: Assistant Professor 35.8%, Associate Professor 34.6%, Lecturer 15.4% and Professor 14.2% in this series.

The age and sex distribution of the teachers are presented in Table II. The majority of the teachers (26 8%) was between 35 and 39 years of age. Next was 40-44 years (19.3%) followed by 45-49 years (17.5%) age. 18.4% of the teachers were famale and 81.6% were male. None of the female teacher was in the age range of 55 years and above.

The majority teachers (48.2%) had monthly income within the range of 4000-6000 Takas per month (1 Taka=31.20 US$). The next group (33.7%) had 2000-3000 Takas while only 4.2% had 8000 Takas and more monthly income (Table III).

Table IV- shows that 85.3% of the teachers have normal PBMI. It was also observed that 4.8% teachers had below normal PBMI, while 6.3% and 3.6% had PBMI in the obese and very obese range, respectively. Obesity was present more in female (14.8%) than in male (4 4%). Females were 13.0% and males were 1.5% in the very obese group (Table V).

Table VI- shows that 91.1% of the teachers had normal fasting serum glucose while 8.9% had mild to severe hyperglycaemia. 45-49 years age group showed highest hyperglycaemia irrespective of sex. There were uniform hyperglycaemic states in 50 years and above.

Table VII- shows that subjects with normal PBMI have more hyperglycaemia in comparison to obese and very obese groups. Interestingly, obese group had more hyperglycaemia than very obese group.

Discussion

Hyperglycaemic condition predisposes to diabetic state. This is a sensitive awareness massage to the educated class. Associate and Assistant Professors had major (70.4%) participation to the study indicating their concern over diabetes—a life long condition. The 35-49 yrs. age group show a peak in this series. Ibrahim (5) confirmed that this is the age vulnerable to develop hyperglycaemia. The younger and senior teachers appeared reluctant to be branded as hyperglycaemics, perhaps in order to avoid a restricted life.

It is observed that 81.6% were male and 18.4% were female. The reasons may be that the female teachers are less in number and also may be unwilling to be known as hyperglycaemic for social reasons.

The income distribution showed that teachers' income was a bit better than national averages (Table III).

PBMI as adopted by late West (9) was defined 80-119 as normal, 120-139 as obese, 140 and above is very obese. The peak prevalence of obesity was found between 35-49 years age group, which constituted 9 9% of the total population.

It was observed that fasting serum glucose level of 91.1% of the examined subjects was normal and 8.9% were hyperglycaemic. Among them 4.6% have mild and 2.2%, 0.3%, 0.9% have moderate to severe hyperglycaemia. Normal fasting serum glucose level ranges from 76-110 mg/dl according to the method used in this study. It was observed that the maximum number of normal glucose values of subjeects were between 35—39 years of age and the minimum 55 years and above. Two subjects showed highest concentration of serum glucose who were in the age group of 45—49 years. This findings are similar as observed by Ibrahim (5) except the prevalence rate which was lower than the present study. The higher prevalence of hyperglycaemia in this study may be due to different methods of glucose estimation and criteria used for hyperglycaemia. Besides, the subjects have been drawn from equal socio-economic status and may also have more health conciousness.

Subjects with normal PBMI were found to be more hyperglycaemic. Seven obese and 2 very obese subjects have varying levels of hyperglycaemia. Experience at BIRDEM (4) showed that about 20% of diabetic subjects are obese. In the present study it was also observed that 47.3% teachers with normal PBMI walk regularly for few minutes and most of the time they enjoy sedentary life. This may be one of the reasons for their hyperglycaemic state.

This study shows that 8.9% teachers are hyperglycaemic although most of them have normal PBMI, one has low PBMI and the others have higher PBMI. Therefore obesity seems to be unrelated to the development of hyperglycaemia. Dietary habits, physical activity and culture may further influnce this state.

Table 1- Total number of respondents

	No. of respondents	%
Professor	47	14.2
Associate Professor	115	34.6
Assistant Professor	119	35.8
Lecturer	51	15.4
	332	100.0

Table II- Age and sex distribution of the teachers

Age in years	Male	Female	Total	%
Below 30	17	4	21	6.3
30—34	38	11	49	14.8
35—39	70	19	89	26.8
40—44	52	12	64	19.3
45—49	45	13	58	17.5
50—54	29	02	31	9.3
55—++	20	—	20	6.0
	271 (81.6%)	61 (18.4%)	332	100.0

Table III- Monthly income of the teachers

Value level in taka	Frequency	%
∠ 2000	1	0.3
2001—4000	112	33.7
4001—6000	160	48.2
6001—8000	45	13.6
8001 & above	14	4.2

Table IV- Age vs percentage of body mass index (PBMI)

Age	Less than 80	80-119	120-139	140-++
Less than 30	3	17	—	—
30—34	3	45	1	—
35—39	2	77	5	5
40—44	2	57	5	—
45—49	2	44	8	4
50—54	1	26	1	3
55—++	3	16	1	—
	16(4.8%)	282(85.3%)	21(6.3%)	12(3.6%)

Table V- Sex vs percentage of body mass index (PBMI)

Sex	Less than 80	80-119	120-139	140-++
Male	14(5.2%)	240(88.9%)	12(4.4%)	4(1.5%)
Female	2(3.3%)	42(68.9%)	9(14.8%)	8(13.0%)
	16(4.8%)	282(85.3%)	21(6.3%)	12(3.6%)

Table VI- Age vs fasting serum glucose level

Age	Serum glucose (mg/dl)					
	Below 110	110-129	130-149	150-169	170-189	190+
Below 30	18	1				
30—34	47					
35—39	84	2	1		1	
40—44	57	3	1			
45—49	48	5	2		1	2
50—54	26	2	2		1	
55+	15	2	1	1		1
	295 (91.1%)	15 (4.6%)	7 (2.2%)	1 (0.3%)	3 (0.9%)	3 (0.9%)

Table VII- Per cent body mass index (PBMI) vs fasting serum glucose level

PBMI	Serum glucose (mg/dl)					
	Below 110	110-129	130-149	150-169	170-189	190+
Below 80	15					1
Normal 80-119	255	10	5	1	2	1
Obese 120-139	15	4	1		1	1
Very obese 140+	10	1	1			
	295 (91.1%)	15 (4.6%)	7 (2.2%)	1 (0.3%)	3 (0.9%)	3 (0.9%)

Summary

A study was conducted on 332 teachers of University of Dhaka in order to find out prevalence of hyperglycaemia and its association with per cent body mass index (PBMI). There were 271 males (81.6%) and 61 females (18.4%), constituting the ratio to be 4.5:1. Subjects had ages ranged between 27 and 60 years, with a majority in 35 to 49 years. Only 9.9% teachers were found obese. Females were more obese (27.8%) than males (5.9%). Fasting serum glucose level of 91.1% of the respondent subjects were found normal and 8.9% showed varying degrees of hyperglycaemia. According to PBMI, 76.8% subjects were normal, 4.5% were underweight, 4.5% were obese and 3.0% were very obese. Hyperglycaemia seemed to be unrelated to PBMI.

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