PREVALENCE OF UNCONTROLLED TYPE 2 DIABETES MELLITUS AND ITS ASSOCIATED FACTORS AMONG PEOPLE WITHIN SOUTHERN PART OF BANGLADESH

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Abstract

Background: Diabetes is a disorder which is very much related to a quality of lifestyle. Bangladesh is one of the countries having highest number of diabetes patients. Most of the population in this country used to take high glycemic indexed foods. In this study, we aimed to evaluate the quality of life of diabetic patients of the southern part and Chattogram city to investigate how controlled and uncontrolled diabetes is related to their lifestyle and socio-economic factors.

Materials and methods: A multi-center, cross-sectional study, conducted in five centers of Chattogram, in 2018-2019, registered 1,888 type 2 DM participants, tested for HbA1c and interviewed face-to-face for other information. Logistic regression analysis was conducted to identify factors associated with UDM. Descriptive analysis and chi square test were done to see the statistical significance between various parameters.

Results: Among the study population nearly 72% were uncontrolled diabetes patients. The prevalence of uncontrolled diabetes in age <60 years was highly significant. Number of female uncontrolled diabetes patients were significantly higher. People having low income and lower level of education were more prone to uncontrolled diabetes.

Conclusion: Health workers at the diabetic hospitals should intensify education and counselling of diabetics. Modifiable risk factors such as education, food and physical activity be considered as potential targets of interventions in southern part of Bangladesh.

Key words
Type 2 diabetes mellitus; Uncontrolled; Southern part.

Introduction

Diabetes is a serious global concern. Diabetes is defined as a group of disorders associated with high blood glucose generated from the disturbance of insulin secretion, insulin action or both[1]. Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (Age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5%[2]. According to WHO, more than 80% of diabetes deaths occur in low- and middle-income countries.The prevalence of diabetes is increasing in Bangladesh in both urban and rural areas. A recent scoping review (1994-2013) revealed that the prevalence of type 2 diabetes varied from 4.5% to 35.0% in Bangladesh. It is estimated that diabetes accounts for 10.8% of the total annual healthcare expenditure worldwide, which totaled at least US$548 billion in 2013 and is projected to exceed US$627 billion by 2035[3,4].

The underlying causes of diabetes mellitus include, being obese or overweight, high blood pressure, elevated levels of triglycerides and low levels of "good" cholesterol (HDL) sedentary lifestyle, familyhistory, increasing age, polycystic ovary syndrome, and impaired glucose tolerance[5-7]. Diabetes itself is a multifactorial disease which is characterized by hyperglycemia, lipoprotein abnormalities, raised basal metabolic rate, defect in

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reactive oxygen species scavenging enzymes and altered intermediary metabolism of major food substances[8, 9]. Diabetes mellitus if untreated may responsible for the subsequent development of diabetes associated retinopathy,neuropathy, Cardiovascular disease, stroke and other complications[10,11].

The US incidence of type 2 diabetes among adults (7.9%) is increasing as the prevalence of obesity continues to increase[12]. In order to obtain an effective treatment regimen people with diabetes need to adopt a healthy diet[13]. Dietary change often requires the adoption of new food habits while modifying lifelong eating behaviors. Little has been reported about the food practices among people with diabetes. A qualitative study has shown that cultural attitudes to lifestyle can be difficult to overcome. Rice being the major food of Bangladeshis one of the contributing factor for the prevalence of diabetes. A study on the Bangladeshi population living in London showed that only 26% of Bangladeshis men and 11% of Bangladeshi women meet the recommended levels of physical activity. Dietary intake of fat, salt, and carbohydrates is also high. Culture may not only affect willingness to participate in prevention, but may also obscure the understanding of diabetes[14].

Bangladesh has a total population of more than 160 million and is among the countries with the highest number of people with diabetes worldwide. The International Diabetes Federation (IDF) estimated 7.1 millionpeople with diabetes in Bangladesh and almost an equal number with undetected diabetes. This number is estimated to double by 2025[15]. In 2017, approximately 5 million deaths worldwide were attributable to diabetes in the 20–99 years age range. The global healthcare expenditure on people with diabetes was estimated to be USD 850 billion in 2017[16].

Chronic hyperglycemia, a major pathological feature of DM, represented by high HbA1c levels, is associated with high mortality and morbidity due to cardiac and renal complications. Hence, one of the major goals of treatment of DM is to keep blood glucose levels as close to normal as possible yet avoiding hypoglycemia by maintaining HbA1c below a certain level, thus minimizing the risk of complications of DM. The American Diabetes Association, International Diabetes Federation, Canadian Diabetes Association and Diabetes Australia -all recognize a HbA1c level of 7% (53 mmol/mol) or less as optimal control[17]. Korean and Malaysian guidelines consider 6.5% (48 mmol/mol) or less as the optimal. A Chinese study recommended using different HbA1c cut-offs, ranging from <6.0% (42 mmol/mol) to <9.0% (<42 to<74 mmol/mol), for various risk groups[18]. Consequently, depending upon the criteria being used, anyone with HbA1c levels above a pre-determined cut-off point can be considered as having Uncontrolled Diabetes Mellitus (UDM). In addition, uncontrolled diabetes has detrimental effects on health including life-long complications in different organs of the patients and socioeconomic status as well. A study reported 13.6% prevalence of controlled Type 2 Diabetes (T2D) and that of uncontrolled diabetes was 86.4%[19]. People from different part of southern region of Bangladesh, come to Chattogram city for consultation their diabetes mellitus.

This study aimed to investigate the prevalence of uncontrolled diabetes mellitus among the diabetes patients of southern part of Bangladesh. This study also focused on various factors associated with or leading to uncontrolled diabetes mellitus.

Materials and methods

A cross-sectional study was conducted among patients attending the Chittagong Medical College and Hospital, Chittagong Diabetic Hospital, CSCR, MAX Hospital and Popular Diagnostic Centre between November 2018 to June 2019. All five centres are situated in Chattogram, the second-largest city of Bangladesh. These hospitals provide treatment for around 2 million residents in Chattogram city and adjacent districts. These patients come from different socioeconomic groups and backgrounds, with a large number of patients with diabetes taking service at the OPD The inclusion criteria for the study were: adults diagnosed as type 2 diabetes mellitus patients as defined by the WHO criteria, taking oral medication, registered at hospital, referred by their attending physician, a resident of Chattogram city. Patients with other types of diabetes, using insulin, or presenting with a serious illness requiring hospitalization were excluded from the study. Total 1888 patients were recruited for the study.

A pretested structured questionnaire was used for data collection. A study physician, a research officer, and thirty research assistants were recruited for this study. The data collection team was trained by the investigators for two weeks. Study participants were interviewed through face-to-face interviews. Collected data was further checked by calling patients on a random basis to ensure the quality of data. After verification, all data was captured into the online system RED Cap hosted at Disease Biology and Molecular Epidemiology Research group server (http://data.dblab.org/redcap/). The questionnaire contained information on sociodemographic characteristics, family history of diabetes, duration of diabetes and the weekly intake of different foods. Glycemic status was considered as "controlled" when fasting blood sugar was ≤7 mmol/mg and "uncontrolled" when fasting blood sugar was >7 mmol/mg according to American Diabetes Association 2018 guidelines.

Data were cleaned and analyzed using SPSS 25.0 statistical software (SPSS Inc., Chicago, United States). Descriptive statistics were used to portray the demographic characteristics of patients and their medication adherence scores. Categorical variables were expressed as percentages and frequencies, whereas means and Standard Deviations (SD) were calculated for the continuous variables. Chi-square tests were performed to find the group-wise association for categorical variables as appropriate.

All participants provided written consent before participation. The objectives and procedures of the study were explained to the participants in their native language (Bengali). Participation in the study was voluntary and participants were informed that refusal to participate would not hamper the services provided to them. This study protocol was approved by the Ethical Review Committee of Chittagong Medical College Hospital.

Results

Eighteen hundred and eighty-eight (1888) eligible patients identified during the recruitment period of the study gave their consent and were subsequently enrolled.

Number of uncontrolled diabetic patient was significantly more than the controlled diabetic patients ($p < 0.05$). More than 71% patients were having uncontrolled diabetes mellitus (Fig. 1). The rate of uncontrolled diabetes was significant among female patients ($p < 0.05$). It was 2.5 times higher than the controlled diabetic patients (Table I). Adult people aged 30-59 years were mostly uncontrolled diabetes patients compared to young or elderly patients. Highest number of uncontrolled diabetic patients were housewives. Uncontrolled diabetes was also high among service holders.

Uncontrolled diabetes was significantly prevalent among people with financial stress (Income less than 35K BDT) (Fig 2). Diabetes was less frequent among solvent people. Moreover, people with lower level of education (Primary and secondary) exhibited higher rate of uncontrolled diabetes which is significant compared to highly educated people (Fig 3).

There was no significant different between vegetable and fruit intake among different patients. However, uncontrolled diabetic patients take high amount of meat (Fig 4). Interestingly, the number of vegetable intake is significantly high among uncontrolled diabetes patients.

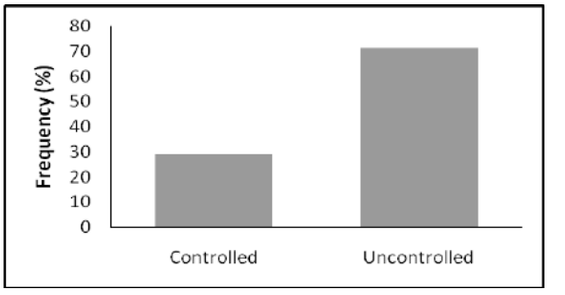

Fig 1: Prevalence of various types diabetes among T2D patients of Chattogram.

Table I : Socio-demographic characteristics of people with type 2 diabetes mellitus attending various tertiary hospitals of Chattogram (2018–2019).

Variable	Controlled	Uncontrolled	P-value
Gender			
Male	234	505	0.026
Female	300	816	
Age			
Young Adult (19 -29 years)	35	54	0.042
Adult (30- 59 years)	363	955	
Elderly (>60 years)	136	312	
Profession			
Business	72	155	0.144
Service	104	244	
Housewife	262	734	
Unemployed	8	18	
Dependents	18	28	
Retired	53	116	
Others	17	26	

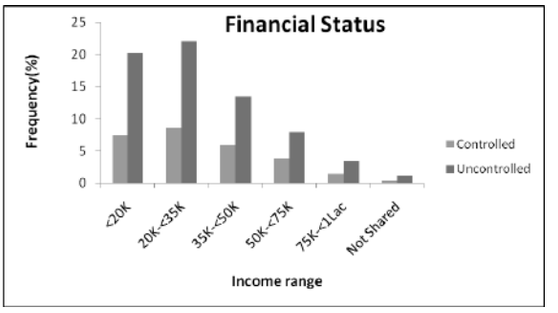

Fig 2: Financial status of various T2D patients of Chattogram.

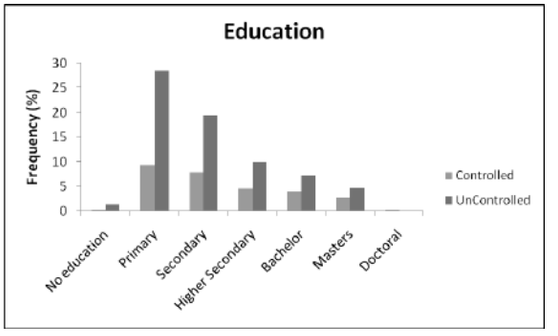

Fig 3: Educational status of various T2D patients of Chattogram.

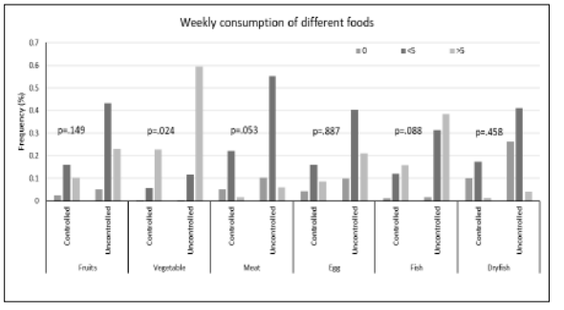

Fig 4: Association between dietary intake and uncontrolled diabetes.

Discussion

Our study reported a significant number, prevalence of 71% of uncontrolled type 2 diabetes mellitus ($p < 0.05$) (Fig 1).The results remain relevant to related research as ourfindings add to the growing body of knowledge about UDM in Bangladesh, even while advances and modification in the management of diabetes occur internationally. Nearly 72% of patients attending tertiary hospitals in a community had UDM based on HbA1c >7%. The previously published studies reported quite varied estimates,mostly owing to the differences in cut-offs[20, 21].

Socioeconomic status and its constituent elements are accepted as being determinants of health[22]. In the current study, a high SES was a predictor of controlled diabetes among diabetics. Regarding economic status of patient, middle and lower-income class were significantly associated with poor control of blood glucose ($p< 0.05$) (Fig 2). Previous studies also found the same result in Bangladesh[23,24]. Financial stress effect the medication purchase capacity and dietary balance which leads to improper management of diabetes.

In our study, patients younger than 50 years of age were more prone to have UDM (Table I) supporting prior published findings that younger people with type 2 diabetes are more likely to have UDM[18,25]. The factors underlying the elevated HbA1c levels among adults are not fully understood. Adults may have difficulty attending clinic appointments and assuming self-care activities, given their greater work and family responsibilities, they may also be more affected by rapid changes in lifestyle as reflected by obesity pattern, an indicator of dietary pattern and physical activity [26]. Previous studies have shown older people are generally more compliant [26]. Nevertheless, currently younger PWD may require more attention or monitoring.

In the current study, there was a significant association between controlled diabetes and occupation (Table I). Housewives were less likely to control their diabetes compared to those who were unemployed (AOR=0.16, p=0.031). Findings from a study conducted in China contrast with findings from the current study[27]. In the Chinese study, those who were unemployed were unable to control their blood glucose level. Uncontrolled diabetes among service holders in our study could be due to the busy working schedule with less time to eat a balanced meal, take medications andto also engage in active exercise.

Education is a significant factor for diabetes management. In the present study, significant number of under educated people were having highest rate of uncontrolled diabetes (Fig 3). Controlled diabetes among those with high education level could be due to due to the fact that they were able to access and understand diabetes management information. This result supports previous findings in other countries[28, 29].

There are a number of foods which could be attributed to the existing scenario of diabetes management and burden as observed in Bangladesh.

Even though it was not statistically significant a high consumption of vegetable among diabetics depicts healthy eating. Healthy eating is associated with controlled diabetes[30]. In the persent study, there was significant association between meat and uncontrolled diabetes was found (Fig 5). It might be due to the association between, red meat, cholesterol and diabetes complication.

Limitations

This study was done in the different centre of Chattogram city. A more representative pictures could be observed if some hospital and centres in different city of these region, rural hospitals could be included. Also, the 8-month period of data collection was unable to capture annual variations that may affect factors such as diet. For example, Ramadhan is a fasting month and at least two festive holidays result in short yet major changes in diet. Biochemical and molecular studies are needed to explain the relationship between food and uncontrolled diabetes.

Conclusion

A substantial proportion (71%) of the diabetes patients attending centres in Chattogram city from of southern part of Bangladesh had UDM. Housewives were less likely to control their blood glucose level. The clinicians should give special attention to those younger than 50 years or who were diagnosed with diabetes at a hospital. Care providers should routinely assess patients perception about treatment modalities prescribed for her/him. Diabetes control was very low. Only 28 of the 100 diabetics could control their blood glucose level. Targeted interventions in the form of financial support to diabetics who are socially disadvantaged could improve their diabetes health care.

Recommendation

Further studies are required to identify reasons for the poor DM control.

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FA- Design, acquisition of data, critical revision & final approval.
SMMA-Acquisition of data, data analysis, drafting & final approval.
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NAC-Conception, interprition of data, critical revision & final approval.
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AM-Data analysis, interprition of data, drafting & final approval.

Disclosure

All the authors declared no competing interest.

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