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Page 3 to 8

Research Article

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Risk Factors of Obesity Associated With Diabetes among Selected Urban People

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Abstract

Introduction: Obesity is an increasing problem in the developing world and has substantial health effects. In developing countries obesity associated diseases – like diabetes increasing day by day among the urban people – that are closely related to behavioral factors – overall decrease in activity levels, consumption of high-fat diets, energy dense foods or drinks, snacking and the loss of formalized meal patterns.

Objective: This study was an attempt to assess risk factors of obesity associated with diabetes among urban people.

Methods: It was a case control study conducted among purposively selected 100 cases (obese and diabetic) and 100 controls (non-obese and diabetic). To compare the adverse effect of obesity nutritional status was determined by WHO cut off value for Asian people.

Results: Fast food intake, sweet food consumption and intake of preferred food were significantly associated with obesity among diabetic patients ($p < 0.05$). It was observed that complications of diabetes was significantly higher among obese diabetic patients ($p < 0.05$). The effect of BMI on hypertension, stroke, nephropathy, diabetic foot and retinopathy was found statistically significant and odds ratio was 26.826, 5.632, 3.576, 3.893 and 6.195 respectively.

Conclusion: Obesity was responsible for causing various complications among diabetic patients. Policy maker should be design and implement appropriate health education programme to prevent obesity and its associated complications among diabetic patients.

Keywords: *Obesity; Risk factors; Diabetes and Urban people*

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Introduction

Diabetes mellitus is a major global health problem. World Health Organization report predicted 79.4 million diabetic patients by the year 2030 [1]. The cause of Diabetes mellitus is poorly understood. Changes in diet and life style due to rapid economic development are fore most among the principle drives of diabetes in developing and developed countries [2]. International Diabetes Congress in Helsinki, Finland reported that obesity is the most preventable and important risk factor for Diabetes mellitus Type 2 [3]. Almost four out of five people who are newly diagnosed with diabetes are obese [4]. The risk for diabetes has been reported to be about 2-folds in the mildly obese, 5 fold in the moderately obese and 10 folds in morbidly obese persons [5]. Obesity, type 2 diabetes mellitus, and their associated long-term complications are emerging as critical [6]. Bangladesh is one of the developing countries in the world, which is facing rapid

urbanization in recent time [7]. It was reported that prevalence of type 2 diabetes is on the rise more in urban areas compared to rural population in Bangladesh [8,9]. Urbanization was found to be associated with a sedentary lifestyle, higher calorie food intake and stressful condition, which might have contributed to the increasing prevalence of diabetes [10]. Based on existing literature and lived experiences gathered through semi-structured interviews this paper offers an investigation of the antecedents and consequences of Type 2 Diabetes. This investigation goes beyond the medical model of diabetes and argues that diabetes emerged as a consequence of numerous changes in urban.

Methodology

Study type: It was observational study.

Study design: Case control.

Study period: The study was carried out over a period of one year.

Study area: This study was conducted in different hospitals (Dhaka Medical College Hospital, Mitford Hospital, Anwar Khan Modern Hospital, Popular Hospital Ltd and Medinova Hospital Ltd) in Dhaka city. The study area was selected purposively.

Sample size: I had taken total 200 diabetic patients, divided into 100 obese diabetic (case) and 100 non-obese diabetic (control) patients.

Selection of sample: Non probability purposive sampling was used to collect sample

Data collection method: Personal interview was taken to collect data. Diabetic book was considered for cross check. Diabetic foot was diagnosed by clinical examination.

Inclusion criteria: All adult diabetic patients

Case: Having BMI ≥ 27 (Obese)

Control: Having BMI < 27 (Non-obese)

Data analysis: After coding and editing, data were analyzed by using Statistical Package for Social Science or SPSS (version 16.0). Obesity status was determined by BMI according to WHO cut off value for Asian people. Both descriptive (frequency, percentage etc.) and inferential (Chi-square) statistics were used to summarize data. Level of significance was considered at 5% or 0.05. Logistic regression was also done.

Results

Association between fast food intake, sweet food intake, preferred food items, unit of insulin and BMI (n = 200)

Table 1 reveals that 33% obese (case) consume fast food and 17% do not consume whereas 11% non-obese (control) take fast food and 39% do not take. Statistical significant association was found between fast food intake and BMI ($p < 0.05$). About 33.5% obese (case) consume sweet food and 16.5% do not consume whereas 5% non-obese (control) take sweet food and 45% do not take. Statistical significant association was found between sweet food intake and BMI ($p < 0.05$). Obese prefer intake of cereals and oils, fish/meat, vegetables and fruits than non-obese. Statistical significant association was found between preferred food item and BMI ($p < 0.05$). About 30.5% obese (case) use ≥ 19 unit of insulin and 19.5% use < 19 unit of insulin whereas 31.5% non-obese (control) use < 19 unit of insulin and 18.5% use ≥ 19 unit of insulin. Association between unit of insulin and BMI is statistically significant ($p < 0.05$).

Association between hypertension, stroke, nephropathy, diabetic foot, retinopathy and BMI (n = 200)

Table 2 indicates that 33.5% obese (case) suffer hypertension and 16.5% do not suffer whereas 44% non-obese (control) do not suffer hypertension and 6% suffer. Association between hypertension and BMI is statistically significant ($p < 0.05$). About 25.5% obese (case) have stroke and 24.5% have no stroke whereas 43% non-obese (control) have no stroke and 7% have stoke. Association between stroke and BMI is statistically significant ($p < 0.05$). About 19.5% obese (case) and 8% non-obese (control) have nephropathy whereas 72.5% patients both cases and controls have no nephropathy. Association between nephropathy and BMI is statistically significant ($p < 0.05$). About 18% obese (case) and 5.5% non-obese (control) have diabetic foot and rest of the patients have no diabetic foot. Association between diabetic foot and BMI is statistically significant ($p < 0.05$). About 27% obese (case) and 7% non-obese (control) have retinopathy and rest of the patients have no retinopathy. Association between retinopathy and BMI is statistically significant ($p < 0.05$).

Fast food intake	BMI		Total	χ2	p-value
	≥ 27 (Case) %	< 27 (Control) %			
Yes	33	11	44	39.286	0.000
No	17	39	56		
Sweet food intake					
Yes	33.5	5	38.5	68.609	0.000
No	16.5	45	61.5		
Preferred food items					
Cereals and oils	13	4.5	17.5	45.561	0.000
Fish or Meat	15.5	5.5	21		
Vegetables and fruits	12.5	8	20.5		
All items	9	32	41		
Unit of insulin					
≥19	30.5	18.5	49	11.525	0.001
<19	19.5	31.5	51		

Table 1:

Hypertension	BMI		Total	χ2	p-value
	≥27 (Case) %	<27 (Control) %			
Yes	33.5	6	39.5	63.291	0.000
No	16.5	44	60.5		
Stroke					
Yes	25.5	7	32.5	31.202	0.000
No	24.5	43	67.5		
Nephropathy					
Yes	19.5	8	27.5	13.266	0.000
No	30.5	42	72.5		
Diabetic foot					
Yes	18	5.5	23.5	17.383	0.000
No	32	44.5	76.5		
Retinopathy					
Yes	27	7	30	35.651	0.000
No	23	43	70		

Table 2:

Risk factor estimation by binary logistic regression of BMI with complications of diabetes

The effect of BMI on hypertension, stroke, nephropathy, diabetic foot and retinopathy is found significant whereas the effect of family history is only significant on diabetic foot and physical activity is significant on hypertension. It has been observed that the odds ratio of BMI on hypertension, stroke, nephropathy, diabetic foot and retinopathy is 26.826, 5.632, 3.576, 3.893 and 6.195 respectively.

Predictors	Complications of diabetes														
	Hypertension			Stroke			Nephropathy			Diabetic foot			Retinopathy		
	B	P value	OR	B	P value	OR	B	P value	OR	B	P value	OR	B	P value	OR
BMI	3.289	0.000	26.826	1.728	0.000	5.632	1.274	0.001	3.576	1.345	0.001	3.893	1.824	0.000	6.195
Family history	-0.255	0.504	0.775	0.182	0.594	1.200	0.041	0.905	1.042	0.783	0.030	2.188	0.236	0.490	1.266
Physical activity	1.269	0.011	3.556	-0.371	0.372	0.690	0.277	0.483	1.319	0.071	0.872	1.073	-0.447	0.284	0.640

OR=Odds Ratio

Table 3:

Discussion

Fast food consumption is one of the factors which have been reported as a cause of obesity. Overweight and obesity continue to increase substantially worldwide, affecting all ages, sexes and races. There is convincing evidence that increases in the energy density of the diet by fat or sugar, together with concomitant eating behaviors like snacking and eating out, promotes unhealthy weight gain through passive overconsumption of energy [11]. Statistical significant association was found between fast food intake and BMI in the present study. Availability of fast food and urban life style may be responsible for obesity. French., *et al*. found that an increase of only one fast food meal in a week was associated with a daily energy intake increase of 234.4 KJ and a weight gain which was over and above the average weight gain of 0.72 kg [12]. The frequent consumption of fast foods is one of the main reasons for high intake of saturated fatty acid and trans fatty acids which partially come from using hydrogenated vegetable oil [13]. This class of fatty acids can cause insulin resistance and predispose to type 2 diabetes [14]. The present study found that obese people consumed more sweet foods. Simultaneous consumption of fast food and beverages with sugar being added was found to be positively associated with BMI, and consuming full portion sizes was found to be positively associated with obesity [15]. Fruits and vegetables play an important role in improving general health. Fruit and vegetable consumption is inversely related to total and low density lipoprotein cholesterol [16]. Obese people prefer intake of cereals and oils, fish/meat, vegetables and fruits than non-obese. Physical activity is a major determinant of health and when it exceeds the minimum recommended amount, it helps in improving physical fitness, reducing the risk of chronic diseases and disability and in preventing unhealthy weight gain [17]. Obesity in association with hypertension, dyslipidemia, and hyperglycemia constitute the metabolic syndrome (MS), a well-recognized constellation of risk factors for the development of type 2 diabetes [18]. Association between hypertension and BMI is statistically significant. Globally, high blood pressure (BP) is estimated to cause 7.1 million deaths, about 13% of the total. About 62% of cerebrovascular disease and 49% of ischemic heart disease are attributable to suboptimal BP (systolic > 115 mm Hg). Overweight and obesity increase the risks of high BP, coronary heart disease, ischemic stroke, type II diabetes mellitus and certain cancers. Worldwide about 58% of diabetes mellitus and 21% of ischemic heart disease are attributable to BMI above 21 kg/m^2 [19]. In a study that examined ethnic differences in the strength of association between BMI and hypertension, higher prevalence of hypertension was associated with higher BMI levels in different ethnic groups [20]. Significant associations between BMI and BP have also been documented in lean Chinese populations [21]. In a prospective cohort, increasing BMI was associated with a steady increase in the risks of total, ischemic, and hemorrhagic stroke. Although concomitant hypertension and diabetes accounted for much of the increase in total and ischemic stroke, a significant increase remained after adjustment for these potential biological mediators. Although the risk of ischemic stroke was highest among smokers and individuals with hypertension, these factors did not substantially modify the relationship between BMI and stroke. Body mass index was not associated with the severity of total and ischemic stroke, but the data suggest that it might be inversely associated with severity of fatal hemorrhagic stroke, particularly subarachnoid hemorrhage. The

association between excess weight and stroke risk has been controversial. Among men, few prospective studies have investigated this relationship. Some of these had small sample sizes and others did not classify stroke subtypes [22]. To my knowledge, the association between BMI and stroke severity has not been examined prospectively before. Association between stroke and BMI is statistically significant in this study. Individuals with diabetes mellitus are 17 times more likely to have an amputation as a result of peripheral vascular disease and are at an increased risk of developing nephropathy, retinopathy, and coronary heart disease, among other adverse health outcomes [23]. The present study showed similar findings. Increasing evidence suggests that obesity is a risk factor for diabetes and chronic kidney diseases. As a marker of obesity, high body mass index (BMI) has been reported to be related with diabetic nephropathy (DN) and end-stage renal disease (ESRD) [24].

Conclusion

Fast food intake, sweet food consumption and intake of preferred food are the risk factors of obesity among diabetic patients. Obese patients need more insulin than non-obese. Tendency to develop hypertension was almost 27 times higher among obese diabetic patients than non-obese diabetic patients. Risk of developing stroke among obese was 6 times high. Four times higher chance of suffering from nephropathy and diabetic foot was seen among obese. Obese diabetic persons were 6 times more prone to suffer retinopathy. All complications were statistically significant.

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