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Study On Effects Of Food On Diabetes Mellitus And Body Fitness

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ABSTRACT

Diabetes is a complex, chronic condition that requires both high quality clinical care and effective self management. Diabetes education is the corner stone of diabetes management because diabetes requires day to day knowledge of nutrition, exercise, monitoring and medication. The study evaluated the effectiveness of delivering diabetes education in individual setting using a consistent, evidence based curriculum. A total of 60 subjects (n-60) were recruited for individual educational setting (n-25) and usual care (n-35). Bangladeshi Bengali speaking adult, age-40 years and above who have been diagnosed with type-2 diabetes, have had a change in treatment or condition or have never received comprehensive diabetes self management education. In this research main outcomes glycosylated haemoglobin were measured at base line, 3 months and 6 months. Other outcomes like fasting blood sugar, post prandial blood sugar, serum creatinine, urinary microalbumin, lipid profile, weight, height, bodymass index and waist circumference were also measured. Individual education significantly improves glycosylated haemoglobin and other outcomes than usual care. Glycosylated haemoglobin decreased from 8.3 ±1.6% at base line to 6.6±0.9% ($P<0.001$) at 6 months in case of individual educational setting. In case of usual care glycosylated haemoglobin increase from 8.5±1.2 at base line to 9.0±1.6. Glycosylated haemoglobin markedly improved in case of individual educational setting. Any reduction of glycosylated haemoglobin is beneficial. Diabetic education not only improves clinical outcomes but also improve quality of life.

Keywords: Diabetes Mellitus, Body Fitness, Nutrition and Health, Diet and Metabolism, Blood Sugar Control, Lifestyle Diseases

INTRODUCTION

The number of people with diabetes is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity, quantifying the prevalence of diabetes and the number of people affected by diabetes, now and future, is important to allow rational planning and allocation of resources. Diabetes education is a critical component of the clinical management of diabetes mellitus and DSME should always be considered as part of the treatment plan even if a patient is reported to have excellent metabolic control. The number of people with diabetes is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity, quantifying the prevalence of diabetes and the number of people affected by diabetes, now and future, is important to allow rational planning and allocation of resources. People can avoid diabetes if he or she eat balanced diet and avoid some foods and practice some physical exercises. If anyone diagnosed diabetes, there is a chance to diagnosed hypertension in future.

Diabetes was first recognized 3500 years ago by the ancient Egyptians. The incidence of diabetes has doubled every 20 years since 1945. The international diabetes federation reported an estimate of 194 million with diabetes in 2003 and predicted that this will increase to 333 million in 2025 (Diabetes atlas-2005) and similar projection have been made by the WHO (wild 2004). 76% of people with diabetes will be living in the developing countries in 2030 (WHO) and the urban population become double in developing countries

(King 1998). The direct disease costs, diabetes will place an enormous additional burden on these countries through productivity losses.

Diabetes mellitus in people of all ages is reaching epidemic proportions in Bangladesh. Bangladesh is a developing country and has the lowest health care spending per capita. The main focus is on reduction of infant and maternal mortality. Recent study estimates that about 40% of people with diabetes in Bangladesh are not able to support themselves productivity because of complication related to their diabetes. In 2020, the IDF estimated that 8.7 million (6.1%) people in Bangladesh are suffering from diabetes. The number of diabetic population in Bangladesh is expected to rise to 11.1 million by the year 2030. This rapid increase in diabetes prevalence will place Bangladesh among the top seven countries in terms of the number of people living with diabetes in 2030. Exact data is not available about prevalence of diabetics in Bangladesh. No countrywide survey was done by Bangladesh Government or IDF or any N.G.O.

In India prevalence of diabetes is about 15%. Bangladesh is the nearest neighbour of India. There is no gross difference between Bangladeshi ethnicity and Indian ethnicity. If any difference exists in prevalence of diabetics in Bangladesh & India, it is due to dietary habit of Bangladeshi people. Most of the people are non vegetarian. Mixed diet flattens the glucose curve. The prevalence of diabetes in rural Bangladeshi is growing rapidly. Lack of physical activity is the significant predisposing factors. Available transport facility is one of the important causes of lack of physical activity and over all knowledge about diabetes is poor. Diabetes among children is growing rapidly due to lack of physical activity and unhealthy eating (fast food, soft drinks etc.). Low birth weight is another risk factor for diabetes in Bangladesh. Obesity is not a major cause.

As of 2019, an estimated 463 million people had diabetes worldwide (8.8% of the adult population), with type 2 diabetes making up about 90% of the cases. Rates are similar in women and men. Trends suggest that rates will continue to rise. Diabetes at least doubles a person's risk of early death. In 2019, diabetes resulted in approximately 4.2 million deaths. It is the 7th leading cause of death globally. The global economic cost of diabetes-related health expenditure in 2017 was estimated at US$727 billion. In the United States, diabetes cost nearly US$327 billion in 2017. Average medical expenditures among people with diabetes are about 2.3 times higher.

OBJECTIVES OF THE STUDY

The specific objectives of the study are as follows:

1. To assess the present status medical treatments relating to food-diabetes-hypertension and physical fitness
2. To identify the impact of the food and exercise on diabetes and body functions.
3. To develop a clinical diet-fitness prescription for diabetic patients

METHODOLOGY

Research Design and Method

Study Design: Randomized Clinical trial.

Setting : Primary Care physician based two Multidisciplinary Medical Centre (including diabetic care), Dhaka, Bangladesh.

Duration of Study: 6-Months

Sample Size: 60 type 2 diabetic patients, Individual setting-(n-25) & usual care (n-35)

Data Analysis

Statistical analysis was done by using SPSS statistical program. All analysis were done by SPSS version 12.0. Descriptive statistics were used to characterize the sample and to summarize the outcome measures before, during and after intervention. Paired sample ‘t’ test was used to analysis the difference between base line and follow up measures. ANOVA analysis was used to show significant reduction in HbA1C at each time period.

Step-1	Step-2	Step-3	Step-4
Data to SPSS	Selection of procedure from menus	Selection of variable for analysis	Examination of the result

Research Design and Method

A total of 60 subjects (n-60) were recruited for individual educational setting (n-25) and usual care (n-35). Bangladeshi Bengali speaking adult, age-40 yrs. and above who have been diagnosed with type-2 diabetes. Participants had no identifiable language barrier or no known mental disability and were willing to participate in the study. Most of the participants are non vegetarian, same ethnicity and same cultural background. Participants were never participating in comprehensive DSME training.

Inclusion Criteria

People with type-2 diabetes, age over 40 years and above, Bangladeshi Bengali speaking adults, newly diagnosed, have had a change in treatment or condition or have never received comprehensive diabetes self management education. HbA1C > 7% and < 10%.

Exclusion Criteria-

i. Having Type-1 diabetes.
ii. Gestational diabetes
iii. Haemoglobinopathy
iv. Marked blood loss.
v. Who had undergone DSME training?
vi. HbA1C <7.0% & > 10%.

Interventions

Subjects received individual education in four sequential sessions delivered at base line, 02 wks, 03 months and 6 months period. DSME training was given according to ADA guide line by the registered nurse educator (RN), Registered Dietitian (RDN), Registered pharmacist (RP), exercise physiologist, primary care physician and psychologist.

Primary care physician select the patient. Education addressed a wide range of self management issue and aimed to impact on clinical out comes. Education was specific for people with type-2 diabetes. Individual education and usual care were given at the same time. All session were face to face. The four sessions were designed to meet the needs of the adult learner and consisted of 5-7 hours of education. For individual education initial visit was 2 hour and 2 wks follow-up session was 1 hour, 3 months and 6-months follow-up session were 1 hour.

Randomization

Randomization occurred at the time of initial selection for individual educational setting and usual care, particularly those who were agreed to participate in individual educational setting and usual care. Subjects were randomly assigned to either an individual setting or usual care in block sizes of six. The first three consecutive subjects were assigned to individual setting and next three subjects assigned to the usual care. Once subjects completed their initial visit, follow-up session were scheduled as outlined in the education curriculum at intervals of 02 wks, 3 months and 6 month and same as for usual care.

RESULTS

Individual educational setting led by primary care physician shows significant improvement in HbA1C and other outcomes compared with usual care. HbA1C decreased from 8.3 ± 1.6% at base line to 6.6 ± 0.9% at 6- months ($p<0.001$) but in usual care HbA1C 8.5 ± 1.2 at base line to 9.0 ± 1.6 at months ($P>0.05$). We examined the efficacy of DSME on a variety of outcomes. All examined for GHb out come. Descriptive characteristics of the study population including age, sex, ethnicity, education level, participants goal and % of patient who achieved goal. Height, weight, BMI and HbA1C are summarized in Table-I, II, III study results and number of participants and results also shown by graphic representation.

Table 1: Socio demographic characteristics of the participants

Particulars	Individual Education	Usual Care	Lost to follow-up	Total participants
No of participants (%)	25	35		
Age 41-55 Yrs.	16	22	5	65
> 55 yrs.	09	13		
Sex				
Male	18	26	04	48
Female	07	09	01	17
Marital Status				
Married	19	32		
Unmarried	01	0		
Widow	04	03		
Divorce	01	0		
Education				
Illiterate	0			
Primary School	09			
Secondary School	20			
Higher Secondary	16			
Graduate & above	20			
Occupation				
Farmer and day labour	04			
Service Holder	26			
Businessman	15			
House Wives	14			
Retirement	06			
Socio economics status				
Poor	09			
Lower Middle Class	27			
Middle Class	29			
Dietary Habits				
Non Veg.	63			
Vegetarian	02			

Table 2: Assessment of individual educational setting compared with usual care

	Individual (n-25)			Usual Care (n-35)		
	Base line	6 months	P value	Base line	6 months	P value
Weight in Pound	220.2 ± 31.7	214.4±32.0	<0.01	225.7 ± 49.2	215.3 ± 48.9	<0.01
Height (inches)	67.0±39			68.2 ± 4.6		0.09
BMI (Kg/m2)	33.9 ± 5.7	33.1± 5.9	.011	34 ± 5.6	34 ± 5.9	
HbA1C	8.3 ± 1.6	6.6 ± 0.9	<.001	8.5 ± 1.2	9.0 ± 1.6	>0.05

Figure 1: Study Results

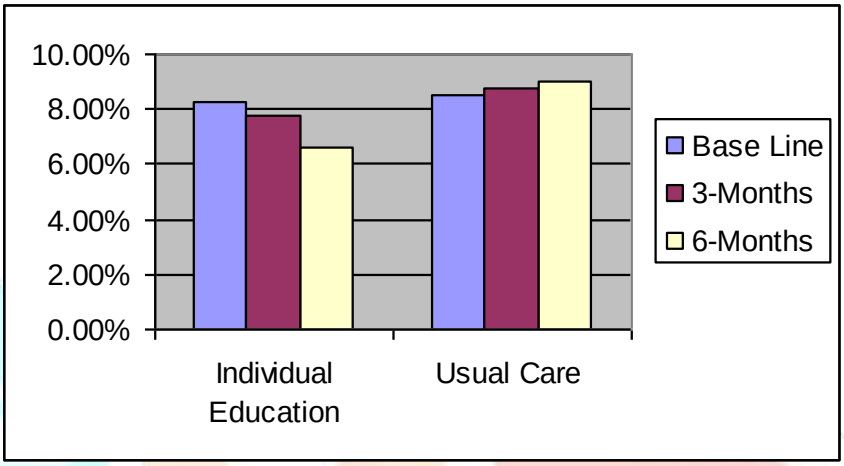


Table 3: Participants' goal & percent of patients who achieved goal

Participants goal	Percent of patients who achieved goal
Learn how to measure self blood glucose (SBGM)	82%
Insulin administration skills & use of prescribed medicine	93%
Developed healthier eating habits	90%
Improve physical activity	75%
More active life style changes	70%

Figure 2: Participants' goal & percent of patients who achieved goal

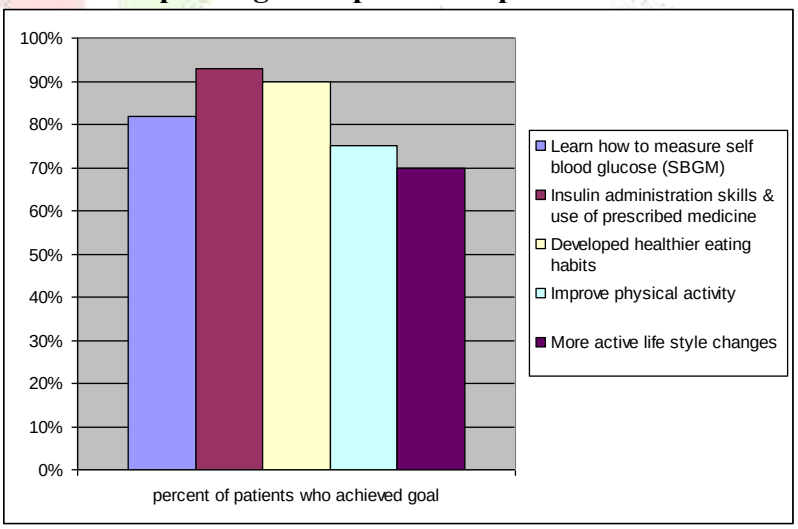


Figure 3: Participation Rates

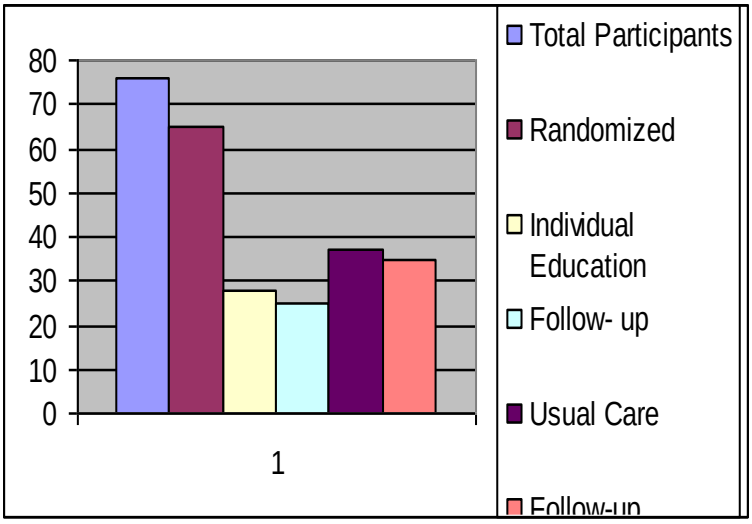
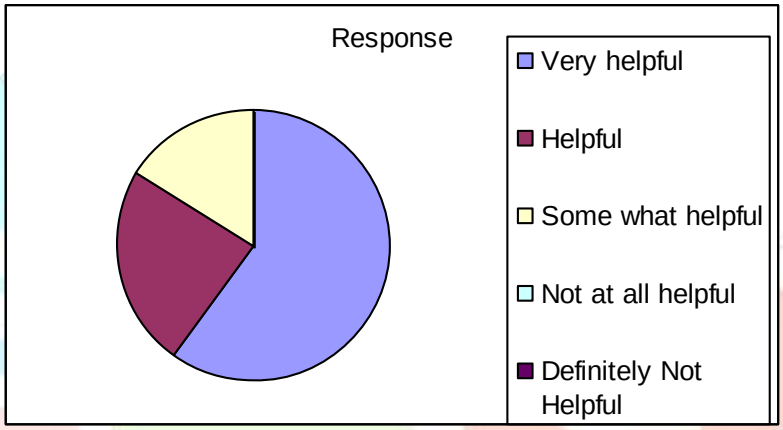


Figure 4: Providers' perception of Helpfulness of DSME



DISCUSSION

Diabetes is a chronic disease that can cause severe complications resulting in Kidney failure, blindness, amputations, loss of sensation and cardiovascular disease. Many of the debilitating effects of diabetes are avoidable through consistent glucose control. Studies have shown that people with diabetes that attend the diabetes self-management education have better clinical outcomes compared to those that have not participated. High quality structured education have a profound effect on health out comes and significantly improve quality of life. Patient education program for people with Type-2 diabetes include.

- Improving knowledge, health beliefs and life style changes, improving patients outcomes i.e. weight, Hemoglobin A1C, lipid level, smoking and psychosocial changes such as quality of life and level of depression.
- Improving levels of physical activity.
- Reducing the need for and potentially better targeting of medications and other items such as blood sugar strip.

Many people with diabetes do not attend the DSME training because:

- Many people think it is not essential.
- Times and date are not convenient.
- Traffic Jam and transportation difficulties.
- Low income group think it is only waste of time. They have no time to participate such kind of education due to busy work schedule.
- Timing of class was not suitable.
- No insurance coverage.

There are some limitations about primary out come (HbA1C) measure-

- Sufficient blood loss, iron deficiency anemia renal failure, haemoglobinopathy and assay method may give false result. We excluded these criteria.

CONCLUSIONS

The study confirms the effectiveness of DSME on improving health out comes. DSME improves HbA1C levels at immediate follow up and increase contact time increases the effect. Further research in needed to develop interventions effective in maintaining long term glycemic control. HbA1C markedly improved in case of individual educational setting compared with usual care. Any reduction of HbA1C is beneficial. Education in individual setting, significantly improved learning, behavioral and clinical outcomes among primary care patients with type-2 diabetes. Those who have not got DSME training associated with unsatisfactory glycemic control and higher rate of complications and those who have got DSME training associated with tight glycemic control.

RECOMMENDATIONS

Primary care is the "Medical Home" for a patient, ideally providing continuity and integration of health care. If DSME is provided at the primary care label with active collaboration of the primary care physician, it will be cost effective and mass people can participate in DSME training. Long term goal can be achieved. Because the aims of the primary care are to provide the patient with broad spectrum of care, both preventive and curative, over a period of time and to coordinate all of the care the patient receives.

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