ORIGINAL ARTICLE

A comparative study of group versus individual diabetes education on the diabetes knowledge among type 2 diabetics in an urban Nigerian hospital

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Abstract

Background: Diabetes group education is a cost effective alternative to individual education with the potential to significantly improve diabetes care. We compared the effect of group versus individual diabetes education on the diabetes knowledge test scores of adult type 2 diabetics in a primary care setting.

Methods: A comparative study consisting of two hundred consenting type 2 diabetics receiving care at the general outpatient department of Bingham University Teaching Hospital was done. Subjects were recruited by systematic random sampling and randomly allocated into intervention (group education) and control (one- on- one education) in 10 blocks of 20 subjects each. Socio-demographic, clinical and diabetes knowledge score data were obtained with standardized questionnaires from both groups at 0 and12 weeks.

Results: A total of 142 patients completed the study, intervention ($n = 82$) and control ($n = 60$). Overall, 104(28.9%) passed the diabetes knowledge test (DKT),66 (80.5%) in the group education compared to 38 (63.3%) in the control group, OR 2.39 (1.12-5.09). The mean DKT score was higher in the intervention group at the end of the study, 8.48 ±2.4 vs 7.58±2.4, p=0.03. The intervention group had a similar change in mean DKT score, 2.16 vs 1.73, p=0.37. Multinomial logistic regression revealed that tertiary education was significantly related to diabetes knowledge test status (OR= 0.39; 95% CI:0.16-0.99).

Conclusion: This study demonstrated poor diabetes knowledge in the entire study group before the intervention, but comparable improvement in diabetes knowledge in the two groups.

Keywords: Type 2 diabetes mellitus, Diabetes knowledge, Education, Group visits

Highland Med Res J 2015;15(1):19-22

Introduction

Diabetes mellitus is a common costly condition associated with significant morbidity and mortality.[1]It is a chronic and progressive disorder that impacts upon almost every aspect of life. Diabetes management is complex and difficult from both the patient's and provider's perspectives. Evidence exists that levels of care are suboptimal.[2] This is mostly because lifestyle behaviours (e.g. diet and physical activity) are difficult to change, and healthy behaviours are more difficult to maintain for long periods.[2]Daily medication regimens, insulin injection and blood glucose monitoring are also complex and uncomfortable. Moreover, substantial time and money are needed to manage diabetes. For successful management, persons with diabetes need adequate patient education and social support.[2] Diabetes patient education is recognized globally as a vital and integral component of overall diabetes care.[3]Current evidence suggest that diabetes education has an overall beneficial impact on health and psychosocial outcomes.[4] Specifically, improved patient's knowledge and behaviour has been shown to improve glycaemic control in diverse settings.[4] Patients with diabetes require both knowledge and skills to manage their disease. These will result in more informed choices and beneficial changes in their behaviour.[4]

Early research into the impact of diabetes education has been criticized for focusing on assessing improvements in knowledge.[5] Nonetheless, it is now widely agreed that, although knowledge alone is not sufficient to effect behaviour change, it is a vital prerequisite to such changes.[5]Compared to individual based approaches group based education typically invites greater interaction and interpersonal dynamics.[4] Moreover, the group setting can foster certain educational activities such as social modelling or problem based learning better than the individual setting.[5]This study was designed to compare individual versus group education on diabetes knowledge test scores among adult Type 2 Diabetes Mellitus (T2DM) at a tertiary health institution.

Materials and Methods

The study was conducted at Bingham University Teaching Hospital, Jos, the Plateau State Capital. The

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hospital is a 200 bed centre and provides healthcare for patients from Plateau State and the neighbouring States of Kaduna, Nasarawa, Bauchi, Gombe, Adamawa and Taraba States.

The General out-patient clinic as well as the medical out-patient clinic runs daily. Unpublished hospital data shows that an average of 500 patients are seen weekly out of which 50 are diabetic. The study was approved by the Bingham University Teaching Hospital Research and Ethics Committee. Informed consent was obtained from subjects before enrolment. A total of 200 participants were recruited within four weeks, and the study was carried out within three months between August and November 2011. Other details of participant selection, sample size estimation, allocation and blinding had been previously reported.[6]

The modified Michigan Diabetes Research and Training centre's brief diabetes knowledge test questionnaire, designed to assess patient knowledge on diabetes was self-administered. The test was created for type 1 or type 2 diabetes mellitus patients.[7] There were a total of 14 multiple choice questions assessing key areas of diabetes knowledge. The questions were aligned and modified to the basic diabetes knowledge test, a version of the Michigan diabetes research and training centre's brief diabetes knowledge test. The test covers knowledge of glucose level awareness, symptoms and treatment of hypoglycaemia, diabetic diet, knowledge of related and non-related morbidities to diabetes, exercise and foot care. The Michigan Diabetes knowledge test is appropriate for testing diabetes knowledge in adults, and was found to have a reliability score of 0.7 and 0.71 from two different Michigan populations.[7] It has been validated in Malaysia where the Cronbach's alpha was found to be 0.702.[8] The patients who pass the test are defined as those who achieved =50% in the knowledge-based part of the questionnaire i.e. patients answering 7 or more questions correctly of the total 14.

For those randomised to the intervention arm, the investigators also issued a clearly written letter of invitation to the group education session explaining its purpose, duration, agenda, time and venue. Group education sessions for each block of 20 patients was carried out on five consecutive days of a particular week, whereas the five blocks of 20 patients of the control group were seen by another family medicine physician who was not part of the study team on five consecutive days of the following week. Both intervention and control groups were given appointments at the same time of the day (8am). During the first visit for both study groups, baseline diabetes knowledge of each subject was assessed using the questionnaire.

The scores obtained by each subject was computed and recorded. After the first educational session, subjects in both the intervention and control group were given a diabetes educational material. At the end of three months, a research assistant not exposed to the study was recruited to administer the same diabetes knowledge questionnaire which was used before the educational sessions commenced.

Outcome Measures

The primary outcome of this study was the change in proportion of participants who passed the diabetes knowledge test. Mean fasting blood glucose, blood pressure and BMI were secondary outcome measures.

Data Analysis

Data collected was analysed using SPSS (Statistical Package for Social Sciences) software 21.0. Mean diabetes knowledge test scores as well as mean change of clinical parameters were analysed using student t-test. Nominal regression was used to analyse the relationship between socio-demographic factors of the study population and their knowledge status. Mann Whitney U test was used to compare non-parametric data.

Results

Within the period of recruitment, 320 diabetic patients were seen in the outpatient department of Bingham University Teaching Hospital. A total of 120 patients were excluded and 200 recruited as shown in Figure 1. A total of 142 patients representing 71% completed the study. Attrition rates were 18% for the intervention group and 40% in the control group.

Table 1: Characteristics of participants at baseline

Variable	Intervention	Control	P value
Sex (M/F)	36/46	29/31	0.36
Age, Mean±SD	49±11	54±10	0.07
Married, n (%)	65(74.2%)	48(80%)	0.87
Positive family history of DM, n (%)	35(42.7%)	16(26.7%)	0.049
Tertiary education, n (%)	29(35.4%)	15(25%)	0.29
Duration of DM, Median (Range)	4(0.5- 21)	6(1- 30)	0.52*
Mean DKT scores	6.3±2.1	5.8±2.2	0.21
BMI (Kg/m^2), Mean±SD	27.62±6.2	26.14±4.2	0.002
FBG (mg/dl), Mean±SD	186.38±85.8	180±76	0.35
Systolic BP (mmHg)	128±24	161±5	<0.001
Diastolic BP (mmHg)	82±14	84±12	0.34

*=Mann-Whitney U-test DKT= Diabetes knowledge test

The subjects were comparable at baseline regarding age, sex, marital status, educational level, mean fasting blood glucose, BMI and DBP (Table 1).

At the end of the intervention, 66 (80.5%) in the group education passed the Diabetic Knowledge Test compared to 38 (63.3%) in the control group, OR 2.39(1.12-5.09). The mean diabetic knowledge test (DKT) score was also higher in the intervention group compared to the control group, 8.48 ±2.4 vs 7.58±2.4,

p=0.03. The intervention group had a comparable change in mean DKT score, 2.16 vs 1.73, p=0.37.

Table 2: Mean change in clinical parameters of participants

Variables	Change in mean		P Value
	Intervention Group n=82	Control Group n=60	
BMI (Kg/m^2)	-0.18	-0.18	0.23
Systolic BP (mm/Hg)	2.07	-0.7	0.64
Diastolic BP (mm/Hg)	-1.96	-31.3	0.53
FBG (mg/dl)	-37.29	-9.20	0.60

Table 3: Factors associated with post intervention diabetes knowledge in study group on logistic regression

Variables	Adjusted Odds ratio (95%CI)	P Value
Age >50years	0.94 (0.43 - 2.04)	0.87
Gender (male)	0.63 (0.29 - 1.38)	0.25
Marital status (married)	1.05 (0.40 - 2.78)	0.92
Occupation (employed)	0.69 (0.24 - 2.03)	0.50
Family history of DM	1.39 (0.63 - 3.06)	0.41
Education (tertiary)	0.39 (0.16 - 0.99)	0.047

There were also no statistically significant differences in the mean change for BMI (-0.18 vs -0.18, p=0.23), systolic BP (2.07 vs -0.7, p=0.64), and diastolic BP (-1.96 vs -31.3, p=0.53) (Table 2).Multinomial logistic regression revealed that tertiary education, OR 0.39 (0.16-0.99) was significantly related to diabetes knowledge test status (Table 3).

Discussion
Overall, of the one hundred and forty two study participants available at the end of the study the baseline diabetes knowledge test status of all the patients recruited for the study showed that only 63 (44.4%); 52.5% of intervention group vs 33.3% of control group, passed the diabetes knowledge test. This finding is consistent with those of a community survey in Kenya where only 27.2% of the people interviewed had good knowledge of diabetes.[9] Puepet et al,[10] found a similar level of knowledge of diabetes, 30.2%, among patients with diabetes in Jos, Plateau State, Nigeria. Even in a developed country, Baradaran and Knill-Jones[11] found that knowledge about diabetes amongst ethnic groups in Glasgow was very low. They found 17.7% in the British, 14.3%, among Indians and 13.8% in the Pakistani groups studied. Even though these studies were community surveys involving relatively larger sample sizes across heterogeneous cultural settings, these findings underscore the need for enhanced diabetes education to the community.

The post intervention knowledge status of the study population however showed improvement of diabetes knowledge test scores in both the intervention and control groups. After the intervention, 104 (73.2%) of the study participants passed the diabetes knowledge test (63.3% of the control group vs. 80.5% of the intervention group), $p= 0.034$. This finding is similar to Rickheim et al,[12] who used a 14 point diabetes knowledge score to assess knowledge at baseline and at six months and found out that both the group and individual education groups had significant improvements in knowledge compared to baseline, but in their study, there was no significant difference in knowledge scores (p= 0.15). Comparisons with our study are however limited by the fact that the population studied by Rickheim et al [12]consisted of only newly diagnosed type 2 diabetics in a relatively homogenous population. Moreover, the retention rate for the study subjects was 54% at the 6-month follow-up visit. In a one-year RCT, Adolfsson et al,[13] evaluated the impact of empowerment group education on diabetes education among other outcome measures. They found out that diabetes knowledge was significantly higher in the intervention group than in the control group (P<0.05). The significant difference between the mean post intervention diabetes knowledge test score of both groups is consistent with results of Adolfsson et al[13], Rickheim et al[12] and Puepet et al.[10]

This implies that structured diabetes education delivered in a group setting has the potential to improve diabetes related knowledge. Higher educational level was the main predictor of diabetes knowledge test score in our study. This is not unexpected as other investigators found educational level as a significant predictor of diabetes knowledge.[14] Age >50years was also a significant predictor of diabetes knowledge test score in this study. This is in keeping with Jasper et al,[14] who found age group 51-60 years was associated with better diabetes knowledge.

Although in our study group education improved patients' diabetes knowledge, the relatively small sample size calls for caution in the interpretation and generalization of these findings to other clinical settings. In addition, the control group had a 40% loss to follow up at the end of the three month period. Moreover, the Michigan Diabetes Knowledge Test had not been previously validated among our patient population.

Conclusion
Diabetes knowledge was poor in the study population pre-intervention. Diabetes education delivered in a group setting improves diabetes knowledge test scores better than one-on-one education in a typical clinic visit setting. Educational level and age are significant predictors of diabetes knowledge.

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