Relationship between Diabetes Education and Glycaemic Indicators of Patients in Diabetes Care Units at Three Hospitals, Khartoum State - Sudan

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Authors' contributions

This work was carried out in collaboration between all authors. Author SAB designed the study, the analysis and wrote the first draft of the manuscript. Authors SIA, KAMA and NMAA assisted in data collection and contributed in the literature search. Authors SAB and KMAS revised the manuscript for consistency and intellectual content. Authors SAB and KMAS revised the manuscript for grammatical and spelling mistakes. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Background: Diabetes education could contribute to the control of glycaemic status of the patients. **Objective:** It was to identify the education received by the diabetic patients and its relationship to their glycaemic indicators in diabetic care units at three hospitals in Khartoum State. **Methods:** A descriptive cross section study was carried out. A sample of 251 diabetic patients who attended for follow up was determined. An exit interview was carried out using a structured questionnaire. The patients` cards were reviewed for the most recent glycaemic indicators. Ethical clearance was obtained. Chi square test was used to test the association of the provided diabetic

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education with the glycaemic indicators of the patients.

Results: The females and males accounted to 67.7% and 32.3% respectively. Patients in the age group 35-65 years were 78.8% (141) and 77.3% (194) were literate. One hundred and ninety seven (78.5%) were either pensioners or housewives. Education on physical activity, diet control, blood glucose monitoring and foot care was received by77.7%, 86.9%, 12.4% and 45.8% of the patients respectively. Fasting blood sugar <=110 mg/dl, post prandial blood sugar <=180mg/dl and HBA1c < 7% were not significantly associated with receiving education, P-value > 0.05.

Conclusion: The association between receiving diabetes education and normal glycaemic indicators was insignificant.

1. INTRODUCTION

Diabetes education contributes to the increase in knowledge of the diabetic patients and positively shifts the behaviour towards controlling the glycaemic status [1]. Both HbA1c and body weight reduced significantly when the patients received frequent diabetes education [2]. Education about monitoring blood glucose, especially fasting blood glucose is an important factor to reduce the risk of death. Fasting blood glucose more than 100mg/dl was associated with the risk of death from cardiac diseases, cancer and others [3].

Education and counselling of patients on structured self-monitoring of blood glucose significantly control the overall glycaemic status and reduce the cost on diabetes care [4,5]. Generally; the comprehensive package of diabetes education is usually include messages about monitoring of blood glucose, physical activities, diet control and foot care [6]. Diabetes care units, included in the study, were located in tertiary care hospitals in Khartoum State. It provides comprehensive care for diabetic patients. The care providers in the diabetes care units are qualified educators and nutritionists who schedule the education on regular basis.

Sudanese diabetic patients in Khartoum State suffer from the direct drug and ambulatory costs without significant reduction on glycaemic status [7]. This reflects poor cost effective diabetes care that could be due to deficient resources, and it needs intensive education about the diabetes control among the patient. The aim of the study was to identify the types of education received by the patients and the relationship of education to the normal levels of glycaemic indicators.

2. METHODS AND MATERIALS

This was a descriptive cross section study that carried out in diabetes care units at three hospitals in Khartoum State: Soba University Hospital, Military Hospital and Police Hospital. The target population was diabetic patients attended for follow up in the diabetic care units. The inclusion criterion was the patient who was attending the diabetic care units for at least one year prior to the time of the study. A sample of 251 diabetic patients was determined by total of eligible patients during one month duration in the three diabetic care units. An exit interview of the patients was carried out using structured questionnaire. The variables for education were; the types of education received including monitoring of blood glucose, physical activities, diet control and foot care. The patients` cards were reviewed for the most recent recorded glycaemic indicators including fasting blood sugar, post prandial blood sugar and glycated haemoglobin (HBA1c). Ethical clearance was obtained from the ethical committee in Faculty of Medicine, University of Khartoum and from the three hospitals` authority. Informed consent was signed by each patient. Data was managed by SPSS software version 20. Descriptive statistics were presented in tables. Chi square test was used to test the differences between the types of diabetic education provided in the three diabetes care units at 95% confidence interval. Normal levels of glycaemic indicators were computed according to the national standard as follows: fasting blood glucose at <=110 mg/dl, post prandial blood sugar at <=180 mg/dl and HBA1c at < 7%. Fisher exact test at 95% confidence level was used to test the relationship between receiving education and the normal levels of the glycaemic indicators.

3. RESULTS

Most of the diabetic patients attended the three diabetes care units were females, 170 (67.7%) and 81(32.3%) were males [Table 1]. Most of the patients were in the age group 35-65 years 141(78.8%) and more than three quarters were

literate and having various grades of education 194(77.3%) [Table 1]. Most of patients 197(78.5%), were not having any work; either pensioners or housewives. Oral hypoglycaemic drugs were used by 158(62.9%) of the patients [Table 1].

The diabetic patients who received education about physical activities in the three diabetes care units accounted to 62(81.6%) in Soba University Hospital, 60(75.9%) in Military Hospital, and 73(76.0%) in Police Hospital P-value 0.693 [Table 2]. More patients in Police Hospital were significantly received education about diet control (91.7%) compared to Military Hospital (79.7%) and Soba University Hospital (88.2%), P-value 0.012 [Table 2].

In Police Hospital, 28.1% patients have received education about control of blood glucose, while 5.3% have received this education in Soba University Hospital and none in Military Hospital, P-value 0.001 [Table 2]. Patients in Soba University Hospital (59.2%) and Military Hospital (49.4%) have received education about foot care more significantly than those attending Police Hospital (32.3%), P-value 0.003 [Table2]. Fasting blood sugar <=110 mg/dl was shown among 27(19.3%) of patients who received education compared to 23(20.7%) among those who did not receive any education, p value > 0.05 [Table 3]. Post prandial blood sugar <=180mg/dl was shown among 54(41.2%) of patients received education compared to 31(33.7%) among patient who did not receive any education, p value > 0.05 [Table 3].

HBA1c < 7% was shown among 17(32.1%) of patients who received education compared to 11(29.7%) patients who did not receive any education, p value > 0.05 [Table 3].

Table 1. Characteristics of diabetic patients attending three diabetes care units in Khartoum State- Sudan (n=251)

Patients` characteristics		Frequency	(%)
Sex	Male	81	32.3
	Female	170	67.7
Age	20-35 Years	13	5.2
	More than 35 -50 Years	97	38.6
	More than 50 - 65 Years	101	40.2
	More than 65 Years	40	15.9
Education levels	Illiterate	57	22.7
	Primary	111	44.2
	Secondary	69	27.5
	University and above	14	5.6
Occupation	Not working	197	78.5
	Working	54	21.5
Type of treatment	Oral hypoglycaemic drugs	158	62.9
	Insulin of any type	93	37.1
	Diet control with hypoglycaemic agent	11	4.4

Table 2. Types of education received by diabetic patients in three diabetes care units in Khartoum State- Sudan (n=251)

Types of education		Soba University Hospital n=76	Military Hospital n=79	Police Hospital n=96	Total	Sig*
Physical activities	Yes	62(81.6%)	60(75.9%)	73(76.0%)	195(77.69%)	P=0.693
	No	14(18.4%)	19(24.1%)	23(24.0%)	56 (22.31%)	
Diet control	Yes	67(88.2%)	63(79.7%)	88(91.7%)	218(86.85%)	P=0.012
	No	9(11.8%)	16(20.3%)	8(8.3%)	33(13.15%)	
Monitoring of blood glucose	Yes	4(5.3%)	0(0.0%)	27(28.1%)	31(12.35%)	P=0.001
	No	72(94.7%)	79(100.0%)	69(71.9%)	220 (87.65%)	
Foot care	Yes	45(59.2%)	39(49.4%)	31(32.3%)	115(45.82%)	P=0.003
	No	31(40.8%)	40(50.6%)	65(67.7%)	136 (54.18%)	

Chi square test

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Table 3. Relationship between glycaemic indicators and diabetes education provided to patients in three diabetes care units in Khartoum State- Sudan

Recorded glycaemic indicators		Patients received any education about diabetes		Sig. Level*
		Yes (%)	No (%)	
Fasting Blood Sugar (n=251)	<=110 mg/dl	27(19.3%)	23(20.7%)	p value > 0.05
	> 110mg/dl	113(80.7%)	88(79.3%)	
Post- Prandial blood sugar (n=223)	<=180 mg/dl	54(41.2%)	31(33.7%)	p value > 0.05
	> 180 mg/dl	77(58.8%)	61(66.3%)	
HBA1c(n=90)	< 7%	17(32.1%)	11(29.7%)	p value > 0.05
	> 7%	36(67.9%)	26(70.3%)	

Fisher Exact Test

4. DISCUSSION

In this study; diabetic patients adequately received education about physical activities and diet control. Small proportions of patients have received education about monitoring of blood glucose and foot care. This is supported by diabetes education in developing countries. A study in Karachi, Pakistan revealed that diabetes education services were adequate, where 90% of diabetic patients received education about diet and 70% informed about the complications of diabetes, monitoring of blood glucose and foot care [7].

Diabetes education about diet control, monitoring of blood glucose and foot care is significantly varied between diabetes care units. In diabetes care unit located in Police hospital, more than 90% of patients significantly received education about diet control. This unit in the Police hospital has well developed infrastructure and professional nutrition educators are carrying out the education. A professional educator synthesizes the diabetic patients to improve the diet plan, control body weight and control the glycaemic status and thereafter reduces the use of hypoglycaemic drugs [8]. However; provision of education about diet control was shown to reduce the fasting blood sugar significantly but did not affect the glycated haemoglobin level (HBA1c) [8].

Education received by the patients regarding monitoring of blood glucose was very low in the three diabetes units in general but significantly high in diabetes care unit located in Police hospital. Police hospital supported by a pharmaceutical company that provides pocket glucose meters at subsidized affordable cost. Improving the access to glucose meters motivates the patients to self-monitoring of blood

glucose. Although the use of glucose meters is a common practice in hospitals [9], but the patients suffer from the running cost of the test strips and needles [10].

Almost less than half of the diabetic patients have received education about foot care in the three diabetes care units. The diabetes care unit located in Soba hospital was providing education about foot care that significantly high. Soba hospital belongs to university of Khartoum, the first University in Sudan which was established since 1975. The diabetic care in Soba hospital is provided during the clinical sessions teaching of the medical students based on standard management protocols including foot care. Foot education improves the knowledge and practices of diabetic patients and significantly prevents the occurrence of diabetic foot ulcers [11,12]. In this study, provision of education to diabetic patients was insignificantly associated with normal levels of glycaemic indicators. Studies of randomized control trials had shown a positive effect of education on glycaemic indicators [13] that does not support the findings of our study. Randomized control trials are longitudinal studies that characterized by close monitoring of the patients and it considers the cultures, behaviours and attitude of the patients. Other longitudinal studies had shown that a structured education reduced the level of HBA1c compared to the provision of advice alone [14,15]. Usually the limitation of cross section studies that, it does not consider the history of education in relation to patients` culture and the standardized types and ways of giving education. The ways and methods of providing diabetes education affect the perception of the audiences and yield positive or negative outcomes.

Education of diabetic patients is also affected by the communication skills of the educator and the

attitude of the patients [16] that affect the adherence of the patients to the education instructions to keep on controlling the glycaemic status [16].

However; our study is supported by a study in Dutch primary care that showed the insignificant effect of education on the change of fasting and post prandial blood glucose [17].

5. CONCLUSION

Almost two thirds of diabetic patients have received education about physical activities. Most of the patients have received education about diet control. Fewer patients have received education about monitoring of blood glucose. Less than half of the patients have received Foot care education. The relationship between receiving any diabetes education and normal glycaemic indicators was insignificant.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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