British Journal of Medicine & Medical Research
14(1): 1-6, 2016, Article no.BJMMR.24203
ISSN: 2231-0614, NLM ID: 101570965

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Adherence of Diabetic Patients to Education Information Provided at Primary Health Care Level in Khartoum State, Sudan

Siham Ahmed Balla[1*], Kamil Mirghani Ali Shaaban[1], Haiedr Abu Ahmed Mohamed[1] and Mohamed Ali Awadelkareem[1]

[1]Department of Community Medicine, Faculty of Medicine, University of Khartoum, Sudan.

Authors' contributions

This work was carried out in collaboration between all authors. Author SAB designed the study proposal, analysis plan and wrote the first draft of the manuscript. Authors KMAS and HAAM revised the literature and the manuscript for consistency and intellectual content. Author MAA revised the manuscript for grammatical and spelling mistakes. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2016/24203
Editor(s):
(1) Kate S. Collison, Department of Cell Biology, King Faisal Specialist Hospital & Research Centre, Saudi Arabia.
Reviewers:
(1) D. G. Dambhare, Maharashtra University of Health Sciences, India.
(2) Zilah Candida Pereira das Neves, Pontifical Catholic University of Goias, Brazil.
Complete Peer review History: http://sciencedomain.org/review-history/13452

Original Research Article

Received 8th January 2016
Accepted 10th February 2016
Published 26th February 2016

ABSTRACT

Introduction: Diabetes mellitus needs medical care and education. Adherence of the diabetic patients to education information provided at primary care level have been scantly documeneted.
Objective: To measure the adherence of diabetic patients to education information provided at health centers.
Methods: A cross sectional study was carried out in 25 governmental health centers (Gov.HCs) and 15 non-governmental health centers (Non-Gov.HCs). Study population was 419 adult diabetic males /females known beneficiaries of the services in the study centers.
Patients were interviewed by structured questionnaire. Descriptive statistic presented the patients profile, as well as the education information received by the patients and the levels of patients' adherence. Fisher exact test at 95% confidence level used to test differences in education information services. Adherence of patients to education information was measured by three points Likert scale. Chi square test used to test the difference in adherence. Ethical clearance and written

**Corresponding author: E-mail: semam44@yahoo.com;*

consent were obtained.
Results: The mean age was 55.2±10.2 years. Males and females were 44.6% and 55.4% respectively. Education accounted to 76.4%. Family income above 1000 Sudanese Geneh (SDG) accounted to 64.2%. Doctors provided education information about physical activities to 64.6% and 46.2% patients in Gov.HCs and Non-Gov.HCs respectively, *P*-value 0.014. Diet plan received by 73.6% and 55.8% of patients in Gov.HCs and Non-Gov.HCs respectively, *P*-value 0.013. Information on how to measure blood glucose at home received by 48.2% and 25.0% of patients in Gov.HCs and Non-Gov.HCs respectively, P-value 0.002. Very few patients received information from educators, 0.2% and 3.4% of patients in Gov.HCs and Non-Gov.HCs respectively. Foot care education information provided to 25.3% of patients. Adherence of diabetic patients to education information provided was adequate but does not significantly differ between the types of the health centers
Conclusions: Education information services were significantly high in Gov.HCs. Adherence of diabetic education information was adequate.

Keywords: Education information; adherence; health centers; physical activities; foot care.

1. INTRODUCTION

Diabetes mellitus is a metabolic disease that needs medical care, education and counseling of the patients [1]. Diabetes education and information could minimize and prevent the occurrence of risk factors for developing diabetes besides controlling the glycaemic status of diabetic patients [1].

Dissemination of education information to diabetic patients is not an easy process. Appropriate education contributes to the improvement of glycaemic status of diabetic patients [2]. As long as diabetes education sessions are provided, the glycated haemoglobin levels prone to be controlled and decreased [3]. Several studies in different countries demonstrated the effectiveness of non-pharmacological education programs on reduction of glycated haemoglobin and cardiovascular risk factors [4]. However; successful control of diabetic status should consider adherence of diabetic patients to diabetes education information [5]. In developing countries, primary health care level confronted with the challenges of chronic diseases epidemics that need simple, feasible and low cost strategies such as diabetes education [6]. Diabetes education is a cost effective tool at primary care level for at risk population and diabetic patients [7].

Adherance of diabetic patients to education information is not less important than adherance to medication, both contribute to the reduction of the devastating outcomes of diabetes [8]. Education of diabetic patients contributes effectively to adherance to antidiabetic medication [9]. Assessment of diabetes education services at primary health care level is needed to identify the strengths and weaknesses of the education policy. Adherence of the diabetic patients to education information as well is needed. The objective of the study was to measure the adherence of diabetic patients to education information provided by medical doctors and educators at health centers in Khartoum State 2013.

2. MATERIALS AND METHODS

This was a descriptive cross sectional study carried out during April- June, 2013. The study centers were 25 governmental health centers (Gov.HCs) and 15 non-governmental health centers (Non-Gov. HCs). Both provide integrated package of preventative and curative services at the primary health care. The study population was adult diabetic males /females, above 18 years of age. Their diabetes duration was not less than 2 years at the time of the study. Patients with Diabetic Ketoacidosis (DKA), coma, pregnant women and acute hypoglycemia were excluded from the study. The diabetic patients were selected as known beneficiaries of the services in the study centers and had attended for diabetes care follow-up at least twice during last six months prior to the study.

The following formula used for determination of sample size of diabetic patients:

$$n = \frac{z^2 p\, q}{d^2}$$

Where

n= sample size
z = the normal standard deviate

p= the prevalence of diabetes education at primary care level. It was estimated as 50%.
q= 1-p
d= the marginal error

The calculated sample size was 422 (384 plus 10% to cover factors affecting data collection)

Three of the questionnaires were misfiled resulted in target sample size equal to 419 patients.

The sample size was divided proportionally between the types of the health centers based on attendance rates of diabetic patients. Study variable were: Age, sex, education, occupation, family income, education information services received by the patients during the six months prior to the time of the study and adherence of the patients to education information. Patients were interviewed by structured questionnaire at the exit point of the health centers. Data was managed by statistical package for social science software version 20. Descriptive statistic presented the patients profile, as well as the education information received by the patients and the levels of patients' adherence. Differences in education information services in the two types of the health centers were tested by Fisher exact test at 95% confidence level. Comprehensive scores of education information services in the two types of the health centers were calculated and tested by online z test for two proportions [10]. Adherence of patients to education information was measured by three points Likert scale; do it exactly, sometimes, not at all. Chi square test was used to test the difference in adherence of the patients between the two types of health centers.

3. RESULTS

Most of the patients were in the age category 35 – 65 years (80.5%) with mean age 55.2±10.2 years. Males and females constituted 44.6% and 55.4% of the sample respectively. Education accounted to 76.4% of the patients, two third were not working due to retirement (69.2%) and 64.2% had their family income above 1000 Sudanese Geneh (SDG) (Table1).

Information about physical activities and walking was received by 64.6% and 46.2% of diabetic patients in Gov.HCs and Non-Gov.HCs, respectively, *P*= .01 (Table 2). Nutrition and diet plan information was received by 73.6% and 55.8% of diabetic patients in Gov.HCs and Non-Gov.HCs respectively, *P*= .01 (Table 2). Regarding Information on how to measure blood glucose at home, it was received by 48.2% and 25.0% diabetic patients in Gov.HCs and Non-Gov.HCs respectively, *P*= .02 (Table 2). Comprehensiveness difference score of education information services between Gov.HCs and Non-Gov.HCs was shown to be insignificant, P-value 0.06 (Table 2).

The proportions of diabetic patients who received education by nutritionists and health visitors were 0.2% and 3.4% in in Gov.HCs and Non-Gov.HCs respectively (Fig. 1).

Adherence of diabetic patients to education information last six months in health centers during clinical consultation was not significantly different between the types of the health centers (Table 3).

4. DISSCUSION

Most of diabetic patients in this study received education information during clinical consultation by doctors and very small proportion received diabetic information from nutritionists and health visitors. The authors used comprehensiveness scores, a method used for quantification for quality of services provided to patients [11]. Scoring of education information services is reflecting the extent to which health care providers is capable to provide education according to standard guideline [12]. The difference in comprehensiveness scores of the four education information services received by the patients was insignificant in both types of health centers. However; Gov.HCs compared to Non-Gov.HCs had shown high significant proportions of patients that received education information about physical activities, diet plan and measuring blood glucose at home. The diabetes education in this study is supported by a study in Karachi, Pakistan that shown more than 70% of diabetic patients received education from doctors and small proportions received education from dieticians [13]. Patients received education on dietary plans, exercise, self-blood glucose monitoring and foot care accounted to 76.1%, 85%, 89.9% and 87.5% respectively [13]. In this study, education information about foot care was poorly received, almost one quarter of patients received foot care education information at both types of the health centers. In developed countries more than three quarters of diabetic patients in outpatients clinics received education

about foot care [14]. Education information about foot care is a preventive strategy reduces the rates of foot amputations among diabetic patients [14]. It was shown that diabetes education had several barriers including poor counseling competencies and low motivation [15]. These barriers could lead to underutilization of qualified human resources as health visitors, nutrition educators and nurses, putting extra load on the physician's job. Diabetes education has a significant effect on controlling the diabetic status and has an effect on the reduction of body weight and HBA1c [16]. Diabetes education should be strengthen at the level of primary health care and expanded to the non-diabetic population [17].

Table 1. Characteristics of diabetic patients attending health centers, Khartoum State, Sudan 2013 (n=419 patients)

Patients` profile		Governmental health centers (n= 367)	Non- governmental health centers (n= 52)	Total
Age*	20-35 Years	11(3.0%)	2(3.8%)	13(3.1%)
	> 35 -50 Years	107(29.2%)	14(26.9%)	121(28.9%)
	>50 - 65 Years	186(50.7%)	30(57.7%)	216(51.6%)
	> 65 Years	63(17.2%)	6(11.5%)	69(16.5%)
Sex	Male	162(44.1%)	25(48.1%)	187(44.6%)
	Female	205(55.9%)	27(51.9%)	232(55.4%)
Education	Illiterate	88(24.0%)	11(21.2%)	99(23.6%)
	Educated	279(76.0%)	41(78.8%)	320(76.4%)
Occupation	Not working	253(68.9%)	37(71.2%)	290(69.2%)
	Working	114(31.1%)	15(28.8%)	129(30.8%)
Family monthly income	Less than 1000 SDG	128(34.9%)	22(42.3%)	150(35.8%)
	More than 1000 SDG	239(65.1%)	30(57.7%)	269(64.2%)

**mean age was 55.2±10.2*

Table 2. Education information received by the diabetic patients last six months in health centers during clinical consultation, Khartoum State, Sudan 2013

Information received by the patients (n=419)		Governmental health centers	Non- governmental health centers	Significance level*
Information about physical activities and walking	Yes	237(64.6%)	24(46.2%)	*P*= .01
	No	130(35.4%)	28(53.8%)	
Information about nutrition and diet plan	Yes	270(73.6%)	29(55.8%)	*P*= .01
	No	97(26.4%)	23(44.2%)	
Information on how to measure blood glucose at home	Yes	177(48.2%)	13(25.0%)	*P*= .02
	No	190(51.8%)	39(75.0%)	
Information on how to care for foot	Yes	92(25.1%)	14(26.9%)	*P*= .72
	No	275(74.9%)	38(73.1%)	
Comprehensiveness score#		**52.9%**	**38.5%**	***P*= .06**

**Fisher exact test; # Online z-test to compare two sample proportions*

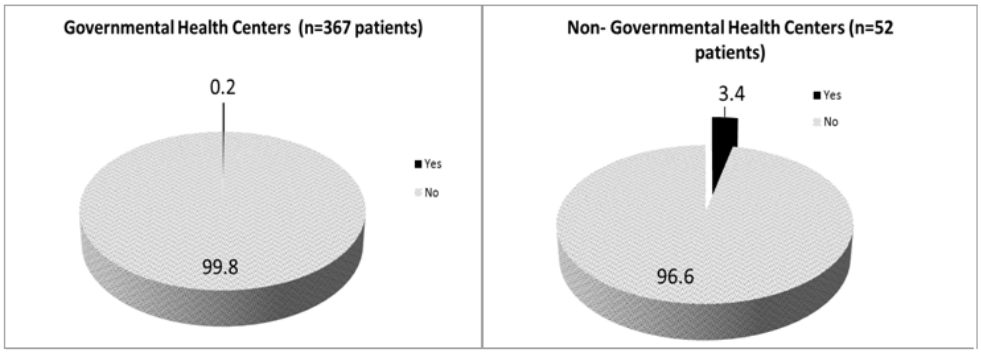

Fig. 1. Percentages of diabetic patients who received education by nutritionists or health visitors during last six months prior to this study in the health centers, Khartoum State, Sudan 2013

Table 3. Adherence of diabetic patients to education information provided last six months in health centers during clinical consultation, Khartoum State, Sudan 2013

Adherence to education information received[¥]		Type of HCs		Sig level*
		Gov. HCs	Non-Gov.HCs	
Information about physical activities (n=261)	Do it exactly	123(51.7%)	8(34.8%)	*P*= .09
	Sometimes	95(39.9%)	15(65.2%)	
	Not at all	20(8.4%)	0(0%)	
	Total	**238(100%)**	**23(100%)**	
Information about diet plan (n=299)	Do it exactly	147(54.4%)	14(48.3%)	*P*= .78
	Sometimes	112(41.5%)	14(48.3%)	
	Not at all	11(4.1%)	1(3.4%)	
	Total	**270(100%)**	**29(100%)**	
Information on how to measure blood glucose at home (n=190)	Do it exactly	76(42.9%)	3(23.1%)	*P*= .30
	Sometimes	72(40.7%)	8(61.5%)	
	Not at all	29(16.4%)	2(15.4%)	
	Total	**177(100%)**	**13(100%)**	
Information on how to care for foot (n=106)	Do it exactly	70(76.1%)	10(71.4%)	*P*= .71
	Sometimes	22(23.9%)	4(28.6%)	
	Total	**92(100%)**	**14(100%)**	

**chi square test ¥ literate patients were significantly adhered to information about measure blood glucose at home and care for foot; P= 0.002 and P= 0.015 respectively*

This study had shown adequate adherence of the patients to the education information provided at both types of the health centers. Although a quarter of patients received foot care education information at both types of the health centers, all had showed full to some adherence to the information they received. Adequate patients` adherence could be due to good provider-patient communication in a context of adequate organizational structure of the health centers at primary health care level [18]. In this study, the majority of patients were literate and significantly adhered to information about measure blood glucose at home and care for foot. This is supported by a study in primary health care clinic in South Africa where diabetic patients with high education level have good glycaemic status [19].

5. CONCLUSION AND RECOMMENDATION

Diabetic patients in governmental health centers significantly received education information by doctors compared to non-governmental health centers. Foot care education information was poorly received at both types of the health centers. Adherence of diabetic education information was adequate. The role of nutritionists and health visitors at primary health care should be revised and strengthen.

ETHICAL CLEARANCE

Ethical clearance was obtained from the ethical committees in Khartoum State Ministry of Health and Faculty of medicine, University of Khartoum. Benefits and risks were explained to the patients and written consent was obtained from each.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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