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RESEARCH ARTICLE

EFFECTIVENESS OF DIABETIC HEALTH EDUCATION ON THE CONTROL OF TYPE 2 DIABETES RIYADH, KSA, 2019

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ABSTRACT

Introduction: WHO report that The number of people with diabetes mellitus has risen from 108 million in 1980 to 422 million in 2014.in KSA the prevalence of Diabetes mellitus was 14.4% **Objectives:** the study Aims to assess the effectiveness of diabetic health education on diabetes clinical outcome (in term of Hemoglobin,A1C,Weight control and Blood pressure) ,among type 2 patients in Riyadh City capital of Kingdom , Saudi Arabia). **Methods:** This was comparative cross-sectional observational study deciding to choose two hospitals one with organized health education system embedded within the routine care of the outpatient clinic (University diabetic center) in King Abdul-Aziz university hospital, and the other with on demand health education and compare the out come of care in 200 patients from both hospitals. **Result:** The study proved that there were differences between the two groups in the University diabetic center scores. where patients had a better understating of diabetes and believed more in the importance of care to control and reduce the chances of having diabetes complications. Also the study showed that patients who received organized health education had a higher self-empowerment. Moreover, organized education will cover most of the topics about the disease. Participants from University diabetic center were more satisfied about their general health which can lead us to assume their health was controlled or improved over time. **Conclusion:** Health education showed an effect on patient knowledge and understanding of the disease. Believing in importance of care will also increase with health education. In addition, self-efficacy and empowerment will be more in patients who receive health education. But the results showed that having the information doesn't necessarily result in practice and behavior change, glycosylated hemoglobin, body mass index and blood pressure readings did not differ from both hospitals. Also patients' behaviors including diet and exercise are the same in both hospitals. However, future research is required due to the limitation of the study.

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INTRODUCTION

Diabetes mellitus is one of the challenged diseases and it is considered as the most common chronic endocrine diseases in many countries.[i].WHO report that The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.in KSA the prevalence of Diabetes mellitus was 14.4% [ii]. Diabetes is one of the most complex diseases. The patient must be aware of many topics to control and limit its complications[iii]. World Health Organization (WHO) estimate a large proportion of type 2 diabetes can be prevented if the population followed a healthy diet, engaged in an adequate level of physical activity and ceased smoking[iv].

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Many studies have approved that the reduction of complication is due to well management of diabetes which is concentrated on changing lifestyle and proper compliance of medication[v]. the Standards clarify that the patient with diabetes must be focus of attention in the whole education process because he is the one who do all of the work to control his disease[vi] It is still hard to provide education to prediabetes people put now there are some strategies to increase the overall knowledge about healthy behaviors[vii]. Health educators play a significant role and consider as an essential element in the medical team for managing diabetes. Improvement of patient's knowledge, attitude and practice is one of the goals of diabetic health educators to reduce serious complications[viii]. Many serious health problems can be caused by diabetes. It increases the risk of skin complication, Neuropathy, cardiovascular disease, foot complication, Kidney Disease (Nephropathy) .Also blindness

risk is higher in people with diabetes and not all that might be caused by diabetes. In fact many more health problems can be affecting the diabetic patients[ix]. In Saudi Arabia the percentage of qualified educators that can deliver different aspects of diabetes does not exceed 45% and the educational programs for patient with diabetes takes 31% .[3]. Diabetes self-management education (DSME) it takes a big and essential part in controlling diabetes patients and those who have an opportunity to get the disease[7]. Definition of Diabetes self-management education is" The ongoing process of facilitating the knowledge, skill, and ability necessary for prediabetes and diabetes self-care.it is guided by evidence-based standards "[7]. Well Structured patient education include changing lifestyle behaviors and giving information about diet, exercise, self-monitoring andmanagement[5]. The workers of DSME have been informed to know about the whole aspects of each participant's clinical profile. Scheduled meetings with the members of participant's health care teams are critical and important to provide good-quality, useful and efficient education and support for people with diabetes and prediabetes The standards of the (DSME) are not fixed they checked and modified every 5 years by the members and professionals of the diabetes education community and changed as a result of many and ongoing diabetesresearches[7]. Recent study in 2013 conducted in Saudi Arabia approve that the most important barriers of diabetes care are lifestyle, lack of education and poor diet.[3]Patients' adherence to therapy is also considered to be a big problem to the medical team[3]. (WHO) has shown that compliance of chronic patients to their treatment around 50% in developed countries.[x]

Although of the recommendation to have structured education sessions there is little proof of the benefits to the patients with type 2 diabetes. "The National Institute for Health and Clinical Excellence (NICE) found little evidence in the UK for the effectiveness of any educational approach in people with type 2 diabetes". From the other side there were some studies that showed positive effects in controlling their condition[xi]. In Saudi Arabia (Al-gassim region) the study of effectiveness in health education on diabetes shows that increasing the educational sessions is linked with better control of diabetes.[xii]. In general, there is no constant result about effectiveness of education. Some studies about the education on diet and exercise they notice good positive effect in controlling diabetes[5].

METHODOLOGY

This was comparative cross-sectional observational study. Aiming to assess the effectiveness of diabetic health education on diabetes clinical outcome (in term of Hemoglobin, A1C, Weight control and Blood pressure), among type 2 patients in Riyadh City capital of King dom od Saudi Arabia) so, we decided to choose two hospitals one with organized health education system embedded within the routine care of the outpatient clinic (University diabetic center) in King Abdul-Aziz university hospital, and the other with on demand health education.

(University diabetic center UDC) in King Abdul-Aziz university hospital has education program. They have two general health educators who interview all diabetes patients in health education clinic. A checklist about diabetes topics is used with the patients to illustrate all the aspects of the disease. The chick list contains 9 sections; starting with explanation of the diabetes, how to deal with hyperglycemia and hypoglycemia, use of insulin or diabetic pills, diet and exercise, monitoring of blood glucose, foot care, management during sick days, management during special days like Hajj and Ramadan or marriage and travelling, ending the checklist with any comments or remarks for the next appointment. Depending on patient situation the general educators transfer the patient either to intensive educational care or home monitoring care or just follow them up without any referral. The transferred patients must come back to the general education when the specified time (six months) is up. Intensive care educators are special for the insulin thereby whether they are on insulin pumps or routine insulin therapy. Home monitoring care educators are controlling and observing their patients by phone; patients send their readings by SMS or by calling them and the educators give help and advice to control their blood glucose or correct their doses if needed. Also, they weekly have five days educational program that contains workshops and lectures and it's available for all general population not limited to their patients.

King Khalid university hospital provides their services in treating diabetic patients in two different clinics. There is a diabetic clinic every week they offer routine care with the physician (endocrinologist). The educator is on call only to teach the patient how to use insulin. The educators do not follow up the patients. Also primary care clinics (general physicians) follow up the diabetic patients with the same regulation of diabetic clinic. Study included Adult above 20 years old patients with type 2 diabetes, irrespective of gender, who have been followed in the clinic for not less than 6 months and excluded Severe and enduring mental health problems. The instrument of the study was direct interview with the patients to fill the questionnaire and reviewing patients' medical records , using diabetes care profile is standard, validated and reliable scale specific to diabetes patients and Diabetes Empowerment Scale-Short Form (DES-SF) permission to use them can be downloaded from the Michigan Diabetes Research and Training Center web site at: www.med.umich.edu/mdrtc". Participants' information was coded and entered in dataset created in Statistical Package for Social Science (SPSS) version 23 which was used for statistical tabulation and analyses. Chi-Square test was used to measure the differences between the categorical variables. And student t test was used to compare continuous outcomes between the two hospitals. Multiple linear regressions was used to explore the association of being in either of the two hospitals and the outcomes .a model was assigned to control duration of diabetes, education level and employment status. A significance level of 0.05 was set to determine statistical significanceAnd 95% confidence interval for all tests.

RESULTS AND DISCUSSION

It was conducted in one-month duration in two hospitals included 100 pts from each. Hospital Mean age in (KKUH) was 56.66 years and the number of male and female participant was 46 and 54 respectively. In (UDC) the mean age was 59.35 years. While the male and female was 58 and 42 respectively. Mean duration of diabetes was 12.99 years in (KKUH) and 18.25 years in (UDC) which conclude significant difference with ($P < 0.0001$). Table 2 shows a comparison in the main outcomes (HBA1C, BP and BMI).

Table 1. Shows the general characteristics of participants

Characteristic	King Khalid Hospital (KKUH) N=100	University Diabetic Center (UDC) N=100	P value
Age	56.66 ±+9.125	59.35±12.230	0.08
Gender	46 (46%)	58 (58%)	0.119
Male	54 (54%)	42 (42%)	
Female			
Duration of Diabetes	12.99±8.11	18.25±9.58	< 0.0001
Education	44 (44%)	40 (40%)	0.030
Pre-collage	28 (28%)	44 (44%)	
Collage and post graduation	28 (28%)	16 (16%)	
Illiterate			
Working status	27(27%)	25 (25%)	0.009
	52(52%)	35(35%)	
Employed	21(21%)	40(40%)	
not employed			
retired			
Marital Status	93(93%)	99(99%)	0.065
married	7(7%)	1(1%)	
others			
Smoking	5(5%)	11(11%)	0.191
smoker	95(95%)	89(89%)	
non smoker			

Table 2:Comparison in the main outcomes HBA1C, BP and BMI:

	King Khalid Hospital (KKUH) N=100	University Diabetic Center (UDC) N=100	P value
HBA1C	8.22 ±1.59	8.36 ±1.62	0.548
Blood pressure	132.83±18.076	131.16 ±14.936	0.497
Systolic pressure			
Diastolic pressure	71.43 ±11.62	69.90 ±11.159	0.344
BMI	32.78 ±7.105	30.92 ±5.98	.052

Table 3: Comparisons between two hospitals in secondary outcomes in knowledge, attitude, behavioral and self empowerment

	King Khalid Hospital (KKUH) N=100	University Diabetic Center (UDC) N=100	P value
Diabetes Understanding& perception	4.06±1.0142	4.53±0.541	< 0.0001
Behaviors (negative attitude)	1.83±0.991	1.76±0.870	0.583
Importance of care	4.77±0.604	4.97±0.135	.001
Self-care adherence	3.74±0.766	3.88±0.623	0.158
Empowerment	3.75±0.872	4.171±0.708	< 0.0001
Diet	3.12±1.372	3.15±1.375	0.857

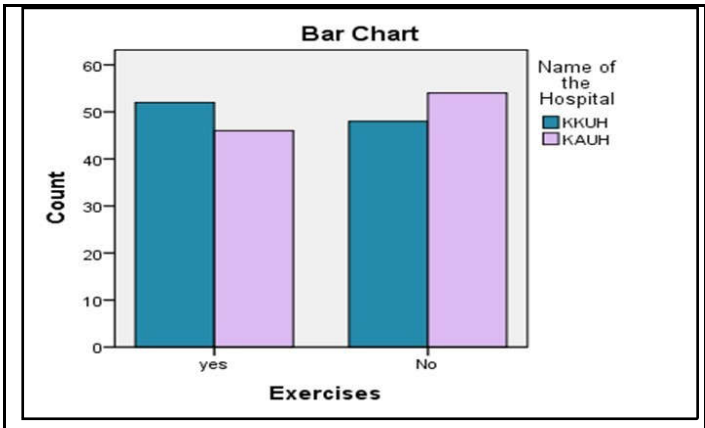
Table 4: General Health of Study participant

	King Khalid Hospital (KKUH) N=100	University Diabetic Center (UDC) N=100	P value
Health status What patients say about their health			
Excellent	24(24%)	41(41%)	0.019
very good	44(44%)	41(41%)	
Good	26(26%)	17(17%)	
Acceptable	6(6%)	1(1%)	
Diabetic Complication			
Retinopathy	37(37%)	12(12%)	< 0.0001
Cardiovascular	13(13%)	13(13%)	0.92
Nephropathy	7(7%)	6(6%)	0.206
Neuropathy	2(2%)	4(4%)	0.159
Diabetic Foot	1(1%)	3(3%)	0.135
Medication			
Tablet	58(58%)	45(45%)	0.099
Insulin	7(7%)	5(5%)	
Both	35(35%)	50(50%)	

There was no significant difference in the main outcomes. The mean of HBA1C values in (KKUH) was 8.22 and 8.36 in (UDC).The mean of systolic and diastolic blood pressure was 132.83 and 71.4 in (KKUH) and 131.16 and 69.9 in (UDC) respectively. The mean of BMI in (KKUH) was 32.78 kilogram and 30.9 kilogram in (UDC). There was significant differences in the scores of diabetes understanding the mean score in (KKUH) was 4.06 and 4.53 in (UDC) with $p<0.0001$.

Table 5. About any health education or advised had been received to the participants.

	King Khalid Hospital (Yes) (KKUH) N=100	University Diabetic Center (Yes) (UDC) N=100	P value
Has your health care provider or nurse ever told you to take special care of your feet?	52(52%)	100(100%)	< 0.0001
Has your health care provider or nurse ever told you to follow an exercise program?	82(82%)	99(99%)	< 0.0001
Has your health care provider or nurse ever told you to follow a meal plan or diet?	82(82%)	100(100%)	< 0.0001
Have you ever received diabetes education?	15(15%)	100(100%)	< 0.0001
Have you been told to follow a schedule for your meals and snacks?	53(53%)	87(87%)	< 0.0001
Have you been told to weigh or measure your food?	47(47%)	87(87%)	< 0.0001



(Figure1).Lifestyle behaviors showed no significant differences between the hospitals in diet and exercise.

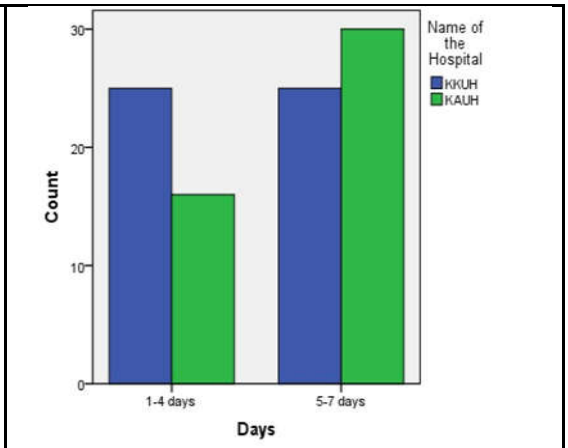


Figure 2. Shows how many days they did exercise 48% of (KKUH) patients who did exercise spend around 5-7 days while 62% of (KAUH or UDC)

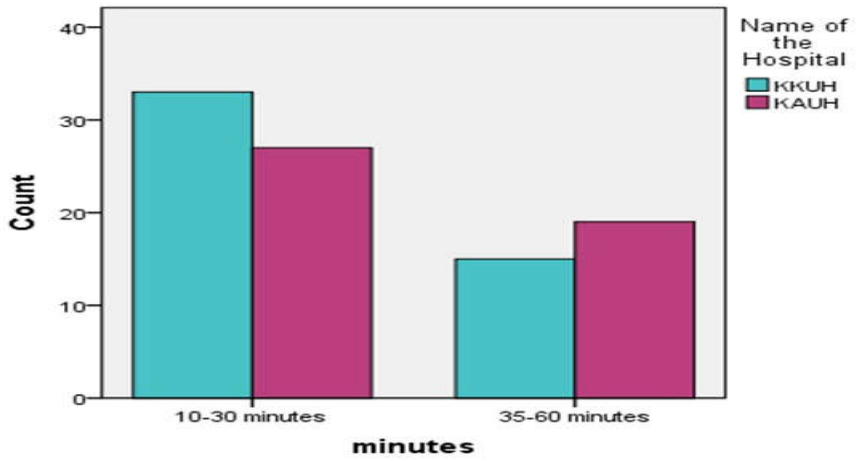


Figure 3. shows the total time of doing exercise. Around 15 patients of (KKUH) participant who were doing exercise spend 35-60 minutes and 19 patients in (UDC or KAUH).

Also importance of care was significant with (p=.001) the mean score was 4.77 in (KKUH) and 4.97 in (UDC). Empowerment score had significant p value (p<0.0001) with mean score 3.75 in (KKUH) 4.171 IN (UDC). The other DCP scales showed no significant effects between the two hospitals such as negative attitude, self care adherence and diet. After the liner regression applied the employment status had a significant effect in the understanding of diabetes and self-empowerment. The patients were asked how they feel about their general health there were significant differences between the hospitals with (p=.019).In (KKUH) only 24% of the patients feel excellent while 41% in (UDC). And 6% in (KKUH) they feel acceptable while in (UDC) 1%. There was a significant deference only in the retinopathy the percentage in (KKUH) was 37% while in (UDC) 12% with (p<.0001).the rest complication such as (cardiovascular disease, nephropathy, neuropathy and diabetic foot) showed no significant differences. Multiple linear regressions showed that in addition to name of the hospital the employment status and duration of diabetes affect the result of the health status. The way of diabetic medication showed no significant differences between the hospitals. In (KKUH) 58% of the patients used tablet medication and 45% in (UDC). The above table showed that more than 85%.

Of (UDC) patients received education and there was significant differences between the hospitals in all education topics with the same value ($p<0.0001$)..In foot care education 100% of (UDC) participant received education while only 52% in (KKUH) get the education .After liner regression applied we conclude that there was an effect of the duration of diabetes in foot care education and if they had received diabetes education. Also we found that education level of participant effect the result of the diet education. Although no significant deference doing exercise among (KKUH) patients is more than the (KKUH) patients

The study proved that there were differences between the two groups in the DCP scores. UDC or KAUH patients had a better understating of diabetes and believed more in the importance of care to control and reduce the chances of having diabetes complications. Also the study showed that patients who received organized health education had a higher self-empowerment score and more motivation to change their attitude in life than patients in usual or routine care which indicates that health education is important to the patients. In addition, the results proved that an organized education will cover most of the topics about the disease. Participants from UDC were more satisfied about their general health which can lead us to assume their health was controlled or improved over time. These results are similar to *Grace Marie V Ku* . Findings which were derived from a study made to investigate the effect of Diabetes Patient Education Program. He found a significant increase in knowledge and adherence to medications after the educational program[xiii]. A clinical trial by *JoAnn Sperl-Hillen* used the same DCP and DES-SF scales to investigate the different types of education, and have compared them to the usual care[xiv] (19). .ROBERT M. ANDERSON had the same results which is health education increases the self-empowerment of the patient.[xv]. Those results are similar to our findings. A study conducted by *Mark Peyrot,* showed that receiving diabetic education raises awareness and helps in the understanding of the risks and benefits of Diabetes[xvi].Another objective of our study was to measure the differences in HBA1C, BMI and BP readings and there were no differences between the two hospitals in these values, which are similar to the results of M J Davies clinical trial study that aimed to measure the effectiveness of a structu rededucation program on type 2 diabetes compared to usual care. The study showed no improvement in systolic or diastolic blood pressureandHBA1C[4].That trial had only one intensive education program that differs from our study which has a continuous health educator clinic , however even with intensive education there was no improvement in HBA1c [4].EmelBeyazıtstudied the effect of Intensive Education Program among Patients with Type 2 and found that Baseline of BMI did not change significantly in either group of the trail during the course of the study [xvii].JoAnn Sperl-Hillengot the same as our results which were of no significant effects on Blood pressure values or BMI between individual education and group education compared to usual care, but she discovered an effect in lowering their HBA1C values[14].

Our results regarding lifestyle behaviors in diet and exercise were not different between the two hospitals which are similar to *Melanie JDavies* results [4].Our results fail to support our hypothesis that is an organized health education will take a positive toll on the clinical outcome. However some of published studies showed that there was an effect after receiving. The education on HBA1C and behavioral changes [xviii, xix, xx]. These findings are different from our results, thus may be due to the long duration of illness which is playing a role in making it harder for the patients to follow a strict lifestyle or because all the studies were clinical trials. Which comparing the patients before and after the study. However, future studies are required to explain the reason of having no difference in clinical outcomes among patients with organized education.

The strength of our study include, proper valid tool was used (DCP and DES scales) to identify the different in many behaviors and attitudes. Second, the study design was fit to determine the research question. In this study the absence of baseline values in both groups is considered as a limitation.

Conclusion

Health education showed an effect on patient knowledge and understanding of the disease. Believing in importance of care will also increase with health education. In addition self-efficacy and empowerment will be more in patients who receive health education. But the results showed that having the information doesn't necessarily result in practice and behavior change, HBA1C, BMI and BP readings did not differ from both hospitals. Also patients' behaviors including diet and exercise are the same in both hospitals. However, future research is required due to the limitation of the study.

Key points

- Health educator in each diabetic clinic will have an effect in some parts of the care process.
- Health education sessions should target not only information on diabetes but also skills on planning and preparing to change patient behaviors.
- Involving family in the education may play a role in improving the patient's situation so the family education sessions must be studied to be developed in hospitals.
- Future studies are required to investigate the factors influencing the behavior change, HBA1C, BMI and BP.

Ethical consideration: Approvals was taken from hospitals administration and from Institutional Review Board (Ethical Committee) before the data collection. The study objectives and goals of the survey were explained to the patients and their freedom to participate in the study along with assurances of the participants' anonymity before the questionnaire was filled was clarified. Neither incentives nor rewards were presented to the patients for exchange of participation.

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List of abbreviation:

BMI:	Body Mass Index
BP:	Blood pressure
DCP	Diabetes Care Profile
DES:	Diabetes Empowerment Scale
DES-SF	Diabetes Empowerment Scale-Short Form
DSME	Diabetes self-management education
HBA1C	glycosylated hemoglobin
KAUH	King Abdul-Aziz university hospital
KKUH	King Khalid university hospital
NICE	National Institute For Health And Clinical Excellence
SPSS	Statistical Package For Social Science
UDC	University diabetic center
WHO	World Health Organization

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