ORIGINAL ARTICLE

Effectiveness of Health Care System in the Controlling of Type (II) Diabetic Patients in Basra City

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Abstract

Objective: Diabetes (diabetes mellitus [DM]) is a chronic disease affecting millions of people around the world with increment in its rate of incidence every year. Complications of diabetes are not only as health problem but also effect on the economic state of either patient himself or the whole society. Diabetes patients make several activities during their life because of DM, such as daily blood glucose measurement, regular physician visits, and others. In this study, we want to focus on the effect of health-care system and cost for the disease. **Materials and Methods:** This study involved the participation of 88 patients with diabetes type II. Their mean age was 53.37 ± 16.65. Mean body mass index was 31.17 ± 6.54. Several health status parameters were collected through specific formula made for this, method for measuring blood glucose level and patients' monthly visits to the clinic or medical center were studied. **Results:** Health status of participated patients shows high level of glycated hemoglobin (HbA1c); the complications (neuropathy and blurred vision) were higher than other complications. Chronic diseases were associated with diabetes also seen. Patients on regular physician visit have lower HbA1c in compare with other patients. **Conclusions:** Diabetes needs further and continuous work to get good results in their health and continuous education to encourage measuring blood glucose measuring, notice any complication occurrence and regular with scheduled physician visits.

Key words: Cost, diabetes, glucose meter, glycated hemoglobin, middle East area, monthly income

INTRODUCTION

Diabetes, a chronic metabolic defect, is characterized by elevated blood sugar levels accompanied by an abnormality in lipid and carbohydrate metabolism. The effect of diabetes mellitus (DM) is not only on the health status of affected patients but also its economic effect.[1,2] DM characterized by complications, either microvascular or macrovascular, that their discovery usually at late stage of its prognosis. The risk of complications occurrence increases as the level of glycated hemoglobin (HbA1c) is higher than 6.5%.[2-4] Lifestyle factors effect on the great pathway on developing of diabetes, especially type II DM (DMII), by their effect on insulin resistance. As the patients follow healthy regimen, either in their diet composition or daily habits through exercises, this will give great result on developing and prognosis of DM through decrease mortality and morbidity factors.[5] Besides the complications of DM on the vascular system, DM has a greater effect on the economic status of patients, using more than one medication, insulin besides oral treatment and the development of other complications that need further treatment. This costly disease can be one of the leading causes of other disease such as cardiovascular disease, loss of vision, and renal problems. The outcomes of almost diabetic patients' families are less than the cost of DM treatment.[6,7] As the percentage of diabetes patients increased over each period, the cost of DM increased also. In the United States, there is about 26% of economic cost of this disease in the period 2012–2017. The total cost spent on DM in 2017 was 327 billion dollars, dividing into

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the cost of treatment; impair the functions due to disease complications, associated with decrease productivity.[8] The Middle East area characterized by an increased incidence of DM in the past few years. Diet habit, change in lifestyle and other factors aid to increase DM. Besides that, high economic cost of this disease increases also, which can reach into 6000 $/year in some countries. This cost will develop in the future if DM not controlled or decrease in incidence.[9,10] In Iraq, as the around countries, diabetes patients' percent had increased from 5% in 1978 to 19.7% in 2012. This increased will cause a big problem in country due to the rise of disease cost. On the other hand, the outcome of almost patients is not covering the medicines price.[11] Thus, the DM consider a big problem at economic side now and in future.[12] In this study, health-care system and correlation of diabetes control with the cost of medications that are monthly spending are the aims of this work.

MATERIALS AND METHODS

In this work, the retrospective design of the study is used for completing this work. Data were collected from 88 patients affected with DM type II from different diabetic centers in Basra city. DM type I, gestational diabetes and any hormonal defects were omitted in this study.

The participants were randomly selected in medical centers. The collecting of demographic data was involved age, gender, DM duration, and HbA1c level. Specific questionnaire forma was made for this purpose. Approval was obtained from each patient before data collection and ethical committee was gotten before starting this work. Data were calculated using statistical program SPSS 22 version and significance value accepted if $P < 0.05$.

RESULTS

Basic parameters were collected in Table 1. Mean age of participated patients was 53.37 ± 16.65, body mass index (BMI) was 31.17 ± 6.54, and their HbA1c was 8.17 ± 1.67, and mean duration of diabetes is 5.74.

In this Table 2, there is number of parameters that related to the participated patients. These parameters can give some impression about the health state of DM type II patients. The HbA1c shows the high percent of patients who have >7, about 71.59% from the all patients. Several risk factors were collected from the patients, which include cardiovascular risk factors. This disease, like others, has several serious complications. Blurred vision shows a higher percent (50%) of all patients. Furthermore, this table shows just 9.43% are smokers and only one patient is alcoholic. Visiting into medical institutions is explaining that 44.31% were visiting medical center and 10.22% visit private clinic.

Table 3 shows the correlation between the cost of diabetic medication and the level of HbA1c in diabetic patients. Where the HbA1c level equal to 7.545 for patients who spent 4–8 $/month, 8.565 is HbA1c level for those who spent 8–6 $/

Table 1: Demographic data for patients

Parameter	Value
Age	53.37±16.65
BMI	31.17±6.54
Smoker	10
Alcoholic	1
HbA1c	8.17±1.67
Duration of diabetes	5.74±3.49

BMI: Body mass index; HbA1c: Glycated hemoglobin

Table 2: Health status and outcome category for patients

Health status and outcome category	% of patients
HbA1c %	
<5	2 (1.88)
5–7	23 (26.13)
>7	63 (71.59)
Risk factors	
H.T	43 (48.86)
Dyslipidemia	39 (36.79)
Cataract	9 (8.49)
Coronary artery disease	2 (1.88)
Skeletal disorder	11 (12.5)
CKD	4 (3.77)
Complications	
Neuropathy	35 (39.77)
Blurred vision	44 (50)
Decrease body weight	41 (46.59)
Emergency admission	4 (4.5)
Social state	
Smoker	10 (9.43)
Alcoholic	1 (0.94)
Visits to health institutions	
Medical center	39 (44.31)
Private clinic	9 (10.22)
Both	21 (23.86)

HT: Hypertension, CKD: Chronic kidney disease

Table 3: Correlation between monthly cost and HbA1c level

Cost	4–8 $/ month	8–16 $/ month	>24 $/ month	*P*-value
HbA1c%	7.545	8.565	8.671	0.127*

*consider non-significant if $P>0.05$. HbA1c: Glycated hemoglobin

Table 4: Methods for usual monitoring blood glucose level

Methods	Glucose meter (at home) (%)	Laboratory investigation (%)	Both (%)	*P*-value
Percent of patients	(–19) 21.50	(–26) 29.50	(19) 21.5	0.46*

*consider non-significance if *P*>0.05

month. Patients who paid more than 24 $/month have HbA1c equal to 8.671. *P*-value shows non-significant difference between groups ($P = 0.127$).

Table 4 clarifies the method by which diabetic patient prefers to measure their blood glucose and checking the state. About 21.5% patients prefer to use glucose meter, about 29.5% of patients prefer to go into laboratory and checking their blood glucose. About 21.5% of patient use both methods to check blood glucose. There is no significant difference between these groups ($P = 0.46$).

Number of visits into physician (either medical center or private clinic) is mentioned in Table 5. About 8.55% of patients have one visit/month. The patients who visited the physician twice/month were 9.57% and 8.4% visit the physician 3 times/month (*P*=0.0001).

DISCUSSION

DM stills the chronic disease that needs frequent research and found resolution to reach the patient into stable and less complicated field. Here, in this study, some of economic considerations are presented which, from small corner, can give a view about the side of this disease. In this study, 88 diabetic patients participated in this study. All these patients are type II DM. Mean age 53.37 years old, BMI is 31.17, and their HbA1c is 8.17, as mentioned in Table 1. Furthermore, duration of the disease is 5.74 years.

Table 2 shows the health status and outcome measures for diabetic patients who participate in this study. About 71.59% of these patients had HbA1c value >7, which is desired for good control of glycemic state controlling, which if still controlled it will delay the onset of disease complications. The most incidences of risky factors are hypertension, which accounts for 48.86%, comparing with 36.79% of dyslipidemia, cataract 8.49%, and 3.77% for kidney disease. One of the major problems of diabetes is its complications, on the short and long term. In this study, blurred vision shows the higher rate, about 50% of patients suffered from blurred vision. Decrease body weight accounts 46.59%, neuropathy about 39.77%. These high rates of diabetes complications need tight control to reduce, or delay, their incidence. These patients visit the general practitioner, either to the private or medical center, to follow-up their cases. About 44% visit medical center, 10.22% visit private clinic. This can give some impression of well oriented of these patients about their disease and try to follow-up their state to reach good glycemic control.

Table 5: Relationship between number of visits/month into medical center or private clinic and HbA1c level

No. of visits/month	1 visit/month	2 visits/month	3 visits/month	*P*-value
HbA1c%	(35) 8.55	(9) 9.57	(4) 8.4	0.0001**

**consider significance when $P > 0.055$. HbA1c: Glycated hemoglobin

Table 3 shows the correlation between the costs that diabetic patients spent on their medications and HbA1c level. Patients who paid 4–8 $/month have HbA1c level equal to 7.545 while 8.565 is HbA1c level for patients who spent 8–16 $/month and 8.671 for those who spent more than 24 $/month. There is no significant difference in glycemic control measured by HbA1c between participated groups. Despite the high cost of medications, most patients had uncontrolled diabetes. In addition to medications cost, laboratory analysis, and private clinic cost; this means that health-care system should be reviewed. There is a report showing that the cost of medications has a reverse relation with glycemic control.[11,12] This is maybe due to several factors. Poor adherence of the patients with their treatment will cause bad glycemic control.[13,14] Furthermore, non-adherence will lead to slow improvement of diabetes, and thus, the patient will discontinue the medications which will cause more deterioration in the glycemic control.[15,16]

Data in Table 4 show the methods that diabetic patients used to measure their blood glucose from time to time (daily or weekly or as needed). About 21.5% assess their blood glucose level using glucose meter, 29.5% determine their blood glucose level by visiting laboratory, and nearly 19.5% using both methods. By certain study, patients prefer to use blood analyzer in compares to glucose meter that is because they thought the results of analyzer are more accurate than glucose meter, and the results show significantly the accuracy of analyzer results.[17-20] In our study, we did not study which type or to which company the glucose meter is related as in mentioned study. The reason behind using glucose meter in people participated in this study is easy to use and at any time can use it due to rapid application.

In Table 5, the relationship between number of visits (either to medical center or to private clinic) and the level of HbA1c is mentioned. About 35 patients (their mean HbA1c level is 8.55%) were visiting the physician once/month. Only nine patients visited the physician twice/month with their mean HbA1c is 9.57%. Only four patients visited the medical center or private clinic 3 times/month and their mean

HbA1c value was 8.4%. This variance in number of visits/month can reflect several parameters. Low adherence with the disease and its complications, minimum knowledge about the disease prognosis if not controlled, low monthly income as mentioned above and far distance of patients home from medical center or private clinic. Frequent and regular visits give positive result on patients care and facilities in management and follow-up[21] and enhance the compliance with treatment is regular visits to the physician that give well controlled of the disease and manage the complications.[22] In addition to frequent and regular physician visits good life style either by diet or by follow sport exams will give best results on glycemic state and disease complications. Thus, these instructions and information must be known by all diabetes patients.[23,24]

CONCLUSIONS

Controlling Diabetes mellitus and its complications still are considering the driving factor for visiting the private and public diabetic clinics due to inadequate glycemic control. Improper glycemic control leads to additional cost on patients by increasing frequency of visiting or changing his medications to get better glycemic control. Thus, the governorate and government should put all-out effort to overcome this growing problem and should encourage all health workers to aid for solving this growing matter.

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AUTHORS' CONTRIBUTIONS

This research was done individually in the laboratories of the College of Pharmacy, University of Basrah. This research was completed over a period of 3 months with serious and continuous work, and therefore, excellent results were obtained the controlling of type (II) diabetic patients in Basra city.

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