



ASSESSMENT OF CONTROL OF PATIENT WITH TYPE I DIABETES MELLITUS IN DIFFERENT HEALTH CARE CENTERS

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ABSTRACT

Background: Achieving optimum glycemic control in patients with type 1 diabetes mellitus is important to delay and potentially prevent serious complications in the future. Multiple daily insulin injections, frequent blood glucose checks, frequent consultations with medical professionals, and careful control of exercise, meal plans, social standing, and parental educational level are just a few of the many obstacles that facing type 1 diabetes control on a daily basis. **Objectives:** To determine whether glycemic control differs by different health care settings of patients with Type I diabetes mellitus. **Methods:** An observational, descriptive, cross-sectional study was adopted in order to achieve the objectives of the present study. The study includes two settings; the first one was Al Wafa'a specialized endocrine center in Mosul city from which 100 patients with type 1 DM were selected, and the second one was different primary health care centers in Al Hamdanyia city from which 50 patients with type 1 DM were selected. The study was conducted during the period between 1st of August 2023 and 15th of March 2025. Pregnant women, aged more than 30 years and those attending the centers for less than 6 months were excluded from the study. The questionnaire consisted from five parts. Part one for demographic and anthropometric information. Part two for exercise level. Part three for blood sugar related information. Part four for diabetes complications. And part five for the doctor-patient interview. **Results:** The mean age of the study participants is 13.47 ± 6.29 years. The majority of diabetic patients were females, having diabetes for more than 3 years, having underweight category of body mass index. Statistically significant difference between the two-study setting regarding; the age of attending patients (P value = 0.0059), duration of attending the center (P value <0.001), and patients' body mass index (P value <0.006). Moreover; patients attending Al Wafa'a endocrine center had statistically significant more self-monitoring of blood sugar (P value <0.001) and more time of doctor-patient interview (P value <0.001). While patients attending PHCCs had more hospital admissions (P value = 0.01). **Conclusion:** Patients attending the Al Wafa'a specialized endocrine center had better glycaemic control than the patients attending the PHCC because its patients are; more self-monitoring their diabetes control, less hospital admission, longer doctor-patients interview and lastly; better body mass index improvement.

KEYWORDS: Insulin dependent diabetes, Adolescent, Nineveh, Iraq.

1- INTRODUCTION

Achieving optimum glycemic control in patients with type 1 diabetes mellitus is important to delay and potentially prevent serious complications in the future.^[1] Newer insulin analogs and technological advancements in pharmacology, such as continuous glucose monitoring (CGM) and insulin delivery via pump, provide more alternatives and flexibility for managing diabetes.^[2] Increasing numbers of patients with Type 1 diabetes mellitus (T1DM) are using improved diabetes management techniques to meet hemoglobin A1C (HbA1c) goals and prevent the acute consequences of diabetic ketoacidosis (DKA) and severe hypoglycemia

(SH).^[3] Clinical indications, patient preferences, changeable prices, or payment models may all influence the choice of treatment technique.^[4] Even though clinical trials and meta-analyses have demonstrated the safety and effectiveness of various insulin analogs, pumps, and sensors, only a small percentage of T1DM are able to meet the recommended HbA1c targets even with using such techniques.^[5-6]

Arab countries have a greater incidence and prevalence of DKA in comparison to other countries.^[7] The high frequency of DKA leads to more emergency room visits and hospital admissions, which raises the expense of care

for patients with type 1 diabetes.^[8] Multiple daily insulin injections, frequent blood glucose checks, frequent consultations with medical professionals, and careful control of exercise, meal plans, social standing, and parental educational level are just a few of the many obstacles that facing type 1 diabetes control on a daily basis.^[9-11]

In post-conflict Iraq, type 1 diabetes mellitus in children and adolescents has poor glucose control.^[12] There is little information on the epidemiology of type 1 diabetes, however the Iraqi Ministry of Health did have some data on type 2 diabetes.^[13] The availability of such data can assist in determining the severity of the problem and offer proof that aids in the development of health initiatives, the distribution of human and financial resources, logistics, and treatment facilities.^[14] The aim of the study is to determine whether glycemic control differs by different health care settings of patients with type 1 diabetes mellitus.

2- PATIENT AND METHODS

This study is a cross-sectional study, conducted in Nineveh-Iraq to compare two different centers in agreement with the ethical guidelines derived from the Helsinki Declaration, and approved by the ethical committee in Nineveh directorate of health. The first setting used in the study was Al Wafa'a specialized endocrine center in Mosul city from which 100 patients with type 1 DM were selected, and the second setting was different primary health care centers in Al Hamdanyia city from which 50 patients with type 1 DM were selected.

The study was conducted during the period between 1st of August 2023 and 15th of March 2025. Pregnant women, aged more than 30 years and those attending the

centers for less than 6 months were excluded from the study.

The questionnaire was included the following anthropometric measurements, such as; body weight, using a weighted digital scale (Seca) with light garments without shoes, and the weight was estimated to the nearest 100g, Height was measured with a portable measure (Seca) and approximated to the nearest 1 cm. BMI is computed by dividing weight (in kilograms) by height (in meters squared). Additionally, fasting blood glucose was tested using the Randox kit's colorimetric method and glycated hemoglobin (HbA1C) was assessed using the StandBio kit's spectrophotometer method.

Data analysis was done using SPSS (Statistical Package for Social Sciences) software version 30 (IBM Corporation, USA). Differences in demographic and clinical characteristics were compared between two groups. Univariate analysis on categorical data was performed using chi test or Fischer exact test. Wilconxon-Mann-Whitney was used to compare numerical variables due to non-normal distribution. A p value of <0.05 was considered statistically significant for all statistical tests.

3- RESULTS

The mean age of the study participants is 13.47 ± 6.29 years. The majority of diabetic patients were females, having diabetes for more than 3 years, having underweight category of body mass index. Statistically significant difference between the two-study setting regarding; the age of attending patients (P value = 0.0059), duration of attending the center (P value <0.001), and patients' body mass index (P value <0.006). As shown in figure 1.

Table 3.1: Comparison of demographic and anthropometric measurement between the study groups. (Number =150).

Variable	Al Wafa'a endocrine center (No. = 100)	Primary health care centers (No.=50)	P-value
Gender:			
- Male	46 (46%)	22 (44%)	0.816
- Female	54 (54%)	28 (56%)	
Age:			
Less than 5 year.	4 (4%)	0 (0%)	0.0059
- 5-10 year.	14 (14%)	2 (4%)	
- 10-20 year.	76 (76%)	33 (66%)	
- More than 20 year.	6 (6%)	12 (24%)	
Duration of diabetes mellitus:			
- Less than 1 year.	12 (12%)	10 (20%)	0.134
- 1-3 year.	27 (27%)	7 (14%)	
- 3-5 year.	32 (32%)	13 (26%)	
- More than 5 year.	29 (29%)	20 (40%)	
Duration of attending the center:			
Less than 1 year.	20 (20%)	10 (20%)	<0.001
- 1-3 year.	57 (57%)	7 (14%)	
- More than 3 year.	23 (23%)	33 (66%)	
Patient educational level:			0.841

Less than 6 year old	8 (8%)	5 (10%)	0.006
Illiterate	1 (1%)	1 (2%)	
Read-write	29 (29%)	15 (30%)	
Primary school	28 (28%)	17 (34%)	
Second. School	30 (30%)	10 (20%)	
University	4 (4%)	2 (4%)	
Body mass index:			
- Underweight	49 (49%)	35 (70%)	0.006
- Normal (20-25)	44 (44%)	9 (18%)	
- Grade I obesity	6 (6%)	6 (12%)	
- Grade II obesity	1 (1%)	0 (0%)	

It's evident that no statistically significant difference found between the study groups regarding exercise level (P value =0.816).

Table 3.2: Comparison of exercise level between the study groups. (Number =150).

Variable	Al Wafa'a endocrine center (No. = 100)	Primary health care center (No.=50)	P-value
Exercise level			0.816
- No exercise	21 (21%)	16 (32%)	
- Sports & work	70 (70%)	26 (52%)	
- Work only	9 (9%)	8 (16%)	

Table 3.3 shows comparison between the study groups regarding their blood sugar related information. Patients attending Al Wafa'a endocrine center had statistically significant more self-monitoring of blood sugar (P value

<0.001). While no statistically significant difference regarding regularity of insulin injection (P value = 0.251) and insulin storage (P value = 0.582).

Table 3.3: Comparison between the study groups regarding their blood sugar related information. (Number =150).

Variable	Al Wafa'a endocrine center (No. = 100)	Primary health care centers (No.=50)	P-value
Self-monitoring of blood sugar:			<0.001
- Yes	56 (56%)	13 (26%)	
- No	44 (44%)	37 (74%)	
Regularity of insulin injection:			0.251
- Regular.	68 (68%)	32 (64%)	
- Irregular.	32 (32%)	18 (36%)	
Technique of insulin injection:			<0.001
- Right.	86 (86%)	21 (42%)	
- Wrong.	14 (14%)	29 (58%)	
Insulin storage:			0.582
- Right	96 (96%)	47 (94%)	
- Wrong.	4 (4%)	3 (6%)	

Table 3.4 illustrates comparison between the study groups regarding complication of diabetes, statistically significant difference between the two groups regarding to frequency of hospitalization with more hospitalization

for patients attending PHCC (P value = 0.01). On the other hand; no significant difference between the two groups regarding the cause of hospitalization.

Table 3.4: Comparison between the study groups regarding their frequency and cause of hospital admission. (Number =150).

Variable	Al Wafa'a endocrine center	Primary health care centers	P-value
Frequency of hospitalization:			0.01
- None	20 (20%)	5 (10%)	
- 1-5 times	64 (64%)	25 (50%)	
- 6-10 times	9 (9%)	10 (20%)	
- > 10 times	7 (7%)	10 (20%)	
Causes for hospitalization			0.521
- Hypoglycemia	8 (10%)	2 (4.4%)	

- DKA	51 (63.75%)	29 (64.4%)	
- Both	21 (26.25%)	14 (31.2%)	
- Total	80 (100%)	45 (100%)	

Table 3.5 shows comparison between the study groups regarding the duration of patient interviews. Patients attending Al Wafa'a specialized center found to be

statistically significant more time for interview (P value <0.001).

Table 3.5: Comparison between the study groups regarding their expended time for patient interview. (Number =150).

Duration of the interview	Al Wafa'a endocrine center (No. = 100)	Primary health care center (No.=50)	P-value
- Less than 5 minutes.	0 (0%)	50 (100%)	<0.001
- 5-10 minutes.	40 (40%)	0 (0%)	
- 10-15 minutes.	43 (43%)	0 (0%)	
- More than 15 minutes.	17 (17%)	0(0%)	

4-DISCUSSION

Type 1 diabetes mellitus is an endocrine condition in which pancreatic β cells stop generating insulin, usually due to autoimmune damage. This leads to hyperglycemia and ketoacidosis; hence insulin replacement is critical for therapy.^[15]

The current study found that the mean age affected by type 1 diabetes is around 13 years. Anyhow; the diagnosis of type 1 DM can occur at any age, including in childhood, adolescence, and adulthood. which is comparable to Yen-Bo Lin et al study findings.^[16] Moreover; the majority of patients with type 1 DM were found to be females and having diabetes for more than 3 years which is goes with Nosaiba Ahmed Hussein Abdelseed et al study findings.^[17] Additionally; most of the patients found to be underweight; due to the body's inability to process glucose and metabolize fat, anyhow; the classic "skinnier presentation" isn't always the case. Taru Manyanga et al had found only (9%) of her study sample were underweight versus (15% overweight; 8% obesity) at time of diagnosis.^[18]

The current study also found; that patients attended to Al wafa'a specialized endocrine center, were significantly older, having DM for more duration and having higher BMI than those attending PHCCs. These facts might due to the patients' high trust on the health services provided by Al Wafa'a endocrine center in addition to the availability of viable insulin in this center. Reetu Zarora et al had similar findings.^[19] Furthermore; the study found patients attending Al Wafa'a endocrine center had significantly more self-monitoring of blood sugar and properly use insulin injection, which may be related to better education of the patients done by the doctors of that center, this is going with Jane L Chiang et al study findings.^[20]

Concerning the complications of diabetes, patients attending PHCC had more complication than the specialized endocrine center, this is often due to factors beyond the care provided, such as socioeconomic status,

access to healthcare, and adherence to treatment plans. Moreover; this study found patients at Al wafa'a specialized center spend significantly more time in their interview with specialist physician in comparison to patients attending PHCC, as the doctor asks the patient about the amount of insulin taken and writes down the amount to be taken from the pharmacy of the hospital, and sometimes blood glucose test is done for the patient. While, in case of Al wafa'a centers, examination of blood glucose, weight and height are done by a nurse before the patient is seen by the doctor; then during the interview, the history, examination and education of the patient are discussed and if insulin is available the patient is instructed about the proper use of it. Anyhow; outside Iraq the provided care was shown to be similar according to Fangjian Guo et al study results.^[21]

The study limitations; the number of type 1 diabetic patients attending PHCC was small, and within these centers there is no complete files for all of the patients, like name of patient and statistical review, as a result; the study had small sample size.

5-CONCLUSIONS AND RECOMMENDATIONS

From the results obtained from this study we can conclude that better glycemic control of patients attending the Al Wafa'a specialized endocrine center than the patients attending the PHCC due to; a higher percentage of patients attending the Al Wafa'a specialized endocrine center depend on self-monitoring to control their diabetes than patients attending the PHCCs, patients attending the PHCCs admitted to hospital are more frequently, the duration of interview between the doctor and the patient is longer in the Al Wafa'a specialized endocrine center, and lastly; there is a difference between the two centers in the BMI as more percentage of the patients attending the Al Wafa'a specialized endocrine center has normal BMI than patients attending the Outpatient, due to better glycaemic control.

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CONFLICT OF INTEREST

The authors report no conflict of interest concerning this study.

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