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"Effectiveness of an Instructional Program on Patients Knowledge and Practices toward Insulin Injection Technique Used by Patients with diabetes at Specialized Centers for Endocrinology and Diabetes in Baghdad City"

Mahmood Radhi Dawood Al-Kinani,[1] Sabah A. Ahmed

Abstract:

Objective : To evaluate Effectiveness of instructional program on patient knowledge toward insulin injection technique used by patients with diabetes at specialized centers for endocrinology and diabetes in Baghdad city**,** to assess Effectiveness of instructional program on patient practice toward insulin injection technique used by patients with diabetes at specialized centers for endocrinology and diabetes in Baghdad city**,** to identify the association between Effectiveness of an instructional Program and the demographic characteristics (age, gender, level of education, and Duration of insulin treatment) of patient.

Methodology: A semi-experimental study was conducted at specialized centers of endocrinology and diabetes in Baghdad, Iraq starting(21th November 2019 To 18th May 2020) . A (non-probability) purpose sample of (60) patients divided into two groups (30) patients for the case group (study) and (30) patients for the control group was tested. The data was collected in two phases: first baseline data (before any overlap was provided to the study group) and 21 days after the application of the study group education program, the post-program test was conducted for patient knowledge, and 21 days after the application of the study group education program for their practices. The reliability of internal consistency was achieved through the application of the Alpha Correlation Factor for knowledge and practice respectively (r=0.788), (r=0.839) which was statistically acceptable. The data was analyzed through the application of metadata and inference **.Result:** The current study demonstrated that there is a noticeable change in patients' knowledge and practices about the insulin injection technique used by patients with diabetes, between pre and posttest in the study group, while there is a slight difference between pre and posttest in the control group, with a statistically significant relationship between knowledge Patients, educational level, and duration of insulin therapy, while there was a statistically significant relationship between practices and the duration of insulin therapy only. **Conclusion:** The program has a positive impact on patients' knowledge and practices, about the insulin injection technique used by diabetics, through the improvement of the study group in the after-test. **Recommendations:** Enrichment of healthcare professionals of knowledge, skills and competencies with regard to best injection technique practice, is needed to support people who use injectable therapies effectively and safely ,raising awareness should be incorporated in existing research relating to injection techniques, and highlighting effectiveness that may have on health outcomes for diabetic patients using insulin therapy for establishing and promoting best practice in injection techniques ,Preparing educational programs for other diabetic patients who have insulin medication and their caregivers, to provide adequate information about knowledge and practice of insulin self- administration.

KEYWORDS: Diabetic patients, Insulin, Self-insulin administration

[1] [1] Ministry of Health, College of Nursing/University of Baghdad, Adult Nursing Department, E-Mail: mahmoodalknane07@gmail.com
[2] Prof. Adult Nursing Department, College of Nursing/University of Baghdad E-Mail: sabah.abbas@gmail.com

I. INTRODUCTION:

Diabetes mellitus (DM) is a chronic metabolic disease characterized by hyperglycemia and high glycated hemoglobin with or without glycosuria. Glucose metabolism disorder (GMD) results from a defect in insulin secretion by the pancreas, insulin action on the target tissues, or insulin resistance, or both. Chronic hyperglycemia leads to damage and failure of various organs, especially the heart, blood vessels, eyes, kidneys, and nerves. That macro and micro angiopathies, which can be observed even in newly diagnosed patients, are due to GMD long-term duration(Chentli et al., 2015).

Type I diabetes (T1D) is caused by the autoimmune destruction of pancreatic cells, and the prevailing pathophysiology is almost absolute insulin shortage. Therefore, injectable insulin is the cornerstone of treatment, and advances in insulin therapy have led to an increase in life expectancy for T1D individuals. The disease also characterized by increased glucagon secretion in the postprandial period, and targeting this abnormal glucagon secretion may be another useful strategy (Priya & Kalra, 2018).

Classifying a clinical condition is very important in disease diagnosis and treatment as it can guide clinicians to translate scientific understanding to clinical practice. Each classification can be further sub-divided depending on severity, and can be differently treated, ranging from insulin injections to lifestyle interventions. However, distinguishing between T1D and T2D has increasingly become more difficult in terms of clinical characteristics and an etiology, as they both share beta-cell inefficiency (Wilkin, 2012).

Self-administration of insulin requires from the user the mastery of the cognitive and psychomotor skills that constitute the learning of different procedures, including storage, transportation, preparation of the solution and application, as well as handling of syringes, needles or injection pens. Therefore, proper use of insulin at home requires training, changes in daily life routine, discipline, availability for learning and dedication and interest to perform self-care. The types of insulin and its forms of use are varied and, depending on the number of daily applications and the effect the dose and type of insulin used, the responsibility of the patient in the control of this chronic condition increases (Csiernik, 2016).

II. IMPORTANCE OF THE STUDY:

The importance of study came from increase ratio of DM patients around the world. The prevalence of diabetes is rising at an alarming rate (Anjana et al., 2011).

In 2000, the global estimate of adults living with diabetes was 151 million. By 2009, it had grown by 88% to 285 million. Today, we calculate that 9.3% of adults aged 20–79 years – a staggering 463 million people – are living with diabetes. A decade ago, in 2010, the global projection for diabetes in 2025 was 438 million. With over five years still to go, that prediction has already been surpassed by 25 million (International Diabetes Federation., 2019).

According to International Diabetes Federation of Diabetes Atlas 2010 estimate of adults Iraqi people with diabetes at age (20-79y) was 1,175,9 in 1,000s, the number of people with diabetes has increased significantly and is expected to reach 3,784,0 in 1,000s in 2045 (IDF of Diabetes Atlas, 2019).

According to data (Iraqi MOH, 2019). The increase in the number of diabetics is alarming, in 2014, the number of adult patients in all health institutions except for the emergency department for all types of diabetes and the two departments of Baghdad Health (Karkh and Rusafa) reached 332524 people affected, the number continued to increase until it reached 36,832 people with diabetes in 2018.

III. OBJECTIVES OF THE STUDY

1. To evaluate Effectiveness of instructional program on patient knowledge toward insulin injection technique used by patients with diabetes at specialized centers for endocrinology and diabetes in Baghdad city.
2. To assess Effectiveness of instructional program on patient practice toward insulin injection technique used by patients with diabetes at specialized centers for endocrinology and diabetes in Baghdad city.
3. To identify the association between Effectiveness of an instructional Program and the demographic characteristics (age, gender, level of education, and Duration of insulin treatment) of patient.

IV. MATERIALS AND METHODS

The quasi-experimental design (two-dimensional demonstration of two-group pre-test and post-test design) was conducted on maintenance Effectiveness of an Instructional Program on Patients Knowledge and Practices toward Insulin Injection Technique Used by Patients with diabetes It was conducted with application of pre and post- test approach for the study group and control group in assessing their knowledge and practice and the application of education program for the study group. It was carried out in order to achieve the initial stated objectives. The study started from(21th November 2019 To 18th May 2020 **SETTING OF THE STUDY:**

The study was conducted at two centers for endocrinology and diabetes in Baghdad city, which include (Al-Mustansiriya University /National Diabetes Center and The Specialized Center for Endocrinology and Diabetes). These centers were the designated site for data collection, because they are specialized centers that contain consulting units in addition to the presence of special units for conducting laboratory and clinical examinations, and it receives about (100-300) diabetic patients daily, which facilitated the data collection process.

THE SAMPLE OF THE STUDY:

A non - probability purposive sample was randomly selected from Patients with diabetes who are treated with insulin who attend specialized centers for endocrinology and diabetes for the purpose of receiving medical advice or receiving treatment The sample divided into two groups (30) patient considered as study group, and another (30) patient considered as control group. The study group was exposed to an instructional program, while the control group was not exposed to the program. Random allocation of the sample was done to avoid bias selection and to control for potential confounding.

INSTRUMENT OF THE STUDY:

To evaluate the effectiveness of the instructional program on patients' knowledge and practice, a self-administered questionnaire was developed to assess the knowledge. It was constructed through the review of related literatures and previous studies. The questionnaire was applied before and after implementation of the program, and used as a mean of data collection mainly it consisted of four parts:

Part I: Socio-Demographic Characteristics Questionnaire:

which included the patients characteristic, such as gender, age, level of education, Social status, Occupation, Monthly income, History of diabetes, how to take insulin, starting date of insulin therapy, the tool you usually use for injection and Insulin taking courses included (duration and number of the training courses).

Part II: general knowledge about diabetes:

The second part includes general knowledge about diabetes. The knowledge test was composed of (10) multiple-choice questions which regarding general information about diabetes.

Part III: insulin-related knowledge and injection technique:

The third part includes insulin-related knowledge and injection technique. The knowledge test was composed of (23) multiple-choice questions which regarding general information about insulin and injection technique.

Part IV: Observational checklist

The observational checklist was composed of (20) items covered injection technique. The researcher observed and checked for correct or not correct performance and then the practices as mean (3) or (2) corrects episodes were rated as always, (one) correct practice was rated as sometime and non-correct practice rated as never.

VALIDITY OF THE INSTRUMENT:

The content validity for the early developed instrument and instructional program was determined through the use of panel of experts to investigate the content of the instructional program and to determine the clarity, relevancy, and adequacy of the questionnaire in order to achieve the study objectives. A questionnaire, and instructional program were designed and presented to (18) experts in medical fields (Appendix E). They are (9) faculty members from College of Nursing / University of Baghdad, (2) faculty members from College of Nursing /University of Babylon, (2) faculty members from College of Nursing /Al-Muthanna University, (1) faculty member from College of Nursing /University of Kufa, (1) faculty member from College of Nursing /University of Al-Ameed and (3) specialized physician from ibn al nafees teaching hospital.

Those experts were provided with copy of study instruments and were asked to review and evaluate the instrument for its content clarity and adequacy.

Reliability of the instrument

The patients in the pilot study had the same criteria of the original study sample. It was conducted at The Specialized Center for Endocrinology and Diabetes in Baghdad-Rusafa during the period from (19th January 2020) to (28th January 2020), the results of the reliability present alpha correlation coefficient were (r=0.788) which considered statistically acceptable.

STATISTICAL METHODS:

The analysis of the data was used through descriptive statistics (frequencies, percentages, and the arithmetic mean and standard deviation) and statistical inferential (T-Test) in order to find the differences between the study group and the control group.

RESULTS OF THE STUDY

Table (1): Distribution of The Study Sample by Socio- Demographic Characteristics for (Study and Control Group) (N= 60 Patients):

Basic Information	Groups	Study group		Control group		Total Sample	
		F	%	F	%	F	%
Age groups	18-28	1	3.3	3	10.0	4	6.67
	29-38	3	10.0	4	13.3	7	11.66
	39-48	6	20.0	4	13.3	10	16.66
	49-58	8	26.7	5	16.7	13	21.67
	59 and more *	12	40.0	14	46.7	26	43.33
	Total	30	100.0	30	100.0	60	100
	$\bar{x} \mp S.D.$	39.0∓1.155		37.67∓1.431		38.34 ∓ 1.526	
Gender	Male	16	53.3	15	50.0	31	51.67

	Female	14	46.7	15	50.0	29	48.33
	Total	30	100.0	30	100.0	60	100
Educational Level	Not read and not write	3	10.0	6	20.0	9	15.0
	Reads and writes	8	26.7	4	13.3	12	20.0
	Primary school graduate	7	23.3	8	26.7	15	25.0
	Secondary school graduated	3	10.0	4	13.3	7	11.67
	Preparatory school graduate	3	10.0	3	10.0	6	10.0
	Graduate of the Institute	5	16.7	2	6.7	7	11.67
	Graduate of college or above	1	3.3	3	10.0	4	6.66
	Total	30	100.0	30	100.0	60	100
Marital status	Single	2	6.7	4	13.3	6	10.0
	Married	21	70.0	19	63.3	40	66.67
	Separated	1	3.3	1	3.3	2	3.33
	Widowed	6	20.0	6	20.0	12	20
	Total	30	100.0	30	100.0	60	100
Occupation	Employee	9	30.0	4	13.3	13	21.67
	Housewife	11	36.7	12	40.0	23	38.33
	Free works	6	20.0	7	23.3	13	21.67
	retired	4	13.3	7	23.3	11	18.33
	Total	30	100.0	30	100.0	60	100
Continue Table (4-1) …….							
Monthly income	Enough	9	30.0	7	23.3	16	26.67
	Not enough	12	40.0	20	66.7	32	53.33
	Somewhat enough	9	30.0	3	10.0	12	20
	Total	30	100.0	30	100.0	60	100
family history with diabetes	negative	20	66.7	16	53.3	36	60.0
	positive	10	33.3	14	46.7	24	40.0
	Total	30	100.0	30	100.0	60	100
Relationship with the person with diabetes	Non	20	66.7	17	56.7	37	61.67
	Father	6	20.0	6	20.0	12	20.0
	Mother	3	10.0	4	13.3	7	11.67
	Brothers	1	3.3	3	10.0	4	6.66
	Total	30	100.0	30	100.0	60	100
Duration of diabetes	1-5	14	46.7	1	3.3	15	25.0
	6-10	5	16.7	11	36.7	16	26.67
	11-15	6	20.0	5	16.7	11	18.33
	16-20	4	13.3	7	23.3	11	18.33
	21-25	1	3.3	6	20.0	7	11.67
	Total	30	100	30	100	60	100
Duration of	less than 1 Y	5	16.7	11	36.67	16	26.67

insulin treatment	1-10	23	76.7	16	53.33	39	65.0
	11-20	2	6.7	3	10.0	5	8.33
	Total	30	100.0	30	13.3	60	100
How to take an insulin injection	Self-injection	24	80.0	28	93.3	52	86.67
	By a family member	6	20.0	2	6.7	8	13.33
	Total	30	100.0	30	100.0	60	100
source of information regard insulin injection technique	Non	4	13.3	1	3.3	5	8.34
	A doctor	6	20.0	15	50.0	21	35.0
	Nurse	9	30.0	8	26.7	17	28.33
	Others	11	36.7	6	20.0	17	28.33
	Total	30	100.0	30	100.0	60	100
Injection method	insulin pen	13	43.3	6	20.0	19	31.67
	Insulin Syringe	17	56.7	24	80.0	41	68.33
	Total	30	100.0	30	100.0	60	100
number of insulin injected per day	Once daily	6	20.0	3	10.0	9	15.0
	Twice daily	22	73.3	8	26.7	30	50.0
	Three times daily	2	6.7	17	56.7	19	31.67
	Four times daily	0	0.00	2	6.7	2	3.33
	Total	30	100.0	30	100.0	60	100.0

F=Frequency, %= Percent, $\bar{x} \mp S$. *D*= Arithmetic Mean and Standard Deviation, *=(59-65)years.

This table (4-1) revealed that the majority 12 (40.0 %) of Patients in the study group are within the age group (59 and more) and 14 (46.7%) of Patients in the control group are within the same age group and 26 (43.33.0%) of patients all study sample of in age group (59 and more), related to the gender the study group were males and 16 (46.7%) of Patients, while equal percent for each male and female in control study. In addition, as for total study sample gender was male 31 (51. 67%).Concerning to the Educational level, majority of Patients in study group were read and write 8 (26.7%), while 8 (26.7%) graduated from primary school in the control group, in addition for total study sample 15 (25.0%) were graduated from primary school., In relation to Marital status, the most of patients 21 (70.0%) were married in study groups, while 19 (63.3%) in the control group were married. In addition, total study sample 40 (66.67%) were married., In relative to occupation of the participant, the most of patients 11 (36.7%) were housewife in study groups, while 12 (40.0%) in the control group were housewife. In addition, total study sample 23(38.33) were housewife.

Table (2): Effectiveness of Instructional Program Among the Two Period (Pre and Post-test) for Patients Knowledge toward Insulin Injection Technique Used by Patients with diabetes for Study Group.

Period	Mean ±S.D.	*N*	T	P. value	Sig
Pre-test	**1.2397 ± 0.14409**	**30**	**11.751**	**0.001**	**S**
Post –test	**1.7276 ± 0.19293**	**30**			

$\bar{x} \mp$ S.D.=Arithmetic Mean ($\bar{x}$) and Std. Dev. (S.D.), F = Fisher test, d.f. = degree of freedom, P = probability value. , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05 t=t test , N=Number of sample,

Table (4-4) shows there is statistically significance deffirenceses between pre and post-test for study group at P < 0.05, which mean effectiveness of Instructional program among the two period (Pre and Post-) for patient's knowledge toward insulin injection technique used by patients with diabetes for study group.

Table (3): **Comparison of Pre and Post Practices between Study Sample (Control and Study Groups) Patients Practices toward Insulin Injection Technique Used by Patients with Diabetes:**

Period	Groups	*N*	Total Mean	*SD*	P=0.001	Sig.

Pre-test Practice	**Control**	**30**	**1.5883**	**0.10229**	**0.640**	**N.S**
Post-test Practice	**Control**	**30**	**1.4950**	**0.13219**		
Pre-test Practice	**Study**	**30**	**1.5567**	**0.15577**	**0.001**	**S**
Post-test Practice	**Study**	**30**	**2.4333**	**0.23807**		

N=number,SD=standard deviation, **, P = probability value. , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05 t=t test , N=Number of sample.**

Table (4-7) shows that the pre-test practice scores were approximately equal for the for control groups (M = 1.5) at pre and post period, while for pre and post-test practice, study group scores are higher (M = 2.43 versus M = 1.55).Also this table show statistically significant differences between pre and post-test for study group at P < 0.05, which mean effectiveness of Instructional program among the two Period (Pre and Post-) for patients practices toward insulin injection technique used by patients with diabetes

Table (4): ANOVA Statistical Associations of the Study Group between the Demographic Variables of Patients and Effectiveness of Instructional Program Among Patients Knowledge toward Insulin Injection Technique Used by Patients with Diabetes:

No	Demographic Variables / Patient`s Knowledge	Statistics				
		Mean±S.D.	F	d.f	P. value	Sig
1	Age	39.0∓1.155	1.113	29	0.529	N.S
2	Gender	1.47∓ 0.507	0.805	29	0.664	N.S
3	Educational Level	3.47∓ 1.756	1.284	29	0.003	S
4	Duration of insulin treatment	2.03∓ 0.890	0.923	29	0.0466	S

$\bar{x}$ ∓ S.D.=Arithmetic Mean ($\bar{x}$) and Std. Dev. (S.D.), F = Fisher test, d.f. = degree of freedom, P = probability value, , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05.

This table (4-8) show their no statistically significances differences between demographics variables (age and gender), while there are statistically significances differences between demographics variables only with (Educational level and Duration of insulin treatment) and effectiveness of Instructional program for patients' knowledge toward insulin injection technique used by patients with diabetes, when analyzed by ANOVA.

Table (5): ANOVA Statistical Associations of the Study Group between the Demographic Variables of Patients and Effectiveness of Instructional Program Among Patients Practice toward Insulin Injection Technique Used by Patients with Diabetes:

No	Demographic Variables / Patients' Practice	Statistics				
		Mean±S.D.	F	d.f	P. value	Sig
1	Age	3.90 ± 1.155	1.309	29	0.305	N.S
2	Gender	1.47 ± 0.507	1.270	29	0.325	N.S

3	**Educational Level**	**3.47 ± 1.756**	**0.633**	**29**	**0.801**	**N.S**
5	**Duration of insulin treatment**	**2.03 ± .890**	**0.362**	**29**	**0.005**	**S**

$\bar{x} \mp$ S.D.=Arithmetic Mean ($\bar{x}$) and Std. Dev. (S.D.), F = Fisher test, d.f. = degree of freedom, P = probability value, , NS : Non Significant at $P \geq 0.05$, S : Significant at $P < 0.05$.

This table (4-9) show their no statistically significances differences between demographics variables (age, gender and Educational level), while there are statistically significances differences between demographics variables only (Duration of insulin treatment) and effectiveness of Instructional program for patients' practices toward toward insulin injection technique used by patients with diabetes, when analyzed by ANOVA.

V. DISCUSSION

The findings of data analysis that are shown in **table (1)** the study shows that the majority of Patients in the study within age group (59 and above) more than other age groups Table (1).These findings are agreed with study done by (Nasir & Abed, 2019), reported that the age group more than fifty six years old makes the majority of patients and more than other groups. Our findings are slightly differed from the results of the study done by (Alhabbo et al., 2018)who stated that the age group less than Thirty-nine years formed the majority of patients because it was more than the other.

Related to the gender, the male category was the largest in the total study sample Table (1). In support of this study (Mohannd & Yousif, 2019) in stated that the males were more than females with percentage (66.7%). Contradicting to the study that done by (A A Mansour et al., 2018) who reported that the females were more than males in study sample.

Concerning to the educational level, majority of Patients in study have graduated from primary school level Table (1). These findings were agreed with the study done by (Sadeq & Lafta, 2017) who reported that the level of primary school graduate made the highest score in his study. But these findings disagree with the study done by (Khuder & Al-Banna, 2015) who documented that the Illiterate group made the majority of patients more than other educational levels.

In relation to marital status, more than half of percipient of sample were married Table (1). These results agree with study done by (Othman & Khurshid, 2014) who mentioned that Marital status of most percipient of sample were married. These results disagree with study done by (El Gendi et al., 2017) in Egypt who reported that the More than half of patients were single.

Concerning to occupation of the participant, the most of patients were housewife Table (1). These results agree with study done by (Al Lami & Faik, 2016) who mentioned that majority of participants were Housewives 282 (48.3%). Contradicting to the study done by (Getachew & Solomon, 2019) in Southern Ethiopia, who reported that the majority of participants were Government employee 45(25%).

Relating to item related to (duration of diabetes), the most of patients in study sample were have duration with diabetes from (6-10) years Table (1). These results have come along with the findings of the study done by (Abbas et al., 2016) that showed the majority of participants have duration with diabetes more than five years. but this results disagree with study findings of (AmerMuhssen Nasir, 2019; Abbas Ali Mansour, 2018) that reported that majority of participants have duration with DM less than five years.

Table(2) The study shows there are statistically significance differences between pre and post-test for study group at $P < 0.05$, which mean effectiveness of instructional program among the two period (Pre and Post-) for patient's knowledge toward insulin injection technique used by patients with diabetes for study group Table (2). These results have come along with the findings of the (Swapna, 2016) the study was conducted to evaluate the effect of awareness program on insulin therapy among patients with diabetes mellitus and to correlate the pre-test knowledge score and pre-test compliance score on insulin therapy. The findings revealed that 36.7% and 35% had poor knowledge and compliance respectively. Where as in post-test, no one had poor knowledge and compliance to insulin therapy. indicating that awareness program was effective in terms of gain in knowledge and compliance on insulin therapy.

Table (3) The study shows that the pretest practice scores were approximately equal for the for control groups (M = 1.5) at pre and post period, while for pre and posttest practice, study group scores are higher (M = 2.43 versus M = 1.55). Also this table show statistically significant differences between pre and posttest for study group at $P < 0.05$, which mean effectiveness of instructional program among the two Period (Pre and Post-) for patients practices toward insulin injection technique used by patients with diabetes Table (3). These results have come along with the findings of the study of (Khuder & Al-Banna, 2015) that showed the mean scores of self–insulin administration practice were increased in comparing between pre-test and post-test (5.36 to 8.76 out of 10). There was a very highly significant difference between pre-test and post-test (p-value of t-test < 0,001), that's related to the education program which the researchers done for them.

Table (4) The study shows there are no statistically significances differences between demographics variables (age and gender), while there are statistically significances differences between demographics variables only with (educational level

and Duration of insulin treatment) and effectiveness of instructional program for patients' knowledge toward insulin injection technique used by patients with diabetes, when analyzed by ANOVA Table (4). In support of our results, (Sajai, 2017) conducted A Descriptive Study to Assess the Knowledge Regarding Self Administration of Insulin Injection among Diabetes Mellitus Patients in Diabetic Clinic of Primary Health Centre at Alnamas in Saudi Arabia. In the results of study, the knowledge level with selected variables and chi-square test was computed. The findings revealed that there was no association between knowledge level and age, Gender. but The findings revealed that there was significant association between knowledge level and Education of the participant, Duration Actual number of years on insulin therapy.

Table (5) The study shows there are no statistically significances differences between demographics variables (age, gender and educational level), while there are statistically significances differences between demographics variables only (Duration of insulin treatment) and effectiveness of educational program for patients' practices toward insulin injection technique used by patients with diabetes, when analyzed by ANOVA Table (5). This may be related to experience gained by patients self-injecting for the duration of insulin treatment (researcher).

Conclusion: The program has a positive impact on patients' knowledge and practices, about the insulin injection technique used by diabetics, through the improvement of the study group in the after-test.

Recommendations: Enrichment of healthcare professionals of knowledge, skills and competencies with regard to best injection technique practice, is needed to support people who use injectable therapies effectively and safely ,raising awareness should be incorporated in existing research relating to injection techniques, and highlighting effectiveness that may have on health outcomes for diabetic patients using insulin therapy for establishing and promoting best practice in injection techniques ,Preparing educational programs for other diabetic patients who have insulin medication and their caregivers, to provide adequate information about knowledge and practice of insulin self- administration.

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