International Journal of Psychosocial Rehabilitation, Vol.24, Issue 09, 2020
ISSN: 1475-7192

Effectiveness of an Educational Program on the Knowledge of Parents of Children with Type 1 Diabetes Mellitus about Methods of Insulin Injection in Specialized Diabetic and Endocrine Glands Center at Al-Nasiriyah City

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Abstract:

Background: *Diabetes mellitus is one of the world's oldest known diseases. Diabetes mellitus (DM) is a clinical syndrome characterized by hyperglycemia. Type 1 diabetes mellitus (T1DM) is the most common chronic metabolic disease in childhood. Diabetics and their families have to learn wide varieties of technical and cognitive skills to maintain good glycemic control.*

Objectives: *Determine the effect of the health education program in enhancing the knowledge of parents of children with type 1 diabetes mellitus about methods of insulin injection.*

Methodology: *The study was designed as quasi-experiment for study group (30) and control group (30) participants' parents of children with type 1 diabetes mellitus being tested in three periods pre-test, post-test-1, and posttest-2. The study group participants are tested prior implementing the educational program (the educational program lectures started from 3rd – 5th of February, 2020) then after period they are tested post-test-1(in 9th February, 2020) then after a while the post-test-2 had been conducted (in 24th February, 2020). The control group participants are provided with the same questionnaire to answer, the pre-test conducted in same time of the pre-test of study group conducted while the post-test-1 conducted (in 10th February, 2020) and the post-test-2 conducted (in 25th February, 2020), but without enrollment in educational program.*

Results: *The study outcomes include low in assessment of parents' knowledge prior the educational program and became high-assessment after participation in the program. This is not applied on control group in which participants remain within low-assessment for three periods of testing each test.*

Conclusion: *Parents knowledge regarding methods of insulin injection has been improved after implementation of the educational program in the study group, which reveal that the effectiveness of the provided program was highly beneficial.* ***Recommendations:*** *Encouraging parents for more involvement in seminars and educational sessions on diabetes mellitus especially the methods to inject insulin and how to deal with Sick child.*

KEYWRODS: *Effectiveness, Educational program, Knowledge, Diabetes mellitus type I.*

INTRODUCATION

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Diabetes mellitus (DM) is a chronic metabolic Condition affecting the child's physical and psychological growth and development. Diabetes mellitus (DM) can lead to damage, dysfunction, or failure of various organs specially eyes, kidneys, nerves, heart, blood vessels, etc . Childhood diabetes is rapid in its onset presenting with the classic triad of symptoms: polyuria (excretion of large amount of urine), polydipsia (excessive thirst), and polyphagia (constant hunger). Despite the hunger and increase food intake, the child loses weight. The symptoms can appear insidiously, with fatigue, anorexia, nausea, lethargy, and weakness. The skin becomes dry and vaginal yeast infections may be seen in the adolescent girls (Madian & Ismail. 2016). Type 1 Diabetes Mellitus (T1DM), previously known as juvenile and/or insulin-dependent diabetes, represents a very frequent chronic health condition in the child population (Wolkers et al., 2017). Treatment of type 1 diabetes mellitus (T1DM) requires lifelong administration of exogenous insulin. The primary goal of treatment of T1DM in children and adolescents is to maintain near-normal glycemia through intensive insulin therapy, avoid acute complications, and prevent long-term microvascular and macrovascular complications, while facilitating as close to a normal life as possible. Effective insulin therapy must, therefore, be provided on the basis of the needs, preferences, and resources of the individual and the family for optimal management of T1DM. To achieve target glycemic control, the best therapeutic option for patients with T1DM is basal-bolus therapy either with multiple daily injections (MDI) or continuous subcutaneous insulin infusion (CSII). Many formulations of insulin are available to help simulate endogenous insulin secretion as closely as possible in an effort to eliminate the symptoms and complications of hyperglycemia, while minimizing the risk of hypoglycemia secondary to therapy (Malik & Taplin .2014).

OBJECTIVES OF THE STUDY:

1. Determine the effect of the health education program in enhancing the knowledge of parents of children with type 1 diabetes mellitus about methods of insulin injection .
2. Find out the association between parent's age, family's socioeconomic status, duration of child's illness, and parents' knowledge about insulin injection.
3. Investigate the differences in parents' knowledge about insulin injection between the groups of father's education, mother's education, family's socioeconomic class, and child's gender.

HYPOTHESIS OF THE STUDY:

There is significant relationship between educational program and the knowledge of parents children with type 1 diabetes mellitus about methods of insulin injection .

MATERIALS AND METHODS:

A quasi-experimental study design two-study group (pre-test, post-test1 and post-test 2) used to guide this study to determine Effectiveness of an Educational Program on the Knowledge of Parents of Children with Type 1 Diabetes Mellitus about Methods of Insulin Injection. It was conducted with application pre-test, post-test-1, and post-test-2 approach for the study group and control group in assessing their knowledge 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(29th December 2019 To 25th February 2020).

SETTING OF THE STUDY

The setting of the study was at Specialized Diabetic and Endocrine Glands Center at Al-Nasiriyah City, thus it was selected as a site for implementing an educational program to fulfill the effectiveness of parents' of children with type 1 diabetes mellitus knowledge about methods of insulin injection.

THE SAMPLE OF THE STUDY

A non - probability purposive sample selected from parents' of children with type 1 diabetes mellitus who were review the Specialized Diabetic and Endocrine Glands Center. The sample divided into two groups (30) parents enrolled as a study group, and another (30) parents enrolled as the control group. The study group participants were exposed to an educational program, while the control group were not.

INSTRUMENT OF THE STUDY

For the purpose of the present study , a questionnaire was conducted by the researcher depending on : Extensive review of available related literatures and studies about methods of insulin injection use the questionnaire was used before and after conducting a special program designed to increase the knowledge of the sample . The purpose behind that is to assess the knowledge of the sample prior to the intervention and after in order to check the effectiveness of the program. Self-administered questionnaire was constructed by the researcher in the purpose of data collection regarding Knowledge of Parents of Children with Type 1 Diabetes Mellitus about Methods of Insulin Injection**.** It consisted of Two parts**:**

Part I: Socio-Demographic Characteristics Questionnaire:

It consists of (9)items related to the socio-demographic characteristics of the sample which include Parents **(**age, gender, educational level, The father and mother occupation , The family's monthly income (in Iraqi dinars), Number of children in the family, The duration of illness , Parent received training on how to inject insulin or no? and Age and gender of the child).

Part II: Contain six domains each one have multiple choice questions, the participant shall choose one answer. The overall sum of questions within part II are fifty questions. The correct answers are used to test participants' knowledge**.** The domains are:

Domain 1. Basic information related to insulin, the method of mixing insulin and storing insulin (8 items)

Domain 2. Insulin injection sites (6 items)

Domain 3. How to inject insulin using (syringe and insulin pen) (20 items)

Domain 4. Complications of insulin injection (4 items)

Domain 5. Dispose of used pen / needles / syringes (3 Items)

Domain 6. Measuring the blood sugar level and reviewing the child To a doctor (9 items).

VALIDITY OF THE INSTRUMENT

The study instrument and the educational program underwent series of revisions and modifications according to panel experts views, those experts had more than ten years of experience in their field of specialty. The researcher proposed each expert member to review the study questionnaire and program for content, simplicity, relevance, style, and suitability. The questionnaire formand the health educational program handled to (15) experts, (6) faculty members from College of Nursing/ University of Baghdad, (1) faculty member from Al-Zahrawi College Al-Ahliyya University,(1) faculty member from College of Nursing/ University of Basrah , (1) Diabetic and endocrine specialization in children College of Medicine \ Baghdad University, (2) Diabetic and endocrine specialization The College of Medicine/ Dhi Qar University, (1) Pediatric consultant from The College of Medicine/ Dhi Qar University,(1) Pediatric consultant from Al Haboubi Teaching Hospital, (1) Pediatric consultant from Child Protection Hospital, , and (1) Pediatric consultant from Mohamed Al-Musawi Hospital for Children. The experts made reviews, notes, evaluates for the study instrument and the program, and all of accepted the content, style, organization of both program and the study questionnaire. Modification done according to experts' validity.

Reliability of the instrument

The pilot study proceeded in Specialized Diabetic and Endocrine Glands Center in Al-Nasiriyah City for the reliability determination of the educational program and the questionnaire . The pilot study was conducted on (10) parents of children with type 1 diabetes mellitus those participants share the criteria of the study sample, and it was done pretest of the pilot study in (5th January, 2020) and the post test of the pilot study done in (20th January, 2020), the sample participants of the pilot study are excluded from the main study sample**.** The results of the reliability present alpha correlation coefficient were (r=0.815) which considered statistically acceptable; means that the questionnaires had an adequate level of internal consistency and equivalence measurability.

STATISTICAL METHODS

Data will be analyzed using the statistical package for social science (SPSS), version 25.0, using the statistical measures of frequency, percent, mean, standard deviation, paired-sample t-test, and independent-sample t-test.

RESULTS OF THE STUDY

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

Basic Information	Groups	Study group		Control group		Total Sample	
		F	%	F	%	F	%
Age of Parents	18-28	12	40.0	13	43.3	25	41.7
	29-38	8	26.7	10	33.3	18	30.0
	39-48	6	20.0	2	6.7	8	13.3
	49-58	3	10.0	3	10.0	6	10.0
	59 and more *	1	3.3	2	6.7	3	5.0
	Total	30	100.0	30	100.0	60	100.0
	$\bar{x} \mp S.D.$	21.0∓ 1.155		20.0 ∓1.245		20.07 ∓ 1.191	
Gender of Parents	Male	16	53.3	21	70.0	37	61.7
	Female	14	46.7	9	30.0	23	38.3
	Total	30	100.0	30	100.0	60	100.0
Age of Child	1- 5 years	11	36.7	9	30.0	20	33.3
	6- 10 years	11	36.7	14	46.7	25	41.7

	11-15 years	8	26.7	7	23.3	15	25.0
	Total	30	100.0	30	100.0	60	100.0
Gender of Child	Male	17	56.7	15	50.0	32	53.3
	Female	13	43.3	15	50.0	28	46.7
	Total	30	100.0	30	100.0	60	100.0
Educational Level of Father	Not read and not write	7	23.3	5	16.7	12	20.0
	Reads and writes	4	13.3	7	23.3	11	18.3
	Primary school graduate	3	10.0	1	3.3	4	6.7
	Secondary school graduated	4	13.3	4	13.3	8	13.3
	Preparatory school graduate	4	13.3	2	6.7	6	10.0
	Graduate of the Institute	5	16.7	4	13.3	9	15.0
	Graduate of college	3	10.0	6	20.0	9	15.0
	Master Degree	0	0.00	1	3.3	1	1.7
	Doctorate	0	0.00	0	0.00	0	0.00
	Total	30	100.0	30	100.0	60	100.0
Educational Level of Mother	Not read and not write	4	13.3	7	23.3	11	20.0
	Reads and writes	12	40.0	6	20.0	18	28.3
	Primary school graduate	3	10.0	5	16.7	8	13.3
	Secondary school graduated	7	23.3	4	13.3	11	18.3
	Preparatory school graduate	1	3.3	4	13.3	5	8.3
	Graduate of the Institute	2	6.7	3	10.0	5	8.3
	Graduate of college	1	3.3	1	3.3	2	3.3
	Master Degree	0	0.00	0	0.00	0	0.00
	Doctorate	0	0.00	0	0.0	0	0.00
	Total	30	100.0	30	100.0	60	100.0
Occupation of the Participant Father	Professional	5	16.7	8	26.7	13	21.7
	Semi-professional	7	23.3	4	13.3	11	18.3
	The author:	7	23.3	3	10.0	10	16.7
	Skill worker:	3	10.0	4	13.3	7	11.7
	The semi-skilled worker	6	20.0	4	13.3	10	16.7
	Unskilled worker.	2	6.7	4	13.3	6	10.0
	It does not work	0	0.0	3	10.0	3	5.0
	Total	30	100.0	30	100.0	60	100.0
Occupation of the Participant Mother	Professional	0	00.0	4	13.3	4	6.7
	Semi-professional	4	13.3	10	33.3	14	23.3
	The author:	2	6.7	4	13.3	6	10.0
	Skill worker:	5	16.7	3	10.0	8	13.3
	The semi-skilled worker	6	20.0	3	10.0	9	15.0
	Unskilled worker.	6	20.0	2	6.7	8	13.3
	It does not work	7	23.3	4	13.3	11	18.3
	Total	30	100.0	30	100.0	60	100.0
The family's monthly income (in Iraqi dinars)	Less than 300,000	12	40.0	8	26.7	20	33.3
	300,000 - 600,000	11	36.7	7	23.3	18	30.0
	601,000 900,000	3	10.0	5	16.7	8	26.7

	901,000-1.200,000	3	10.0	5	16.7	8	6.7
	1.200,000-1.500,000	1	3.3	3	10.0	4	3.3
	1.501,000 or more	0	0.0	2	6.7	2	100.0
	Total	30	100.0	30	100.0	60	33.3
The number of children in the family	1-5	18	60.0	12	40.0	30	50.0
	6-10	11	36.7	10	33.3	21	35.0
	11-15	1	3.3	8	26.7	9	15.0
	Total	30	100.0	30	100.0	60	100.0
Duration of the child with diabetes	1-5	22	73.3	17	56.7	39	65.0
	6-10	6	20.0	10	33.3	16	26.7
	11-15	2	6.7	3	10.0	5	8.3
	Total	30	100.0	30	100.0	60	100.0
Have you ever received training on insulin injection?	Yes	8	26.7	10	33.3	18	30.0
	No	22	73.3	20	66.7	42	70.0
	Total	30	100.0	30	100.0	60	100.0

F=Frequency, %= Percent, x^- ∓S. D= Arithmetic Mean and Standard Deviation.

This table revealed that the majority 12 (40.0 %) of Parents' age in the study group are within the age group (18-28 years) and 13 (43.3%) of Parents' age in the control group are within the same age group and 25 (41.7%) of parents in all study sample of in age group (18-28 years) with mean (20.0). Related to the gender the study group were males and 16 (46.7%) of Parents' gender , while in control group 21 (70.0%) are males. In addition, as for total study sample gender were male 37 (61.7 %).In related to the child age the majority of study group 22 (74.1 %) with age group (1-5) and (6-10) years , while the majority of control group 14 (46.7) within age (6-10 years), then the majority of overall study sample child age with 25 (41.7 %) with age group (6-10) years. Related to the gender of child the study group were males and 17 (56.7%) of child' gender , while in control group 15 (50.0%) are males. In addition, as for total study sample gender were male 32 (53.3 %). Concerning to the educational level of father, majority in study group were not read and not write 7 (23.3%), while 7 (23.3%) were read and write in the control group, in addition for total study sample 12 (20.0%) were not read and not write. Concerning to the educational level of mother, majority in study group were read and write 12 (40.0%), while 7 (23.3%) not were read and not write in the control group, in addition for total study sample 18 (28.3%) were read and write. In relation to occupation of father, the most of father 14 (46.6%) were semi-professional and author study groups, while 8 (26.7%) in the control group were professional. In addition, total study sample 13 (21.7%) were professional. In regarding to occupation of mother, the most of mother 12 (40.0%) were semi-skilled worker and unskilled worker study groups, while 10(33.3%) in the control group were semi-professional. In addition, total study sample 14 (23.3%) were semi-professional. Regarding to the monthly income, the most of Parents' Less than300,000 monthly incomes in study groups 12 (40.0%), while 8 (26.7%) in the control group. In addition, total study sample 20 (33.3%) have Less than300,000 monthly incomes. Related to Duration of the child with diabetes, the most of child have diabetes about (1-5 years) 22 (73.3%) in study group, while 17 (56.7%) in the control group. In addition, total study sample were 39 (50.0%) have (1-5 years). Regarding to The number of children in the family, the most of Parents have (1-5 child) 18 (60.0%) in study group, while 12 (40.0%) in the control group. In addition, total study sample were 30 (65.0%) have (1-5 child). Regarding to Have you ever received training on insulin injection session, the most of Parents' in study group 22 (73.3%) have not get training session, while in the control group 20 (66.7%). In addition, total study sample were 42 (70.0%) have not get training session.

Table (2): Effectiveness of an Educational Program on the Knowledge of Parents of Children with Type 1 Diabetes Mellitus about Methods of Insulin Injection Among the Three Period (Pre , Post-testI and Post-test-II) of the Study and Control Group.

Period	Groups	*N*	Total Mean	*SD*	F	d.f	P-Value	Sig.
Pretest	Control	30	1.2741	0.09457	4.352	29	0.602	NS
Posttest-I	Control	30	1.2579	0.09699	3.467			
Posttest-II	Control	30	1.2646	0.10779	2.711			

Pretest	Study	30	1.4156	.11662	1.983	29	0.014	S
Posttest-I	Study	30	1.7672	06635	1.920			
Posttest-II	Study	30	1.8966	.05464	1.688			

N=number, SD=standard deviation, , df=degree of freedom, P = probability value. , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05 , N=Number of sample.

Table (2) shows that the three period of pre-test, post- test-I and post test -II of the control group mean are approximately equal (M 1.2) while the pre and post-test-I and post –test-II study group scores are higher (M = 1.41) and (M = 1.76) and (M=1.89) . Also this table show statistically significant differences between pre and post-test for study group at P < 0.05, which refer effectiveness of an educational program on the knowledge of parents of children with type 1 diabetes mellitus about methods of insulin injection among the three period**,** when analyzed by ANOVA**.**

Table (3): ANOVA Statistical Associations of the Study Group between the Demographic Variables of Parents' , Child Knowledge and Effectiveness of an Educational Program on the Knowledge of Parents of Children with Type 1 Diabetes Mellitus about Methods of Insulin Injection:

No	Demographic Variables / Effectiveness of an Educational Program	Statistics				
		Mean±S.D.	F	d.f	P. value	Sig
1	Parent's age	21.0∓ 1.155	1.526	29	0.206	N.S
2	Family's socioeconomic status	2.17∓1.147	0.771	29	0.644	N.S
3	Duration of child's illness	1.33∓ .606	3.536	29	0.009	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 (3) show their no statistically significances differences between demographics variables (Parent's age and family's socioeconomic status) ,while there is statistically significances differences between demographics variables only with (duration of child's illness) and effectiveness of an educational program on the knowledge of parents of children with type 1 diabetes mellitus about methods of insulin injection, when analyzed by ANOVA.

Discussion

The findings of data analysis that are shown in **table (1)** result of the study sample reported that the majority of Parents in the study within age group (18-28 years) more than other age, These findings are agreed with study done by (Khuder & Al-Banna, 2015), reported that the age group(18-31) makes the majority of participant in the study. Our findings are differed from the results of the study done by (Jönsson, L. 2014) who stated that the age group (36- 40) years formed the majority of parents in the study sample .

Related to the parent gender, the male category was the largest in the total study sample. 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 (Wolkers *et a*l ., 2017) who reported that the females were more than males in study sample.

In relation to the child age the majority of overall study sample with age group (6-10) years. These results agree with study done by (Karilena *et al*., 2016) who mentioned that 76% of children in the age group of (6 to 10 years) old. These results disagree with study done by (Lewandowski and Drotar, 2007) findings the majority of study a sample children in Age (13–18 years).

Related to the gender of child, total study sample gender were male 32 (53.3 %). These findings agreed with study of the (Loucks, 2011) who reported that the majority of study sample were male. But this result disagrees with study results' that showed the majority of study sample were females 59 (56.2%) that done by (Zalzala *et al*., 2019).

Concerning to the educational level of father, the majority of in study have were not read and not write. These findings were agreed with the study done by (Abdulkader, 2017) who reported that the education level was Illiterate. But these findings disagree with the study done by (Stephanie J *et al*., 2009) who documented majority of the fathers educational level were high school graduates.

Concerning to the educational level of mother, majority of study sample 18 (28.3%) were read and write. These results have come along with the findings of the study done by (Abolhassani *et al*., 2013) that showed that Level of education of majority of participants of mothers was high school education and higher . But this results disagree with study findings of educational level of mother was Illiterate the study done by (Salih, 2019).

In relation to occupation of father , total study sample 13 (21.7%) were professional . These findings are agreed with study done by (El-Khawaga &Abdel-Wahab , 2015) in Egypt that revealed the majority of the study sample was Professional . But these findings disagree with the study done by(Mahfouz EM *et al*., 2018) that showed the majority of studied sample were Nonworker.

In regarding to occupation of mother , the most of mothers in total study sample were semi-professional. These results have come along with the findings of the study done by (Malerbi *et al.* 2012) that showed the majority the mothers in study were active workers. But our finding disagrees with results the study done in Iran by (Baharvand & Hormozi, 2019) that show there was (65.3%)of Mothers homemakers.

Regarding to the monthly income , the most of study sample have Less than 300,000 monthly income. This results were supported by the results of the study done by (Nasir & Abed, 2019), as it showed that the majority of participants have inadequate monthly income (43.0%),and disagree with study done by (Jasim *et al*., 2014) that showed About 35% of the respondents considered their monthly income as moderate or better than moderate level (adequate).

Related to Duration of the child with diabetes , the most of child have diabetes in total study sample were 39 (50.0%) have (1-5 years). this finding agree with (Niba , 2016) , That showed that duration of diabetes was (2–5 years). but the results of this study disagree with study that done by(Faraj , 2016) that showed Duration of illness was (6-10 years).

Regarding to The number of children in the family, the most of Parents' in total study sample were have (1-5 child). These results have come along with the findings of the study done by (Lindström,2016) that showed the Number of children in family was (1- 5 child).

Regarding the parents training on insulin injection method , the most of Parents' total study sample were 42 (70.0%) have not get training session. These results have come along with the findings of the study done by (Faraj , 2016) that showed the majority of participants have not get Participation in educational sessions.

Table (2) The study shows there are three period of pre-test, post- test-I and post test -II of the study group mean are higher (M = 1.41) and (M = 1.76) and (M=1.89). Also this table show statistically significant differences between pre and post-test for study group at $P < 0.05$, which refer effectiveness of an educational program on the knowledge of parents of children with type 1 diabetes mellitus about methods of insulin injection among the three period**,** when analyzed by ANOVA. 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. The Table also show that the three period of pre-test, post- test-I and post test -II of the control group mean are approximately equal (M 1.2) due to not participant in education program(the researcher).

Table (3) The study shows their no statistically significances differences between demographics variables (Parent's age and family's socioeconomic status) ,while there is statistically significances differences between demographics variables only with (duration of child's illness) and effectiveness of an educational program on the knowledge of parents of children with type 1 diabetes mellitus about methods of insulin injection, when analyzed by ANOVA This result disagree with the result of study conducted by (Khurshid & Othman, 2014) ,that found statistically significant association was found between knowledge levels and age of patients (P=0.02) , and statistically significant association between knowledge and family socioeconomic status (P value <0.001) .

Conclusion: Parents knowledge regarding methods of insulin injection has been improved after implementation of the educational program in the study group, which reveal that the effectiveness of the provided program was highly beneficial.

Recommendations: Encouraging parents for more involvement in seminars and educational session on diabetes mellitus especially the methods to inject insulin and how to deal with Sick child.

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