ORIGINAL ARTICLE

Effectiveness of nursing intervention regarding self insulin administration among diabetic patients

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Received: January 12, 2016 **Accepted:** March 6, 2016 **Online Published:** April 25, 2016
DOI: 10.5430/cns.v4n2p57 **URL:** http://dx.doi.org/10.5430/cns.v4n2p57

ABSTRACT

Objective: the study was carried out to assess effectiveness of nursing intervention regarding self insulin administration among diabetic patients.

Methods: Research design: A quazi experimental design was utilized. Setting: Medical Clinic at Health Insurance Hospital, at Shebein El-Kom, Menofia Governorate, Egypt. Subjects: Convenient sample of 200 diabetic patients who were self insulin administered. Tools for data collection: Interviewing questionnaire includes socio demographic date, knowledge questionnaire sheet regarding self-administration of insulin, and observational checklist.

Results: Majority of studied sample was married female that have negative family history of diabetes, and are insulin injected for more than 1 year. Majority of studied sample have poor knowledge and incorrect practice their barriers to continuing insulin were pain, too expensive, and weight gain, the main points that improved by nursing intervention were as follows: air bubbles removing before injecting using the insulin syringe, frequently change site of injections, before injection keep insulin vial at room temperature at least for 15 minutes, and disposal of used needles in a safety box at home, the only statistical difference between knowledge and practice was after one week of intervention among study group.

Conclusions: The study concluded that the knowledge regarding insulin injection and self-administration of insulin practice after the nursing intervention were increased which is related to the effectiveness of the nursing intervention.

Key Words: Diabetic patients, Insulin, Knowledge, Self insulin administration

1. INTRODUCTION

Diabetes mellitus (DM) is a chronic disease, with which the patient must live his life. To achieve a state of health and acceptable level of function, patient with DM needs to have adequate knowledge and attitude of self-care activities. They need to clear their doubts related to self care activities such as diet, exercise, medication, self administration of insulin, food care and follow-up.[1]

Egypt prevalence of diabetes has reached epidemic proportions. Egyptian statistics showed that diabetes which is the eleventh most important cause of premature mortality and is the sixth most important cause of disability burden in Egypt by the year 2030, it will affect at least 8.6 million adults, which are responsible for 2.4% of all years of life lost.[2] Furthermore, Alwan and Alhusuny[3] reported that DM is still growing as an epidemic in both developed and developing countries it will affect more than 230 million people worldwide. Statistics from developed countries show that more than 30% of all diabetics use insulin either singly or in combination with oral anti-diabetic drugs. Inadequate knowl-

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edge regarding insulin is likely to influence its acceptance and adherence.[4]

Knowledge about insulin self administration is a fully requests for our society to take action for control of diabetes. To overcome the barriers of insulin injection and to have good glycemic control which will reduce the cost of treatment and diabetes related mortality the diabetic patients who are insulin administered need to have knowledge related to the disease and insulin administration and they must have a competency and positive attitude towards self administration of insulin injection.[5]

Insulin is administered by intermittent subcutaneous injection, traditionally it was given twice a day, often as premixed insulin, but the dose adjusted according to eating, physical activity and current blood glucose levels. Basal insulin is given twice daily. It involves the combination of quick-acting insulin before eating (altered according to the amount of carbohydrate) and long-acting background "basal" insulin to control blood glucose in between meals.[6]

The combination of insulin "multiple daily injections" involves 5, even 6 injections a day, according to the amount of carbohydrate eaten at each meal frequent checks of blood glucose is required to adjust the dose. Due to the limitations of insulin prepared for therapeutic use and its delivery into the systemic rather than the portal circulation insulin given subcutaneously cannot reproduce the physiology of insulin secretion of individuals without diabetes.[6] So it is important to minimize the risk of hypo- or hyperglycaemia patients adjust their insulin doses appropriately in response to factors such as carbohydrate intake, lifestyle, and exercise and undercurrents illness.[7]

The risk of poor glycemic control may increase by incorrect technique of injecting insulin due to mismatch of peak insulin effect and maximal glucose load.[8] Also improper use or reuse of injection devices, as needles, can lead to undesirable effects such as pain with bleeding and bruising, breaking off and lodging under the skin, contamination, dosage inaccuracy, and lipohypertrophy[9] According to Nagaraju *et al.*[10] essential part of diabetes management is appropriate injection technique. Studies conducted in various parts of the world considering the awareness and practice of diabetes patients towards the self-administration of insulin but patients' awareness and practices are still scarce.[11]

Successful self management in diabetes helps the patient feel better. Education is an important aspect of self-management, teaching the client on self administration of insulin helps the patient helps to build self confidence and pride of contribution in their management. Sandra[12] and Indi[1] reported that nursing intervention was effective in increasing the knowledge. The most important role of the nurse is to provide awareness to regarding knowledge on self care activities regarding diabetes among patients with diabetes. The nurse plays an important role in prevention and health promotion activities.

The nurse has an important role to play in the management of diabetes. The nurse has the responsibility of teaching the self injection of insulin to the patient and the family members or significant others and she has to begin this as soon as the need for the insulin has been established and use written or verbal instructions and demonstration techniques for teaching the patients.[12]

1.1 Significance of the study

DM is a chronic disease presented a worldwide burden. Insulin therapy is a potent and life saving medication but if prescribed or administered inaccurately had the potential to cause harm. Insulin management and prescribing errors are common due to insufficient patient's knowledge and can lead to patient harm and adverse patient outcomes as hypoglycemia leading to patient death.[13]

Recently, due to the increasing usage insulin therapy with diabetic patients, more emphasis should be given to the standardization and improvement of insulin administration technique, focusing promoting practice in injection techniques.

1.2 Aim of the study

To assess the effectiveness of nursing intervention and to identify barriers to continuing insulin therapy regarding self insulin administration among diabetic patients.

1.3 Hypothesis

(1) The study group subjects who exposed to nursing intervention exhibits more mean knowledge score compared to the control group subjects who do not exposed.
(2) The study group subjects who exposed to nursing intervention exhibits satisfied practice compared to the control group subjects who do not exposed.
(3) The study group subjects who exposed to nursing intervention exhibits more compliance (less barrier) compared to the control group subjects who do not exposed.

1.4 Inclusion criteria

- Diabetic patients being on insulin therapy
- Clients who are willing to participate in the study

1.5 Exclusion criteria

- Patients with visual impairment have difficulties to assess site of injection and to check expired date of insulin or determine proper dose of insulin.
- Patients with severe peripheral neuropathy cannot handle insulin device safely.

2. SUBJECT AND METHODS

2.1 Design

A Quazi experimental design was utilized.

2.2 Setting

The study was conducted at medical clinic at Hospital Health Insurance, Shebein El-Kom, Menofia Governorate.

2.3 The Study subject

A systematic random sample was utilized. Diabetic patients recruited in the present study were selected randomly manner, as they were selected from medical clinic at Hospital Health Insurance, Shebein El-Kom, Menofia Governorate, patients with odds numbers was selected to be included in the study till attain the sample size.

Sample size was calculated based on the previous year census report of diabetic patients at Hospital Health Insurance, Shebein El-Kom, Menofia Governorate. Total numbers of Diabetic patients insulin administered at Hospital Health Insurance, Shebein El-Kom, Menoufia Governorate was 400 patients. Sample size was calculated utilizing the following Equation 1:

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

Where: n = sample size; N = total population number (400); e = margin error (0.05).

A total 200 of diabetic patients self insulin administered were recruited in the current study. They were randomly allocated into two groups: control group (100 patients) they had routine hospital care, while study group (100 patients) who utilized nursing intervention. The data collection was carried out from November 2014 to February 2015.

2.4 Tools

Interviewing questionnaire include the following:

Section A: Demographic data consisting of: age, gender, marital status, educational status, occupation, family history of diabetes, duration of DM, duration of insulin therapy ,frequency of insulin injection per day, and device used for insulin injection.

Section B: Structured knowledge questionnaire regarding self insulin administration: It was developed and used by the researcher after reviewing the related literature (1, 14, 25) to assess patient knowledge. It consisting of 36 items of open questions covering the following 3 areas: Knowledge regarding concepts of insulin administration, techniques of self-administration of insulin, complications and precaution of insulin administration. Examples of Data on knowledge regarding general information on DM and insulin self administration: Know definition of DM, Know action of insulin ,Insulin vial is stored in the refrigerator or cold place, insulin injection is taken soon after or just before taking food, the sites for insulin injection are abdomen, thigh, glutei and deltoid, the angle to administer insulin is 90, the distance to rotate on the same site is one thumb, ways to reduce pain during insulin injection are Inters the skin, do not manipulate the needle once Inserted, avoiding re using of the same site, The complications of insulin therapy are low Blood Sugar, insulin allergy, insulin resistance and wasting of subcutaneous tissue and wasting of subcutaneous tissue, The use of rotation of the injection site is to reduce pain, prevent wasting of subcutaneous tissues, massage after injection is used to reduce the rapid absorption of insulin, The benefit of insulin self administration are, time saving, inexpensive and easy to take on self while traveling.[14]

Scoring system: patient knowledge was assessed using the following score 2 for correct & complete answer, 1 for correct incomplete answer and zero for wrong answer. Then all score will be summed up and the total score of knowledge was 72 degree. It was as following: poor knowledge (less than 24 score), fair knowledge (score 24 to 36), and good knowledge (from 36 to 72 score).

Section C: Observational Check-list will be used to assess the technique of self-administration of insulin injection. There were 10 items in the checklist covering the following 3 areas: pre procedure, procedure and post procedure as follow: (1) giving insulin with proper angle and avoiding massage of injection site after insulin administration, (2) Changing the site of injections frequently, (3) avoid injection on scar or nevi, (4) keep the insulin vial at room temperature at least for 15 minutes before injection, (5) Hand washing before injection, (6) Disinfect site of injection, (7) air bubbles removing from the syringe before injecting, (8) Syringe should be used for once, (9) Disposal of used needles or syringe in a special safety box, (10) and Eating after insulin injection.

Scoring was correct practice for more than 60% (more than 6 degree). And incorrect practice for less than 60% (less than 6 degree).

2.5 Validity and reliability

Tools were tested for content validity by three experts in the field of Medical Surgical Nursing, Faculty of Nursing, Menoufia University, and two experts in the field of Medicine, Faculty of Medicine, Menoufia University and modifications were done accordingly. All tools were tested for reliability using test retest method to ascertain consistency: patient's knowledge regarding self insulin administration $r = 0.87$, observation check list $r = 0.72$.

2.6 Field work

- The researcher will assess the knowledge through knowledge sheet regarding self insulin administration, technique of self insulin administration through observational checklist) among diabetic patients by the means of pretest.
- The researcher will administer the nursing intervention as the following:
  (1) Knowledge through one by one teaching (lecture) during interview.
  (2) Practice regarding self insulin injection. Through demonstration and re demonstration procedure.
  (3) The researcher used audiovisual aids as colored booklet and instructional videos to provide knowledge and technique of self insulin administration
- After one week of nursing intervention(post test):
  (1) The researcher will assess the knowledge through knowledge sheet regarding self insulin administration.
  (2) Practice regarding self administration of insulin injection among diabetic clients through Check-list to assess the technique of self-administration of insulin injection.
- And repeated this measurement after two weeks.
- The data were collected on first day as pretest and second post test for the same data was collected after one week, and after two weeks. For control group measurement was taken three times (on first day of meeting, after one week, and after two weeks) without any intervention.

2.7 Pilot study

A pilot study was conducted prior to data collection on 10% of the study sample. This was performed in order to test the clarity and applicability of the tool and necessary modifications were done. Data obtained from the pilot was excluded from the study.

2.8 Administrative and Ethical consideration

- Official letter from the faculty of nursing was delivered to the responsible authorities of hospitals to take their approval to conduct this study. It was obtained after explaining the purpose of the study.
- Patient's formal agreement to participate in the study was obtained after explanation of the study purpose. Each patient was reassured that confidentiality and privacy will be maintained and his or her right to withdraw at any time.
- Anonymity and confidentiality: The respondents were assured that the data will be treated as strictly confidential; furthermore, the respondents' anonymity was maintained as they weren't required to mention their names.

2.9 Statistical analysis

Data was collected, tabulated and statistically analyzed with SPSS statistical package descriptive statistics were first applied e.g number, percentage, mean and standard deviation Tests of significance were used to compare study group using chi square test, p-values, which were less than .05, were considered as statistically significant.[15]

3. RESULTS

Table 1 shows that majority of both groups are married who were moderately educated, have negative family history of diabetes, and are diagnosed by diabetes and insulin injected for more than 1 year. Nearly half of both groups are insulin injected three times per day and more than half of both group using pen for insulin injection.

Table 2 shows that more than half of study group have average knowledge pre intervention, and 67% good knowledge after a week of intervention that more improved to 71% after 2 weeks. While control group presents 68% with poor knowledge pre intervention and almost remain in the same level after first and second week of intervention.

Table 3 shows that majority of both groups have incorrect practice at pre intervention, although percentage of control group of patients who perform self insulin administration correctly increased after one week and after two weeks of nursing intervention. While number of study group increased after one week post nursing intervention and decreased after two weeks post intervention. After two weeks the both groups have the same percentage of correct as well as incorrect practice regarding insulin self administration.

Table 4: This table shows that percentage distribution of barriers to continuing insulin therapy among both groups (study and control) at 3 interval of intervention. It was revealed that during the first week of intervention the main barrier of insulin injection is sensation of pain and it is too expensive, while after two weeks the main barrier presented is pain, weight gain, expensive among control group and

embarrassment, pain, and expensive among study group but with low percentage than control group.

Table 1. Socio demographic characteristics of studied sample

Variable	Control (n = 100) %	Study (n = 100) %
Age/years	44.64 ± 8.75	46.72 ± 7.84
Gender		
• Female	52	58
• Male	48	42
Marital status		
• Married	70	57
• Unmarried	30	43
Level of education		
• High (secondary & university)	26	20
• Moderate (primary)	43	48
• Low (read and write)	31	32
Family history of diabetes		
• Positive	37	34
• Negative	63	66
Diagnosis duration		
• < 1 year	37.5	45.0
• > 1 year	62.5	55.0
Occupation		
• Unemployed	59	54
• Self employed	41	46
Duration of insulin injection		
• Less than 1 year	24	9
• More than 1 year	76	91
Frequency of insulin injection		
• Once	4	0
• Two time per day	18	5
• Three time per day	49	58
• Four time per day	29	37
Type of device		
• Syringe	28	50
• Pen	72	50

Table 5 shows percentage distribution of observational checklist of patients practices related to self-administration of insulin among both groups. It shows that the main points that improved through measuring were as follows: air bubbles removing from syringe before injecting,, avoid injection on scar or navi while the other variable improving to some extent as frequently rotate the site of injections, keep the insulin vial at room temperature at least for 15 minutes before injection, and disposal of used needles or syringe in a special safety box. It was observed that during pre intervention stage the practices of the study group of patients were more correctly performed than the practices of patients in the control group in relation to all items of self insulin administration except one item (eating after insulin injection).So that, the practice of study group were better than of control group after one week and after two week of nursing intervention.

Table 6: This table showed that there is significant positive correlation between practice and knowledge pre intervention and significant positive correlation between pre and after two weeks of intervention between practice and knowledge after two weeks of intervention among control group.

Table 7: This table show that only statistical difference was between knowledge and practice was after one week of intervention among study group.

4. DISCUSSION

DM is a devastating chronic health illness bringing reasons for cessation of work and an increased attendance in emergency hospitals. Patients with type II DM badly need effective self-management for their illnesses which is enhanced through patients' success in solving their identified problems.[16]

4.1 Concerning sociodemographic data

The result of the present study showed that nearly half of both groups were female with mean age 46.72 $\pm$ 7.84 of study group and 44.64 $\pm$ 8.75 of control group were, this was in line with (Mostafa[13] whose study revealed that more than half of the studied subjects' were females with mean age 49.8 $\pm$ 10.6 years. He explained that as female more obese than male in our society that because impaired glucose tolerance or insulin resistance and female doesn't do physical activity and sporting like male. Concerning Zaki[16] study, more than half of the study sample's aged was from 41-65 years. This came in line with International Diabetes Federation 2012 statistics[17] that shows Egypt to be on the top of all the countries in the Middle East and North Africa (MENA) regarding prevalence of type II DM reported as 15.27%. Also Dieren *et al.*,[18] mentioned that, middle and late adulthood populations are thought to be the major drivers of the increasing prevalence of diabetes in Egypt and Africa in general.[16]

In the present study that majority of both groups were married, the study supported by Salem,[19] Raina[20] and Ebrahim,[21] who reported that that majority of the studied subjects were married, similar to Khaldon *et al.*[22] who showed that (91%) were married. On the other hand, Gurmu1and Teni[23] reported that the majority were men and those in the age group of 14-29 years.

In the present study the majority of studied sample have negative family history of diabetes, and are diagnosed by diabetes and insulin injected for more than 1 year. In Mahdi *et al.*[24] study nearly half of studied sample had positive family history of diabetes, and Ebrahim[21] study nearly one third of the participants had history of diabetic for less than five years. The researcher explained this discrepancy in the result due to difficult nature of life in menofia governorate and stress that present everywhere.

Table 2. Patients' knowledge regarding insulin self injection at 3 interval intervention (pre intervention /one week post intervention, and two weeks post intervention)

Variable	Pre-intervention		One week post-intervention		Two weeks intervention	
	Control	Study	Control	Study	Control	Study
Good	0	0	0	67	0	71
Average	32	60	38	33	39	29
Poor	68	40	62	0	61	0
Mean (%) ± *SD*	1.32 ± 0.46	1.4 ± 0.49	1.38 ± 0.48	2.67 ± 0.47	1.39 ± 0.49	2.71 ± 0.45
Chi-Square	84.64	84.64	4.00	43.56	0.000	25.00
t-value	.000	.000	.046	.000	1.000	.000

Table 3. Patients' practice about insulin self administration at 3 interval intervention (pre intervention /one week post intervention, and two weeks post intervention)

Practice	Pre-intervention		One week post-intervention		Two weeks post-intervention	
	Control	Study	Control	Study	Control	Study
Correct	4	4	40	83	50	50
Incorrect	96	96	60	17	50	50
Mean (%) ± *SD*	1.04 ± 0.19	1.04 ± 0.19	1.4 ± 0.49	1.83 ± 0.37	1.50 ± 0.50	1.75 ± 0.43
Chi-Square	12.96	4.00	5.76	11.56	4.84	17.64
t-value	000	.046	.016	.001	.028	.000

Table 4. Percentage Distribution of barriers to continuing insulin therapy among both groups (study and control) at 3 interval of intervention

Variable	Pre-intervention		One week post-intervention		Two weeks post-intervention	
	Control	Study	Control	Study	Control	Study
Fear of hypoglycemia	98	96	91	19	91	19
Weight gain	83	72	89	6	96	41
Self-consciousness/Embarrassment	96	80	94	12	94	49
Pain	98	87	98	71	97	44
Too expensive	98	79	99	57	95	48
Scarring	98	76	86	17	87	5
Passing out	96	65	97	11	95	2

In the present study, nearly half of both groups are insulin injected three times per day and more than half of both group using pen for insulin injection. The glycemic responses of the individual to food intake and exercise regimens determine the insulin dosage. For virtually all type 1 patients and many types 2 patients, to meet glycemic goals the time course of insulin action requires three or more injections per day.[25]

4.2 Concerning patient's knowledge regarding self insulin administration

The result of the present study showed that more than half of study group have average knowledge pre intervention, and two thirds have good knowledge after a week of intervention that improved after 2 weeks. Supporting this result; Indi,[1] findings revealed that the majority of studied subject had inadequate knowledge before nursing intervention that had improved after nursing intervention. On the same line, Mostafa[13] showed that the majority of sample had low level of knowledge regarding to the total knowledge scores of studied subject for safe insulin therapy. It was supported also by Faria *et al.*[26] who found that more than half of diabetics didn't know their insulin doses correctly. It may due to low level of education and unavailability of health education programs. Nagaraju *et al.*[27] concluded that knowledge assessment on self insulin administration revealed that more than half of the subjects had inadequate knowledge. Jenhani *et al.*[28] and Al-Banna & Khuder[29] concluded that the mean score knowledge after the education program were increased in comparing between pre-test and post-test, which is related to the effectiveness of the Individual Planned Teaching program. This result was agreed with the study done in Mangalore by Parecatty[30] which showed that the mean post-test

knowledge score of diabetic patients was higher than the mean pre-test knowledge score. Gerensea *et al.*[31] revealed slight improving knowledge score of study subjects regarding diabetes and insulin self administration. The researcher described this due to effectiveness of nursing intervention/ education in improving patient's knowledge.

Table 5. Observational checklist of patients' practices related to self insulin administration

Variable	Pre-intervention		One week post-intervention		Two week post-intervention	
	Control	Study	Control	Study	Control	Study
Giving insulin with proper angle , avoiding massage of injection site after insulin administration						
• Correct	2	29	1	45	4	54
• Incorrect	98	71	99	55	96	46
Changing the site of injections frequently						
• Correct	7	21	2	51	3	60
• Incorrect	93	79	98	49	97	40
Avoid injection on scar or navi						
• Correct	3	23	9	81	4	97
• Incorrect	97	77	91	19	96	3
Keep the insulin vial at room temperature at least for 15 minutes before injection						
• Correct	2	40	3	57	3	53
• Incorrect	98	60	97	43	97	47
Hand washing before injection						
• Correct	4	36	5	52	3	55
• Incorrect	96	64	95	48	97	45
Disinfect site of injection						
• Correct	1	43	5	58	4	55
• Incorrect	99	57	95	42	96	45
Air bubbles Removing from syringe before injecting						
• Correct	1	45	8	78	3	98
• Incorrect	99	55	92	22	97	2
Syringe should be used for once						
• Correct	3	4	4	49	3	54
• Incorrect	97	96	96	51	97	46
Disposal of used needles or syringe in a special safety box						
• Correct	2	12	1	56	4	59
• Incorrect	98	88	99	44	96	41
Eating after insulin injection						
• Correct	3	1	3	45	9	58
• Incorrect	97	99	97	55	91	42

Table 6. Correlation between knowledge, practice among control group

Knowledge variable	Pre-intervention (n = 100)		One week post-intervention (n = 100)		Two weeks post-intervention (n = 100)	
	R	Sig	*R*	Sig	*R*	Sig
Practice pre-intervention	-.031	.762*	.050	.618	.046	.649*
Practice one week post-intervention	-.123	.225	-.093	.360	-.109	.281
Practice two weeks post-intervention	.086	.396	.041	.684	.021	.840*

* = statistically significant difference

Table 7. Correlation between knowledge, practice among study group

Parameter	Pre-knowledge (n = 100)		One week post-intervention (n = 100)		Two weeks post-intervention (n = 100)	
	R	Sig	*R*	Sig	*R*	Sig
Practice pre-intervention	.042	.681	-.074	.466	-.094	.350
Practice one week post-intervention	.315**	.001	.022	.827	-.055	.590
Practice two weeks post-intervention	-.047	.641	-.061	.544	-.064	.529

** correlation is significant at the .01 level

4.3 Regarding to patient's practice concerning self insulin administration

It is critical to reassess how people with diabetes are injecting themselves on a regular basis.[6] The results of the present study showed that during pre intervention stage the practices of the study group were more correctly performed than the practices of control group So that, the practice of study group were better than of control group after one week and after two weeks of nursing intervention have the same percentage of correct practice as well as incorrect practice about insulin self administration. Ebrahim,[26] regarding to insulin self-administration reported that nearly half of studied sample had good practice for those who were receiving insulin for more than 10 years than the other group related to self-administration of insulin. These results were better than the result of study of Nagarajui *et al.*;[10] who revealed that more than two thirds of the subjects had poor practice. Golchin & Ghorbani[32] similar with Parecatty[30] showed that there were statistical significant difference between knowledge and skills. Supporting the present study, Al-Banna, and Khuder[29] revealed that majority of the sample had inadequate knowledge and half of them had inadequate practice regarding self-administration of insulin. Also, Frid *et al.*[33] who examined the injecting habits of diabetic people using insulin, revealed worrying practices in the procedure of injection technique, with poor improvement in the technique even after years of injection. From the researcher point of view self insulin administered patients believed that insulin self administration is tiresome and brought stigma. By time they ignore what is right and what is wrong and follow routine steps without making mind after nursing intervention they have the motivation to have controlled diabetes

4.4 Regarding to barriers to continuing insulin injection

It is important in all aspects of diabetes care to raise awareness about the consequences of an incorrect injection technique.[6] In the present study barriers to continuing insulin therapy among both groups (study and control) at 3 interval of intervention revealed that during the first week of intervention the main barrier of insulin injection is sensation of pain and it was too expensive, while after two weeks the main barrier presented in pain, weight gain, expensive among control group and embarrassment, pain, and expensive among study group but with low percentage than control group. Partanen[34] reported redness and itching at site of insulin injection were reported by one quarter by the patients while in Finland nearly half of studied sample had redness at site of injection. In Ebrahim's[21] study more than one third of studied sample faced no fear when they knew their need insulin therapy while in Spain half of the sample fear from hypoglycemia. Belendez[35] also, Shettigar[36] found that most patients are fearful of self injection. White *et al.*[6] highlight the necessity of repeated practice using sterile technique, use of the correct injection technique is central to optimal glycaemic control in those on injectable therapies.

In the present study, regarding to patients' practices related to self-administration of insulin it showed that the main points that improved through measuring were as follows: air bubbles removing from syringe before injecting, avoid injection on scar or navi while the other variable improving to some extent as frequently rotate the site of injections, keep the insulin vial at room temperature at least for 15 minutes before injection, and disposal of used needles or syringe in a special safety box. Supporting this result Parecatty[30] study showed after implementation individual planned teaching on self-administration of insulin for patients with DM higher percentage of procedures related to checking the expire dates of insulin, washing hands, removing air bubbles from the syringe before injection. Also, In Varder & Kiziki[37] and Ebrahim[21] study majority of studied sample changing the site of injections frequently that helping in reducing irritation, bruising, and risk of infection.

Also, these findings are in the same line with Juntunen & eHow[38] who concluded that, skilled self-injection technique was found to make the diabetic patients experience less pain and avoid unnecessary complications and basic to effective diabetes control is teaching the patients how to safely inject themselves with insulin through involving them into effective and basically affordable training programs that should be widely implemented in different community health settings.

Thais *et al.*[39] and Shettigar's[36] study showed poor skill on self-administration of insulin before training which improved significantly after training. Diabetes insulin therapy relies on the correct injection technique for optimal effect. immediate problems, such as hypoglycaemia (when insulin is injected into the muscle where it is absorbed at a fast rate), and/or hyperglycaemia (when the insulin is injected into an area where it is poorly absorbed) can be caused by incorrect technique, such as use of inappropriate needle length, failure to rotate the injection sites, as well as the reuse of needles, can lead to injectable therapies being absorbed in an unpredictable manner.[40]

In the present study, only statistical difference was found between knowledge and practice after one week of intervention among study group. Supporting this result Gurmu1and Teni[23] showed poor practice among patients regarding self insulin administration and statistically significant association between educational status and inappropriateness of insulin handling. Which indicate the necessity of health care providers to educate diabetic patients who are self insulin

injected. From the researcher point of view the difference because the time factor has a positive impact in improving practice among patients.

Also, Parecatty[30] has confirmed that there is a positive correlation between knowledge and self insulin administration skill where Shettigar[36] found a weak positive correlation in the same area. Namita[41] said that lack of organized health education and negligence of health care workers on insulin self administration. Inadequate knowledge regarding site of insulin injection may lead to develop complication of insulin therapy. These findings high light the need of emphasizing insulin injection during diabetes education.

5. CONCLUSIONS

The study concluded that the knowledge regarding insulin injection and self-administration of insulin practice after the nursing intervention were increased which is related to the effectiveness of the nursing intervention. When injectable therapies are initiated patients should be taught the correct injection technique, and the subject must also be revisited and reviewed on subsequent consultations.

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.

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