

Effect of Nursing Instructions on Adherence of Diabetic Patients to Treatment

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Abstract

Background: Diabetes Mellitus (DM) is a major 21st century health and development challenge, this chronic and incurable non-communicable disease is large preventable but remains responsible for millions of deaths annually and many more life-threatening complications. Uncontrolled diabetes and poor diabetic patients' knowledge about disease can lead to a high morbidity and mortality. **Aim of the Study:** To evaluate the effect of nursing Instructions on adherence of diabetic patients to treatment. **Research Design:** A quasi-experimental design was utilized in this study. **Setting:** The study was conducted in outpatient clinic for diabetic follow up at Minia University Hospital and Minia General Hospital. **Sample:** A purposive sample of 144 adult with type two diabetes mellitus (T2DM) were divided in to two equal groups (study and control) from both sex with duration of diabetic disease more than one year and patients without comorbid disease, and without cerebrovascular accident. **Tools of Data Collection:** Structured Interview assessment questionnaire sheet (patient socio-demographic characteristics and medical data), Assessment Scale for Treatment Adherence to assess Compliance of T2DM to Diabetic management, and instructions about diabetes "Booklet". **Results:** Current study findings revealed that there was a highly a significant improvement in Compliance of T2DM patients to Diabetic management in study group than control group and in post 1st and 2nd follow up for study group than pre application of instructions. **Conclusion:** The diabetic instructions and the use of booklet would improve patient's Adherence to Treatment. **Recommendations:** Nurses should emphasize to provide instructions tailored to each diabetic patient and increase their awareness about the importance of diabetic instruction to improve glycemic control.

Key Words: Adherence to Treatment, Diabetic Nursing instruction, T2DM.

Introduction:

Diabetes is a major cause of morbidity and associated mortality, type 2 DM is the most common type of diabetes and characterized by insulin resistance, which may be combined with relatively reduced insulin secretion, the defective responsiveness of body tissues to insulin is believed to involve the insulin receptor (Alkhatib, & Tuomilehto, 2019).

There is strong evidence that individuals who are educated and diligent with their diabetes self-care achieve better and durable diabetic control (Powers, et al., 2015). Furthermore, previous studies on knowledge, attitude and practice (KAP) on diabetes have supported the needs of greater awareness of prevention, diagnosis, and risk factor control in diabetes (Islam, et al., 2014). Even though, having better knowledge, good attitude and practices on diabetes could be helpful for better management (Herath, et al., 2017).

Instructional programs that emphasize adherence to treatment regimens as a whole, especially to diet, to exercise and to regular follow up are of greater benefit in glycemic control as compared to compliance of medications alone. A significant role in diabetic patient instruction is played by the nursing staff, nurses provided patients with better information on diabetes than other studied staff. (MakkiAwouda, et al., 2014).

Patient instruction plays a crucial role the treatment and management of diabetes. Without proper instruction, people diagnosed with T2DM may ignore their symptoms, develop life-threatening complications and continue this trend amongst their family and peers. Instruction can help prevent serious complications as well as hospitalization. Instruction needs to be specific to the individual to have a basic understanding of his disease and for him to feel confident in managing his disease in a home setting when a provider is not present (Cardenas, 2019). Nurses have important educating

roles and responsibilities to improve knowledge of diabetic patients (Aalaa, et al., 2012).

Significance of the Study:

Egypt is the nation with the ninth biggest population of diabetics in the world. According to IDF, there have been 8.2 million diabetic patients in Egypt in 2017, it is expected that this number will bounce up to 13.1 million by 2035. Among all diabetic cases, 90% are T2DM mellitus (Omar et al., 2018). The prevalence of T2DM is around 15.56% among adults with an annual death of 86,478 associated with diabetes (Hegazi, et al., 2015). In Egypt, the Demographic and Health Survey (DHS) 2015 estimated that around 4 in 10 of the individuals who had diabetes were eating a healthy diet, 13 percent of women and 15 percent of men were trying to lose weight or control their weight, and 2 percent of women and 7 percent of men were exercising. Only 2 percent of individuals who were diabetic (mainly men) said that they had stopped smoking in response to their condition (DHS, 2015). Diabetics need to have adequate knowledge, skills and positive attitudes to successfully manage diabetes every day (Parsons, et al., 2017 & Escalada, et al., 2016).

Aim of the Study:

The aim of the present study was to evaluate the effect of nursing Instructions for diabetic patients on their adherence to treatment.

Research Hypothesis:

H1: Diabetic patients' Adherence to Treatment will be better for study group post instructions than control group.

Subjects and Methods:

Research Design: Quasi experimental research design (study and control) was utilized to fulfill the purpose of the current study.

Study variables:

The independent variable in this study were the nursing instructions while the dependent variables were: patient's Adherence to Treatment

The present study was portrayed under topics as the following: technical design, operational design, administrative design, and statistical design.

I- Technical design:

Setting: This study was carried out at outpatient clinic for diabetic follow-up in Minia university hospital and Minia General Hospital.

Subjects: A purposive sample of 144 adult type II diabetic patients were divided in to two equal groups (study and control) the 1st admitted patient for study group (n=72) and the 2nd admitted patient for control group (n=72), all of them included in this study with the following criteria:

- Inclusion criteria: male and female patient, patients age of (18 - 65) years, and with duration of diabetic disease more than one year.
- Exclusion criteria: patients without comorbid disease, and without Cerebrovascular Accident (CVA).

Sample size :

Sample size is calculated by using the **Isaac, Bell, & Micheal (1982)** formula which is computed as $(N = n \times 30 / 100)$

N = sample size

n = Total number of diabetic patients admitted at Minia University Hospital during the period 2016:2017.

$N = 240 \times 30 / 100 = 72$ patient

Study group 72 patient + control group 72 patient = 144 patient for total study sample.

Study duration: The data collection was continued over a period of ten months, starting from April 2018 to January 2019.

Tools of data collection:

Two tools were designed and used for collecting data:

Tool I: "Structured Interview assessment questionnaire sheet" (I): structured and developed by the researcher after a literature review, through clinical evaluation and examination, this tool includes two main parts:

Part 1: Patient socio-demographic characteristics: it includes items related to demographic characteristics of patient such as (age, sex, occupation, marital status, level of education, income, residence).

Part 2: Patient medical data: it includes details of the diabetes disease such as (duration of DM, treatment type, frequency of follow-up, had previous hospitalization for DM, smoker, previous instruction related to diabetic disease management, and source of knowledge about diabetic disease management).

Tool II: Assessment of patient Adherence to Treatment by using of "**Assessment Scale for Treatment Adherence in Diabetes Mellitus**" which adopted and developed by **Demirtaş and Akbayrak, (2017)**. This scale with 5 item Likert type, the participants reflect the degree of their attitude related to the statement content. The scale consists of these grades in the form of 1= certainly agree, 2 = agree, 3 = partially agree, 4 = disagree and 5 = certainly disagree, score of 5 was accepted as indication of an unfavorable attitude and 1 as a favorable attitude.

The scale includes 13 items containing positive attitudes and 17 items containing negative expressions:

Items including positive expressions: item No.(1,3,5,8,13,15,16,17,19, 23,25, 26, 29).

Items including negative expressions: item No.(2,4,6,7,9,10, 11,12,14, 18,20, 21,22,24,27,28, and 30).

Scoring system:

- **Good adherence:** was considered if scoring = **(13)** grade in positive expressions items, and if scoring = **(85)** grade in negative expressions items.
- **Moderate adherence:** was considered if scoring = **(14:64)** grade in positive expressions items, and if scoring = **(18-84)** grade in negative expressions items.
- **No Adherence:** was considered if scoring = **(65)** grade in positive expressions items, and if scoring = **(17)** grade in negative expressions items.

Instructions about Diabetes "Booklet": The researcher was implementing the instructions about Diabetes "Booklet": that was formulated by researcher after extensive literature review (**Phillips et al., 2015, Thom et al.,2013, Evert et al.,2013, Powers et al.,2013, Funnell et al.,2015, Raebel et al.,2014, and American Diabetes Association 2017**) and revised by experts. This Booklet contain knowledge about diabetes (definition, sign and symptoms, causes, complication, how to prevent complication, medication, nutrition, exercise, and glycemic control). The researchers used simple language to suit the level of patients, with motivation and reinforcement to enhance learning. A copy of the handout booklet that was written in Arabic language offered for each study participant to use it as future reference. It was developed and supported with photos and illustrations to help patients and families to understanding the content of the booklet

II- Operational Design:

The study will carried out on three phases:

Phase I: Preparatory phase:

1- The study tools were designed after extensive review of literature.

2- The content and validity were done to identify the degree to which the used tools measure what was supported to measured. The developed tools was tested by Jury committee consist of five academic experts in field of thesis (staff of medical and surgical nursing at faculty of nursing in Minia and Assiut university). Each of the experts is an active participant in their particular environment and together they offered a complete assessment of the content and face validity of the instruments. All jury members (100%) agreed that current study tools were valid and relevant with the aim of the study.

3- Pilot study: After having the ethical approval and permission to access the hospital, a pilot study was conducted on 10% of participants whom included in the study to test the clarity of tools and estimate the time required for fulfilling it. Based on result of the pilot study no modification or refinements were done and the participants included to the actual sample.

4- Tools Reliability: were designed in final format and tested for reliability by using, Cronbach’s alpha coefficient test (0.96, 0.71 and 0.68) respectively.

Ethical Consideration:

An official permission to conduct the study was obtained from the ethical committee in the Minia Faculty of Nursing, Dean of nursing faculty and the Manager of Minia University Hospitals, Minia General Hospital and agreement from Egypt academic for research center and technology at Minia University to carry out this study. Oral permission was obtained by the researcher from the patients and anonymity and confidentiality was applied by coding of all data and protecting the obtained data. Subjects were informed that obtained data will not be included at any further researches without a second oral consent. Each involved subject was informed about the purpose, procedure, benefits and nature of the study and that he/she had the right to withdraw from the study at any time without any rational, then oral consent were obtained.

III- Administrative design:

Phase II: Implementation phase:

1. An official permission was obtained from the Manager of Minia University Hospitals and Minia General Hospital.
2. Oral permission for voluntary participation was obtained from the participants and the nature and the purpose of the study was explained.
3. Data was assured for confidentiality.
4. Each participant from the study and control group was assessed using tool I, II, in the first interview.
5. The researcher prepared the training places, teaching aids and media (computer, picture, handouts). Educational instructions were conducted through discussion, demonstration and re-demonstration.

Results

Table (1): Socio-demographic characteristics of the study & control group:-

Characteristics	Study group N=72		Control group N=72		χ^2 P
	N.	%	N.	%	
Age					
18 - < 30 yrs	7	9.7	3	4.2	4.6 0.09
30 - < 50 yrs	26	36.1	18	25	
50 - 60 yrs	39	54.2	51	70.8	
Mean ± SD	51.9 ± 10.14		55.9 ± 12.14		
Sex					
Female	52	72.2	59	81.9	1.9
Male	20	27.8	13	18.1	0.1
Residence					
Rural	43	59.7	36	50	1.3
Urban	29	40.3	36	50	0.2
Marital state					
Married	60	83.3	4	94.4	4.5
Single	12	16.7	5	6.9	0.03*
Education					
Illiterate	27	37.5	23	31.9	8.7
Read and write	13	18.1	18	25	0.03*
Primary and secondary	25	34.7	31	43.1	
University	7	9.7	0	0	
Occupation					
Work	23	31.9	16	22.2	3.1
Not work	49	68.1	56	77.8	0.2

6. Study group were exposed to design nursing instructions in the form of small instructional sessions.
7. Knowledge was provided to the study group in 2 sessions, the duration of each session ranged from 30:45 minutes or according to the level of understanding of every patient. The first session started by theoretical part about knowledge related to meaning of DM, types, sign and symptom, causes, and complications. The second session concerning with the practical part about how to prevent complication, medication, nutrition, exercise, and glycemic control. One patient’s family member attended the sessions to help him/her follow the health instructions at home in addition every patient was given an illustrated booklet.

Phase III: Evaluation phase:

In which the researcher was follow up for patients (study and control group) two times 1st follow up (post 1st 3 months) and 2nd follow up (post 6 months) from the implementation of instructions to the study group using second tool to evaluate the impact of nursing instructions for diabetic patients on their Adherence to Treatment.

IV- Statistical design :

Data were summarized, tabulated, and presented using descriptive statistics. Statistical package for the social science (SPSS), version (20) was used for statistical analysis of the data, quantitative data were expressed in the form of means and standard deviations as a measure of dispersion while qualitative data presented as frequency distribution. Chi square and fisher exact were used to compare qualitative data and One way ANOVA test and independent sample t test used for quantitative data. P value of less than 0.05 considered as cut off for significance, the test of significance, less than 0.05 was considered significant is the result (*), less than 0.001 was considered highly significant(**). Fisher's Exact test is a way to test the association between two categorical variables. When in case of small cell sizes (expected values less than5). Chi-square test is used when the cell sizes are expected to be large. If the sample size is small (or you have expected cell sizes<5).

Characteristics	Study group N=72		Control group N=72		χ^2 P
	N.	%	N.	%	
Family income according to subject expression:					
Enough	31	43.1	36	50	0.69
Not enough	41	56.9	36	50	0.4

χ^2 Chi-square test

* Statistical significant difference (P < 0.05)

Table 1: Show that out of 144 of total study participants were their age around 50 years for study and control group, the majority of them were females and around half were live in rural area. Most of study participants were married and regarding to educational level about more than third (37.5%) were illiterate in the study group and (43.1%) were primary and secondary educated in control group. In addition more than half of the study participants were not working and with not enough family income according to subjects expression.

Table (2): Medical data of the study & control group:-

Data	Study group N=72		Control group N=72		χ^2 P
	N.	%	N.	%	
Duration of DM					
1-<5 years	34	47.2	22	30.6	5.5
5-10 years	38	52.8	50	69.4	0.06
Treatment of DM					
Oral	50	69.4	49	68.1	7.2
Insulin	8	11.1	1	1.4	0.02*
Both	14	19.4	22	30.6	
Follow up					0.94
Monthly	36	50	40	55.6	0.6
More than one month	32	44.4	30	41.7	
Weekly	4	5.6	2	2.8	
Previous hospitalization					
Yes	8	11.1	1	1.4	6.7
No	64	88.9	71	98.6	0.03*
Receive previous diabetic instruction					10.1
No	58	80.6	70	97.2	0.001**
Yes	14	19.4	2	2.8	
Source of information					
Family or friends	22	30.6	13	18.1	3.1
Hospital	28	38.9	31	43.1	0.2
Mass media	22	30.6	28	38.9	
Smoking					
No	64	88.9	70	97.2	3.6
Yes	8	11.1	2	2.8	0.04*

χ^2 Chi-square test

* Statistical significant difference (P < 0.05)

** Highly statistical significant difference (P < 0.001)

Table 2: Shows that more than half of the study participants in the study and control group have duration of disease 5-10 years, with oral diabetic treatment, with frequent follow up monthly, and with no previous hospitalization. Also less than quarter of participants had previous diabetic instruction and regarding to source of information was from physician in hospital. Most of study participants were not smoking with a statistical significant between study and control group regarding treatment of DM, previous hospitalization and smoking, and a highly statistical significant regarding previous training.

Part II: Comparison between the studied groups regarding to Adherence to Treatment pre-post application of nursing instructions (Table 3):

Treatment adherence		Study				Control				χ^2	P
		Pre-instructions	post-instructions		Pre-instructions	post-instructions					
			1 st follow up	2 nd follow up		1 st follow up	2 nd follow up				
N. (%)	N. (%)	N. (%)	N. (%)	N. (%)	N. (%)	N. (%)					
Positive expression	Good	0	29(40.3%)	39(54.2%)	0	6 (8.3%)	7 (9.7%)	19.9	0.0		
	Moderate	72(100%)	43(59.7%)	33(45.8%)	72(100%)	66(91.7%)	65(90.3%)	32.7	0.001*		
	No	0	0	0	0	0	0	0.0	0.001*		
Negative expression	Good	0	0	0	0	0	0	0.0	0.0		
	Moderate	71(98.6%)	72(100%)	72(100%)	72(100%)	72(100%)	71(98.6%)	1.007	0.3		
	No	1(1.4%)	0	0	0	0	1(1.4%)	1.007	0.3		

χ^2 Chi-square test

** highly Statistical significant difference (P < 0.001)

Table 4 Shows that all study and control group (100%) had moderate adherence to diabetic treatment pre application of instructions while in the 1st and 2nd follow up after application of instructions (40.3% and 54.2%) respectively of study group became good adherence. Also there is a highly statistically significant difference between study and control group in diabetic treatment adherence (positive expression) in the 1st and 2nd follow up after application of instructions (P < 0.001), and there is no statistical significant difference in diabetic treatment adherence (positive expression) pre and after application of instructions.

Part IV: Relation of Socio-demographic characteristics for study group with Adherence to Treatment pre-post application of nursing instructions (Table 4):

Characteristics	Positive expression			Negative expression		
	pre-instructions	post-instructions		pre-instructions	post-instructions	
		1 st follow up	2 nd follow up		1 st follow up	2 nd follow up
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age						
18-<30	29.5±8.5	14.7±3.1	13.8±1.5	61.2±11.3	78.5±3.5	79.4±2.8
30-<50	27.5±7.3	15±2.03	14.3±1.5	64.8±9.8	76.1±3.2	76.3±3.5
50-60	36.1±15.5	16.9±6.8	14.7±4.5	57.1±9.3	75.3±7.6	77.7±6.3
F	3.7	1.2	0.2	4.8	0.8	1.1
P	0.03*	0.2	0.8	0.01*	0.4	0.3
Sex						
Male	36.1±14.3	15.6±3.2	14.9±2.3	57.8±11.2	76.4±5.1	77.1±5.1
Female	30.8±12.4	16.1±5.9	14.3±3.8	61.2±9.7	75.7±6.4	77.5±5.3
T	2.3	0.1	0.4	1.2	0.4	0.3
p	0.1	0.6	0.4	0.2	0.6	0.7
Residence						
Rural	28.9±7.2	16.4±6.5	14.7±4.2	62.4±9.8	75.3±7.4	76.8±6.1
Urban	37.4±17.6	15.3±2.7	14.1±1.8	67.2±10.1	76.7±3.3	78.2±3.5
T	2.8	0.9	0.7	2.1	0.9	1.1
P	0.006**	0.3	0.4	0.03*	0.4	0.2
Marital state						
Married	32.8±13.8	16.1±5.5	14.5±3.7	59.6±10.1	75.7±6.4	77.2±5.1
Single	30±8.6	15.8±3.8	14.1±1.5	63.6±10.6	77±4.1	78.3±3.7
T	0.6	0.1	0.3	1.2	0.6	0.6
P	0.5	0.8	0.7	0.2	0.5	0.5
Education						
Illiterate	29.7±5.7	16.03±5.2	15.02±5.1	65.1±10.8	75.9±6.6	76.5±6.8
Read and write	30.3±9.6	18.6±8.9	14.1±1.5	64.5±10.5	73.8±8.7	78.2±2.9
Primary & secondary	28.8±6.9	15.2±2.5	14.4±2.1	59.2±9.5	76.2±4.2	77.2±4.7
University	58.7±24.6	14±1.7	13.4±1.1	51.7±3.03	78.5±2.6	79.5±2.7
F	18.1	1.6	0.4	2.8	0.9	0.7
P	0.001**	0.1	0.6	0.04*	0.4	0.5
Occupation						
Work	37.6±20.1	14.8±2.3	14.5±2.2	57.8±10.4	77.1±4.8	77.5±4.9
Not work	29.8±6.9	16.5±6.1	14.4±3.9	61.5±10.1	75.3±6.6	77.3±5.4
T	2.4	1.2	0.1	1.4	1.1	0.1
P	0.01*	0.2	0.9	0.1	0.2	0.8
Family income						
Enough	38.8±16.8	14.7±2.6	14.1±1.8	55.8±8.5	77.7±2.8	78.6±2.9
Not enough	27.3±5.7	16.9±6.5	14.7±4.3	63.7±10.2	74.5±7.4	76.4±6.4
T	4.1	1.7	0.7	3.4	2.2	1.8
P	0.001*	0.08*	0.4	0.001*	0.02*	0.07

*Statistical significant difference (P < 0.05) ** highly Statistical significant difference (P < 0.001)

F on-way-ANOVA test t Paired sample T test

Table 9: It's clear from the above table that there was a highly positive significant relation between study participant's adherence to treatment and participant's age, residence, level of education, and occupation pre instructions except with family income pre and post 1st follow up after application of instructions.

Discussion:

Diabetics need to have adequate knowledge, skills and positive attitudes to successfully manage diabetes every day (Parsons, et al., 2017). Treatment adherence among patients with type 2 diabetes mellitus (T2DM) is strongly influenced by the level of knowledge of the patient, his misconceptions, beliefs and inaccurate assumptions on the matter (Campbell, 2012). Adherence to treatment of diabetes mellitus is to improve glycemic control and therefore decrease morbidity and death associated to uncontrolled diabetes and reduce the effective cost of the disease (Albuquerque, et al., 2015).

Based on the result of the current study, it has been noticed that out of 144 of total participants were their age

around 50 years with mean age 51.9±10.14 for study group and 55.9±12.14 for control group, this may be due to that T2DM start at middle age and late adult hood, and this confirmed by [National Diabetes Statistics Report \(2017\)](#) which reported that adults aged 45 to 64 were the most diagnosed age group for diabetes in 2015, and middle-aged and older adults are still at the highest risk for developing type 2 diabetes. These findings were compatible with [Reisi et al., \(2016\)](#), who cited in their study that the majority of study group with the mean age of the patients was (57.4±11.1 years), also current findings agree with [Aliha et al., \(2013\)](#), who said that the mean age at experiment and control groups were around 50 years (had mean±SD age 50.9 ± 7.3 and 55.1 ± 10.1 years respectively).

The present study illustrated that the majority of the participant were females, the researchers opinion were that related to increase obesity is common in female and it is one from main risk factor for developing T2DM, this justification confirmed by **Quartuccio, et al., (2018)** which reported that female had more extensive fat distribution than male. Also **Ramirez, et al., (2016)** and **Taha, et al., (2016)**, who mentioned that the most of study group were females, While **Kassahun, et al., (2016)**, in contrast with current results who found in their study that the majorities of patients were male in the study group.

The current study found that around half of participants were lived in rural area, this is due to lack of resources and limited access to medical care for diabetic follow-up in rural area, this result supported by **Zheng, et al., (2019)** who cited in their study that most of the patients were rural residents. Also agree with **Arafa, et al., (2019)** who found in their study that around half of T2DM patients were lived in rural area.

In relation to educational levels about more than one third were illiterate in the study group, this may be related to Egyptian rural culture which not allowed for women to attend or complete their education level which confirmed by **Ali, and Gurmu, (2018)** who said that Upper and Lower Egyptian rural culture not allowed for women to go to school or complete their education level. This finding come agree with **Aliha et al., (2013)**, who stated that, more than one third among the study group were illiterate. In contrast, **Taha, et al., (2016)**, reported in their study that, the majority of participants indicated their educational level was read and write and basic education.

According to occupation the present study illustrated that more than half of participants haven't work in both groups and with not enough family income according to subjects expression and this may be due to the majority of participant were females that lived in rural area and do not have a profitable job, but their work is limited to household, and this leads to the lack of sufficient income, which compels her to go to the hospital to follow up and spend the treatment free of charge. These results agree with **Cardenas, (2019)** who stated that low income and the educational level of an individual are contributing factors resulting to poor management of T2DM Also in the same line with **Thomas, et al., (2016)** who found in his study that the greatest increase in T2DM prevalence has occurred in low-to-middle family income. In contrast, **Taha, et al., (2016)** reported in their study that the majority of participants 72% had working.

Our results show that more than half of the participants in the study and control group have duration of disease 5-10 years (because most of participants age around 50 years and the prevalence of T2DM is in middle adulthood phase), using oral hypoglycaemic treatment, with frequent follow up monthly (this due to hospital policy), and most of participant with no previous hospitalization (my explanation that in the current study excluded patients with comorbid disease or CVA. These results in an accordance with **Zheng et al., (2019)** who reported that the most of study group take oral hypoglycaemic treatment. Also agree with **Taha, et al., (2016)** who stated in their study that Two-fifth of the patients (40.0%) were on oral medication and the majority (72.0%) had monthly follow-up.

The current study show that less than one quarter among participants in study and control group had previous training and they were received their information from

physician in hospital. From my observation the patients' follow-up process was not done and there was no continuity in DM patient's care, no teamwork in diabetes unit and the role of the nurse was limited to insulin injection training and there was no nutritionist for training the patients about their diet. My observation confirmed by **Abaza and Marschollek, (2017)** who found in their study that diabetic patients have poor levels of communication with healthcare providers, most patients were not receiving the most basic form of education in the clinic, and accordingly knew very little about their diabetes and how to control it and very few patients indicated attending educational diabetic instruction lectures or seminars which were rarely organized. This result disagree with **Reisi et al., (2016)**, who mentioned that less than half (48.1%) of the participants had received previous diabetes patient Previous instructions.

Regarding smoking, the majority of both group in our study were not smoking, perhaps this is due to majority of participant were females in rural area and our culture the females not smoking. This finding agrees with **Swiątoniowska et al., (2019)** who cited that about more than half of the study respondents have not smoking. Finally current results agree with **Kassahun et al., (2016)**, who reported that 92.9% of study patients have not smoking.

Concerning to compliance of the study group to diabetic management was had good treatment adherence in the first instruction and second follow up after application of instructions than pre, this improvement was due to the participants attending current studied instructional session and acquiring sufficient knowledge about diabetes sign & symptoms, complication, medication, nutrition and exercise, that all encourage them to be more compliance to medication, taking diabetic diet as prescribed and performing suitable exercise with using our educational booklet and this reflect of instructions on patients adherence to treatment. Our findings were in the same line with **Awodele & Osuolale, (2015)**, who mentioned in their study that the overall improvement in adherence rate of 86.8% was observed after educational interventions. This findings were disagree with study by **Sontakke, et al., (2015)**, who observed that, 74% of diabetic patients had low adherence to treatment, 26% had medium adherence whereas none of the patients showed high adherence. Also in contrast with **Sankar, et al., (2013)** who found in their study that nearly three fourths of patients had poor adherence to the medication with a mean score of 3.57 ± 1.67 .

Conclusion:

The majority of both study and control groups have aged around 50 years, female, married, live in rural area with low income and with duration of disease from 5-10 years.

The participant of study group had improvement in adherence to treatment after application of nursing instructions than pre also than control group.

Recommendations:

For patients;

- Increase patient awareness about the importance of diabetic education to improve glycemic control to prevent developing complication that affects patient quality of life.
- Each diabetic patient should have such our educational booklet.

For nurse;

- Nurses should emphasis to provide an educational instruction tailored to each diabetic patient.

For administration;

- Accessibility to diabetic health center should be easy for all diabetic patients and raising the awareness of diabetic patients towards their education.
- Develop and equip more diabetic health centers with audio tapes, video tapes, pamphlets, leaflets, magazines, and books.
- Establishment of hot line (phone and net) contact for urgent consultations.
- Strengthening of diabetic patients association.
- The study recommends generalization of such educational booklet in all health care settings providing services to T2DM patients. Such booklet should particularly address the patients with low educational attainments, long history of T2DM, and those residing in rural areas.
- Healthcare organizations must develop a dedicated funding plan that supports diabetic education.

For further researches

- Replication of the current study on a larger sample size to achieve generalizable results.
- More research on evaluation of the impact of health instructions on diabetic patients.

Acknowledgment

The researchers would like to acknowledge the contribution of all participants who kindly agreed to take part in the study. They generously gave their time and attention to conduct this study. This study would have been impossible without their generosity.

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