Knowledge about Disease and Adherence with Treatment among Type 2 Diabetes Mellitus Patients

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Abstract: **Patients with good knowledge on diabetes and its complications seek proper treatment and care, and take charge of their health. Uncontrolled diabetes and poor diabetic patients' knowledge can lead to a high morbidity and mortality. Aim of the Study: To assess diabetic patient's knowledge about disease and adherence with treatment. Research Design: A descriptive design was utilized in this study. Setting: The study was conducted in outpatient clinic at Minia University Hospital and Minia General Hospital. Sample: A purposive sample of 72 adult Type 2 diabetes mellitus from both sexes with duration of diabetic disease more than one year and patients without comorbid disease, and without cerebrovascular accident.Tols of Data Collection: A structured Interview assessment questionnaire sheet (patient socio-demographic characteristics and medical data), Diabetes Knowledge questionnaire sheet, and Assessment Scale for Treatment Adherence. Results: Current study findings revealed that all participants (100%) had poor diabetic knowledge and the majority of them had moderate adherence to diabetic treatment. Conclusion: patients had poor knowledge about disease and the majority of them had moderate adherence to treatment. Recommendations: Nurses should emphasis to provide an educational protocol tailored to each diabetic patient and increase their awareness about the importance of diabetic education to improve adherence to treatment.**

Keywords: **Type2 Diabetes Mellitus, Knowledge, Treatment adherence.**

1. 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. Preventing type 2 diabetes mellitus (T2DM) is possible through understanding its determinants, especially obesity, poor nutrition, sedentary lifestyle and physical inactivity *(Alkhatib, & Tuomilehto, 2019)*.

Egypt is the nation with the ninth biggest population of diabetics in the world. According to IDF, there were 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 type 2 diabetes mellitus **(Omar et al, 2018)**. The prevalence of type II diabetes is around 15.56% among adults with an annual death of 86,478 related to diabetes **(Hegazi, et al., 2015)**.

Knowledge on diabetes remains a key weapon as this helps people assess their risk of developing diabetes, motivate them to seek proper treatment and care, and inspire them to take control of their disease. In the interest of communities, the countries should design and develop a comprehensive health promotion strategy for diabetes mellitus and its related risk factors. This is equally important to design and implement suitable diagnostic, management and treatment policies to ensure people with diabetes are taken care **(Mbanya et al., 2010)**.

Treatment adherence demands that people take responsibility for their treatment and become active participants in a process that permits modulating the biological conditions through human behavior, one of the factors that facilitate the acceptance and integration of the therapeutic regimen is people's knowledge about the disease, adherence must be seen as a joint activity in which the person not only follows medical advice, but understands, agrees with and adopts the regimen described **(Figueira et al., 2017).** Poor adherence with diabetes management is common in Egypt **(Hegazi et al 2015)**.

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).**

Significance of the Study: 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: was to assess diabetic patient's knowledge about disease, and adherence with treatment.

2. SUBJECTS AND METHODS

Study Design: A descriptive research design was utilized in this study.

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

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

Subjects: A purposive sample of 72 adult type II diabetic patients with the following criteria: Male and female patients, age of (18 - 65) years, Duration of diabetic disease more than one year, Patients without comorbid disease, and Cerebrovascular Accident (CVA).

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

N = sample size

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

N = 240 x 30 / 100 = **72** patient

Study duration: The data collection was continued over a period of 3 months, starting from April 2018 to june 2018.

Tool of data collection:

*A **Structured Interview assessment questionnaire** was designed and used for collecting data for this study* after a literature review this include Diabetes Knowledge & Treatment Adherence in Diabetes Mellitusadopted and developed by **(Demirtaş and Akbayrak, 2017)** . It includes the following parts:

Part I: 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).

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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 education related to diabetic disease management, and source of knowledge about diabetic disease management).

Part III: *"Diabetes Knowledge questionnaire sheet"* It developed by the researcher based on extensive review of literature [**Maretha R., et al., (2018), Prianka, M., et al., (2010), Lemes dos Santos, et al., (2014), Fitzgerald, et al., (2015)**] and consists of 33 multiple-choice questions.

Scoring system: The Total score 33 grad, score of one was given for correct answer and score of zero for incorrect answer, and categorized as the following:

▪ **Good knowledge**: was considered if scoring more or equal than ≥ 75% of total score (25:33 correct answer).

▪ **Fair knowledge:** was considered if scoring from 60% to less than < 75% of total score (20 : < 25 correct answer).

▪ **Poor knowledge:** was considered if scoring less than < 60% of total score (< 20 correct answer).

Part IV: Assessment of patient adherence to diabetic 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 includes13 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.

Procedure of data collection:

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

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.

Tool 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.

An official permission was obtained from the Manager of Minia University Hospitals and Minia General Hospital. Oral permission for voluntary participation was obtained from the participants and the nature and the purpose of the study was explained. Data was assured for confidentiality.

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. Correlation between variables was assessed using Pearson correlation coefficients and grade of r was calculated as the following r: 0.00 - 0.24 no or week correlation, 0.25 - 0.49 faire, 0.50 - 0.74 moderate and ≥ 0.75 strong, 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 (**) and coefficient was done by using person correlation test. 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 than 5). 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).

3. RESULTS

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

Characteristics	Study group N=72	
	N.	%
Age		
18 - < 30 years	7	9.7
30 - < 50 years	26	36.1
50 - 60 years	39	**54.2**
Mean ± SD	51.9 ± 10.14	
Sex		
Female	52	**72.2**
Male	20	27.8
Residence		
Rural	43	**59.7**
Urban	29	40.3
Marital state		
Married	60	**83.3**
Single	12	16.7
Education		
Illiterate	27	**37.5**
Read and write	13	18.1
Primary and secondary	25	34.7
University	7	9.7
Occupation		
Work	23	31.9
Not work	49	**68.1**
Family income according to subject expression:		43.1
Enough	31	**56.9**
Not enough	41	

χ^2 Chi-square test   * Statistical significant difference (P < 0.05)

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Table 1: Show that out of 72 of total study participants were their age around 50 years, 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 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 group:-

Data	Study group N=72	
	N.	**%**
Duration of DM		
1-<5 years	34	47.2
5-10 years	38	**52.8**
Treatment of DM	50	
Oral	8	69.4
Insulin	14	11.1
Both		19.4
Follow up	36	
Monthly	32	50
More than one month	4	44.4
Weekly		5.6
Previous hospitalization	8	
Yes	64	11.1
No		**88.9**
Previous training	58	
No	14	**80.6**
Yes		19.4
Source of information	22	
Family or friends	28	30.6
Hospital	22	**38.9**
Mass media		30.6
Smoking	64	**88.9**
No	8	11.1
Yes		

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 training and regarding to source of information was from physician in hospital. Finally Most of study participants were not smoking.

Table (3): Diabetic knowledge of the study group:-

Diabetic knowledge		
	N	**(%)**
Poor	72	100%
Fair	0	0
Good	0	0

Table 3: Shows that all participants of study group have poor diabetic knowledge (100%)

Table (4): Treatment adherence of participants:

Treatment adherence			
N		(%)	
Positive expression	**Good**	0	0
	Moderate	72	100%
	No	0	0
Negative expression	**Good**	0	0
	Moderate	71	98.6%
	No	1	1.4%

Table 4 Shows that all participants (100% in positive expression, and (98.6%) in negative expression) had moderate adherence to diabetic treatment.

Table (5): Correlation between diabetic knowledge and treatment adherence of the study group (n=72):

	Knowledge score	
Adherence to diabetic treatment	0.21	r
	0.06	P

r :correlation (r: 0.00 - 0.24 no or week correlation , 0.25 - 0.49 faire , 0.50 - 0.74 moderate and ≥ 0.75 strong)

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

Table 5 Shows that there was no correlation between diabetic knowledge of the study group and adherence to treatment.

Table (6): Relation of Socio-demographic characteristics and diabetes knowledge among the study group:

Characteristics	Mean ± SD
Age: 18-<30 30-<50 50-60	4.2±4.7 4.1±4.08 6.3±4.7
F P	2.1 0.1
Sex: Male Female	6.9±2.3 4.7±5.3
T P	1.8 0.06
Residence: Rural Urban	4.2±4.1 6.9±4.8
T P	2.5 **0.01****
Marital state: Married Single	5.3±4.5 5.1±4.8
T P	0.2 0.8
Education Illiterate Read and write Primary and secondary University	 4.3±3.2 4.6±3.9 4.4±4.3 13.5±2.1

F	12.5
P	**0.001****
Occupation: Work	6.4±5.5
Not work	4.7±3.9
T	1.4
P	0.1
Family income according to patient expression:	
Enough	8.1±4.9
Not enough	3.2±2.9
T	5.1
P	**0.001****

F on-way-ANOVA test   t Paired sample T test   *Statistical significant difference (P < 0.05)

** highly Statistical significant (P < 0.001)

Table 6: Shows that there are a highly statistical significant between study participants level of diabetic knowledge and participants residence, level of education, pre application of educational protocol only with p value (0.001) and a highly statistical significant with family income pre and post 1st 3months after application of educational protocol.

Table (7): Relation of Socio-demographic characteristics and Treatment adherence:

Characteristics	Positive expression	Negative expression
	Mean ± SD	**Mean ± SD**
Age		
18-<30	29.5±8.5	61.2±11.3
30-<50	27.5±7.3	64.8±9.8
50-60	36.1±15.5	57.1±9.3
F	3.7	4.8
P	**0.03***	**0.01***
Sex		
Male	36.1±14.3	57.8±11.2
Female	30.8±12.4	61.2±9.7
T	2.3	1.2
p	0.1	0.2
Residence		
Rural	28.9±7.2	62.4±9.8
Urban	37.4±17.6	67.2±10.1
T	2.8	2.1
P	**0.006****	**0.03***
Marital state		
Married	32.8±13.8	59.6±10.1
Single	30±8.6	63.6±10.6
T	0.6	1.2
P	0.5	0.2
Education		
Illiterate	29.7±5.7	65.1±10.8
Read and write	30.3±9.6	64.5±10.5
Primary and secondary	28.8±6.9	59.2±9.5
University	58.7±24.6	51.7±3.03
F	18.1	2.8
P	**0.001****	**0.04***
Occupation		
Work	37.6±20.1	57.8±10.4

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Not work	29.8±6.9	61.5±10.1
T	2.4	1.4
P	**0.01***	0.1
Family income		
Enough	38.8±16.8	55.8±8.5
Not enough	27.3±5.7	63.7±10.2
T	4.1	3.4
P	**0.001***	**0.001***

F on-way-ANOVA test   t Paired sample T test   *Statistical significant difference (P <0.05)
**** highly Statistical significant difference (P < 0.00**1)

Table 7: 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 protocol except with family income pre and post 1st follow up after application of educational protocol.

4. DISCUSSION

The global burden of Diabetes estimate being 415 million, if no measures taken, the figures might rise to 642 by the year 2040 (**IDF, 2015**). 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 72 of total participants were their age around 50 years with mean age 51.9±10.14, 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. The current finding s were in the same line with **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 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 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 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 education.

Regarding smoking, the majority of study group 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.

The present study showed that all participants had poor diabetic knowledge. This result confirmed by **Arafa et al., (2019)** who found in their study that T2DM patients' knowledge in South Egypt was insufficient. However, hospital-based awareness program led to a remarkable improvement in patients' knowledge. Also this finding was in agreement with **Taha et al., (2016)**, who reported that patients' knowledge about DM was generally low at the pre-guidelines phase, and the posttest showed significant improvements in all aspects of patients' knowledge about DM, reaching 100.0% satisfactory knowledge in almost all aspects.

Concerning to treatment adherence the study group was had moderate treatment adherence and this was due to the poor knowledge of study participants. 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.

In the present study, it has been noticed that there was a positive moderate correlation between diabetic knowledge and adherence to treatment. This is consistent with (**Brazilian Society of Diabetes, 2016**) which stated that the WHO presents education to chronic patients as an option to promote compliance, through motivation and personal training to use cognitive and behavioural strategies that facilitate adherence behaviours. With this regard our finding matched with similar study by **Figueira, ALG., (2017)** who mentioned that the educational interventions seem to have positively contributed to the participants' knowledge about diabetes mellitus, the medication treatment adherence and the glycated

hemoglobin rates. Also agree with **Kassahun *et al.*, (2016)** who found a correlation between low diabetic knowledge and level of medication adherence. Finally these results disagree with the study by **Nazir et al., (2016)** who reported that there was negative association reported between HbA1c, treatment adherence and diabetes-related knowledge among T2DM patients in Pakistan.

In relation to socio-demographic characteristics and diabetes knowledge among the study group, our results revealed that there were a highly positive significant relation between study participants level of diabetic knowledge and their residence, level of education with ($p< 0.001$), and with their family income, these findings may be related to most of them were lived in rural area, illiterate and were had low income that lead to lack to gain health education from nursing staff in outpatient clinics because they were had a more work load rather than giving health education, and educational resource for their patients.

These results agrees with **Karaoui, et al., (2018**) who mentioned that the patient's level of education being significantly associated with the diabetes knowledge score. Also previous results agree with **Ntaate, (2015)** who reported that level of education were shown to significantly affect the patients' knowledge positively. Finally in the same line with **Abdo, & Mohamed, (2010)** who found in their study a significant positive relationship between the level of patient knowledge and the educational level, residence, they mentioned that those living in the rural areas had significantly lower level of knowledge compared with those living in urban areas.

With regard to socio-demographic characteristics and treatment adherence, the current study found that there was a highly positive significant relation between study participants adherence to treatment and participants age, residence, level of education, and occupation and with family income, This finding is congruent with **Bhatti, et al., (2018)** who illustrated that socio demographic factors of age, sex, marital status, educational level, and monthly household income were associated with adherence to self-care practices among patients with diabetes. Also agree with **Awodele & Osuolale, (2015**), who mentioned that a significant $P \leq 0.05$ association between age, gender and adherence to treatment.

5. CONCLUSION

This research has shown that the majority of study participants have aged around 50 years, female, married, live in rural area with low income and with duration of disease from 5-10 years. Diabetic knowledge of the study participants had been poor and with moderate adherence to diabetic treatment. Finally, the present study has demonstrated a positive moderate correlation between diabetic knowledge score and adherence to treatment.

6. 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.

For nurse;

- Nurses should emphasis to provide an educational program 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.

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