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Original Research

Effectiveness of An Educational Program on Knowledge of Patients with Diabetes Mellitus About Prevention of Late Complications

Raissan Rahi Helal, MscN[1] | Hussein Hadi Atiyah, Ph. D[2]

[1]Academic Nurse, College of the Nursing /University of Baghdad, Iraq.
[2]Professor, Adult Nursing Department College of the Nursing /University of Baghdad, Iraq.

Abstract:

Background: Diabetes mellitus (DM) is a collection of metabolic illnesses distinguished by elevated levels of glucose in the blood, known as hyperglycemia. Diabetes mellitus (DM) is associated with irregularities in the metabolism of carbohydrates, fats, and proteins, which can lead to late complications such as disorders affecting small blood vessels, large blood vessels, and nerves. Several investigations have provided extensive knowledge among the participants regarding the nature, causes, symptoms, management, and outcomes of DM. An important goal in managing type II diabetes mellitus (TIIDM) is to prevent both major and minor complications. Patients with diabetes mellitus have found various educational intervention studies conducted worldwide to be highly helpful in enhancing their knowledge level. Aim: To evaluate effectiveness of educational program regarding late complications.

Methods: A quasi-experimental design, with the application of a pre-test and post-test approach for patients for both the study and control groups. conducted on 80 patients selected by purposive sampling at in Internal consulting unit at ALkarama teaching hospital at Al-kut city during 2024. Data were collected by using self-report questionnaire. Descriptive and inferential statistics were used in data analysis.

Results: presented the differences between total knowledge of both study and control groups at pretest and posttest levels. Results reflected that there was only a high significant difference between total knowledge of the study group pretest and posttest levels at p = .000. there were significant correlation between patients knowledge with their level of education at both pretest and posttest level (P= .000 for both levels). Other significant correlation was presented between job of participants with their knowledge at pretest and posttest level (P = .023 and .011 respectively).

Conclusion: Most of the diabetic patients in pre-test have poor knowledge about late complications for diabetes mellitus type II. patient's knowledge regarding diabetes mellitus type II in post-test increased after implementation of educational program. And this conclusion is proved through the statistical approaches which show that there is a significant increasing in the study group knowledge compared to the control group. Recommendations: Due to the knowledge deficient among diabetic patients about late complications, the Ministry of Health should use a mass media to increase the patients knowledge about prevention late complications diabetes mellitus type II.

Keywords: Effectiveness, Educational Program, Knowledge Patients, Prevention, Diabetic Late Complications.

Introduction:

Diabetes mellitus (DM) is a collection of metabolic illnesses distinguished by elevated levels of glucose in the blood, known as hyperglycemia.DM is associated with irregularities in the metabolism of carbohydrates, fats, and proteins, which can lead to late complications such as disorders affecting small blood vessels, large blood vessels, and nerves [1]. DM occurs when the pancreas is unable to produce insulin or when the body's cells are unable to respond to insulin [2]. Diabetes, a swiftly expanding health issue in the twenty-first century, has been on the rise globally. Experts predict that 463 million people worldwide will suffer from diabetes in 2019. Uncontrolled diabetes can lead to various health concerns, including eyesight loss, tooth loss, pregnancy complications, cardiovascular diseases, renal disorders, neuron damage, vascular damage, and foot problems [3]. The three most prevalent forms of diabetes are Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM), and Gestational Diabetes Mellitus (GDM) [4]. Both type I and type II diabetes suffer late complications, which typically do not manifest during the first 5 to 10 years following diagnosis. Nevertheless, indications of these complexities can be apparent upon diagnosis of type 2 diabetes, as individuals may have experienced undetected diabetes for a significant period of time. Individuals with type 1 diabetes have a higher incidence of kidney (microvascular) illness, while elderly individuals with type IIdiabetes are more prone to cardiovascular (macrovascular) issues [5]. Macrovascular complications. Atherosclerosis is more prevalent in individuals with diabetes mellitus compared to those without the condition. For example, those between the ages of 20 and 65 with DM have a stroke risk that is more than five times higher than those without DM [6]. Microvascular complications. Having high blood sugar for a long time can lead to nephropathy, neuropathy, and retinopathy in small blood vessels. These problems happen for a number of reasons, such as the creation of advanced glycation end products (AGEs), the creation of an inflammatory environment, and the activation of oxidative stress [7]. An estimated 29.1 million individuals in the United States suffer from diabetes mellitus, and approximately one-third of these cases remain undiagnosed. Every year, the number of individuals over 20 receiving a new diabetes diagnosis rises by 1.7 million. Should this pattern persist, the prevalence of diabetes among adults in the United States might reach one in every three individuals by the year 2050. The global prevalence of diabetes mellitus in 2019 was 9.3%, with type II diabetes representing over 90% of all cases, whereas type I diabetes and gestational diabetes accounted for fewer than 10% of cases [5]. Diabetes patients have a 35% incidence of retinopathy. Retinopathy accounts for 1.9% of cases involving significant vision impairment. The prevalence of end-stage renal disease in diabetes patients ranges from 12 to 55%. Furthermore, individuals with diabetes have a significantly higher occurrence of cardiovascular events, with a prevalence that is 2–3 times greater compared to non-diabetic patients. Additionally, the likelihood of lower extremity amputation is 10 to 20 times higher in diabetic patients compared to non-diabetic patients [8]. Diabetes mellitus is becoming prevalent in Middle Eastern countries, including Iraq [9].

Diabetes is a highly burdensome condition. In 2017, the death rate among adult patients (ages 20–79) due to diabetes was 10.7%. In the Mena Region, diabetes is responsible for 373,557 deaths in 21 countries and territories, including Iraq. Approximately 51.8% of these deaths occur among people under the age of 60. This puts the region at the second highest level among all IDF regions. Researchers conducted a study in the city of Basra, southern Iraq, involving approximately 5400 participants. The study found that the age-adjusted prevalence of diabetes in individuals aged 19 to 94 years was 19.7% [10]. According to statistical reports from the Iraqi Ministry of Health, there has been a significant increase in the number of instances of diabetes mellitus, as seen in the figure below:

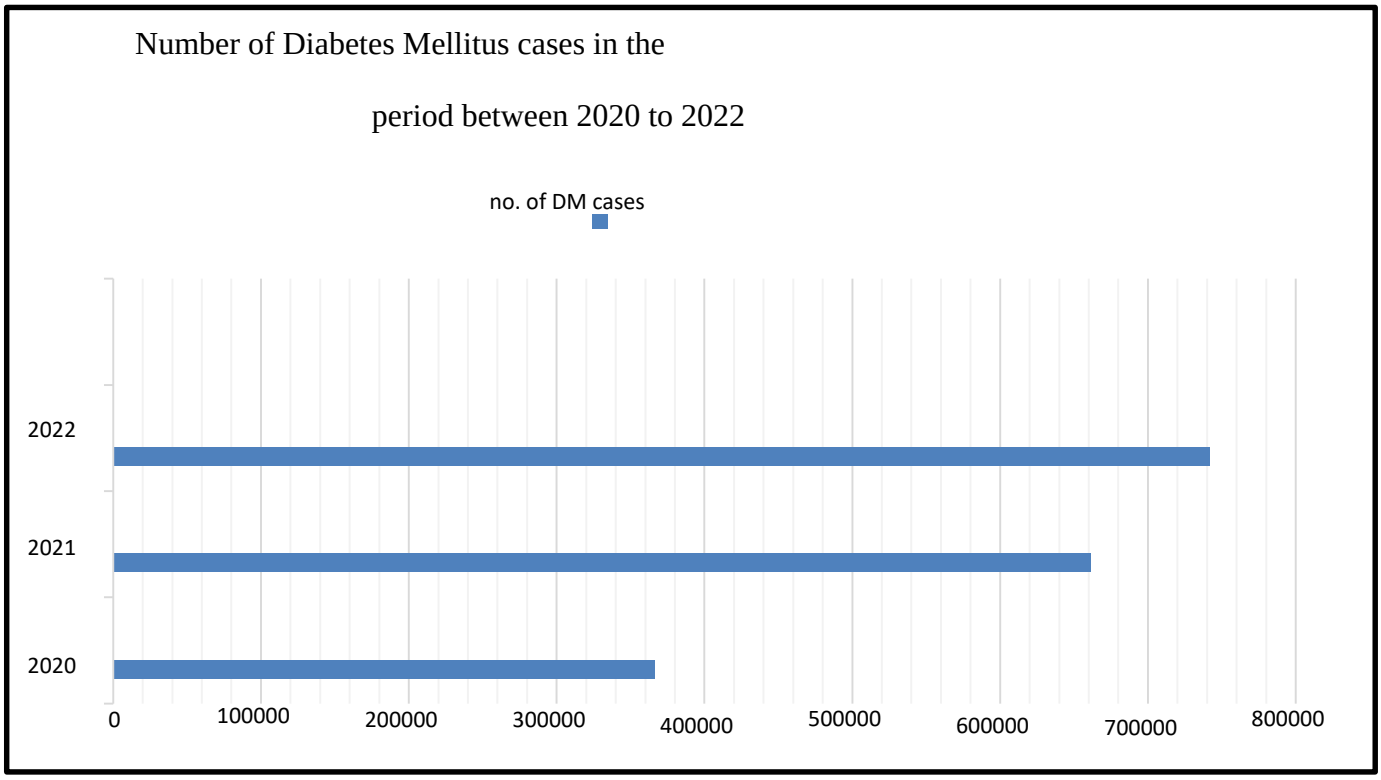

Figure (1). Iraqi Ministry of Health Report of DM cases

The International Diabetes Federation (IDF) estimates that there will be 537 million individuals with diabetes globally in 2021. Global health expenses have risen to US$966 billion, with projections indicating an increase to over $1054 billion by 2045 [11]. Insufficient understanding of self-care methods can lead to delayed problems such as nephropathy, atherosclerosis, neuropathy, retinopathy, and cardiac diseases [12]. Insufficient self-care practices can lead to an increased likelihood of early death and complications in individuals with diabetes [13]. These complications are more serious, common and highly cost chronic complications with type 2 diabetic [14]. Diabetes complications can greatly diminish quality of life and result in enduring disability [15]. In the initial stages of the commonest variety (Type 2 diabetes mellitus) this can be controlled by lifestyle modifications that include changes in diet and increasing physical activity, but once diabetes becomes chronic, medication is necessary to control the condition [16]. Several investigations have provided extensive knowledge among the participants regarding the nature, causes, symptoms, management, and outcomes of DM [17]. Effective management of diabetes is essential to reduce the early and long term complications of diabetes and to inhibit the onset of associated chronic diseases [18]. Educational programs should deliver accurate information, consistently reinforce previously provided knowledge, offer feedback on effective self-care practices, and provide problem-solving techniques to address self-care challenges, thereby facilitating patient discussions on self-care matters [19]**.** There is not found studies in Al-kut city about an educational program on knowledge diabetic patient to prevent late complications. The goal of current study to evaluate effectiveness of an educational Program on knowledge of patients with diabetes mellitus about Prevention of Late Complications.

Methodology:

A quasi-experimental design was used in the present study with the application of a pre-test and post-test approach for patients for both the study and control groups. The study period lasted from the 22 of November 2023 to the 8 of April 2024. The study was conducted in the internal consulting at ALkarama teaching hospital at ALkut city. The sample size component From (90) patients that had diabetes mellitus type II patients at internal consulting at al-karamah teaching hospital, (10) patients were excluded for the pilot study. So the total number of

patients participating in the study was (80) patients in order to obtain accurate data and a representative sample. The sample had been taken in two group. (40) patients were assigned to the control group. (40) patients for the study group. A non- probability (purposive) sample was selected to obtain representative and accurate data.in this study applied use red and yellow card to select control and study group patients.

Inclusion Criteria:

1. Diabetes mellitus type II patients, Both male and female.

2. Adult patients 35-70 years of age.

3. Patients who were agree to participate in the present study.

Exclusion Criteria

1.patients with neurological disorder

2. Diagnosis patients with diabetes mellitus more than 20 years.

The Study Instrument

To evaluate the effectiveness of an educational program on knowledge of patients with diabetes mellitus about prevention of late complications, the researcher has developed the study instruments based on the review of the relevant literature and previous study (Rajaa Ibrahim abed and Dr. Haleema Y. Kadhim, 2011). which consists of two parts: Part 1: consists about demographic characteristics, which consists of (ten) items including age, gender, educational level, marital status, occupation status, monthly income, Duration of disease, BMI, Smoking, Alcoholic. Part 2: consists of (5) domain about Knowledge on the late complications for patients with diabetes mellitus type II:

First domain: consists of (8) items about Knowledge to patients about the complications involving the cardiovascular system.

Second domain: consists of (9) items about Knowledge to patients about the complications involving the urinary system (nephropathy).

Third domain: consists of (8) items about Knowledge to patients about the complications involving the eye disease (retinopathy).

Fourth domain: consists of (10) items about Knowledge to patients about the complications involving the nervous system (neuropathy).

Five domain: consists of (9) items about Knowledge to patients about the complications involving the foot problems.

An instrument was constructed through the use of (3) level for the assessment of patients knowledge. The score of the patient's Knowledge Regarding of late complications instrument was for I know=3, for uncertain =2 and for I don't know=1.

Construction of Health Education program

The an educational program is created and implemented based on the patients needs, the period is from (13 to21 March 2024). The educational program consisted of (3) sessions and were implemented in the continues education room in the Alkarama Teaching hospital.

Group Assignment:Control Group. Patients in the control group who was exposure to pre-test at 30 January to 25 Feb 2024 and after 2week exposure to post-test without exposed educational program.

Study Group Enrolled to Health Education program. The study group exposed to pre-test at 30 January to 25 Feb 2024, and then dived into two group: first group giving educational program about 3 sessions that giving in 13,17,20 March 2024 after 2week from end educational program exposed to post-test in 7April 2024. And the second group that giving educational program about 3 sessions that giving in 14,18,21 March 2024 after 2week from end educational program exposed to post-test in 8 April 2024.

Data collection procedure: In order to collect the data participants were contacted at alkarama teaching hospital. Through self-reported questionnaire, The duration of the interviews oscillated about 15 to 30 minutes. Each interview was terminated when data started to repeat itself. After this, they were thanked for their participation.

Results:

Table (4.1): The Distribution of the Study Samples according to their Demographic characteristics.

Variable	Groups	Study		Control	
		Freq.	%	Freq.	%
Age	Mean ± SD	50.05	10.33	50.47	10.4
Sex	Male	27	67.5	29	72.5
	Female	13	32.5	11	27,5
Level of education	Read and write	7	17.5	5	12.5
	Primary	7	17.5	10	25
	Intermediate	8	20	7	17.5
	Secondary	8	20	7	17.5
	Institution	6	15	6	15
	College	4	10	5	12.5
Marital status	Married	30	75	32	80
	Single	2	5	1	2.5
	Separate	3	7.5	1	2.5
	Widowed	3	7.5	3	7.5
	Divorced	2	5	3	7.5
Occupation	Governmental employee	9	22.5	10	25
	Retired	3	7.5	4	10
	Free work	15	37.5	15	37.5
	Housewife	10	25	7	17.5
	Unemployed	3	7.5	4	10
Monthly income	Sufficient	6	15	8	20
	Barely sufficient	7	17.5	12	30
	Insufficient	27	67.5	20	50
Duration of disease	Mean SD	6.22	3.1	5.75	2.38
Weight	Mean ± SD	80.27	9.9	81.4	9.09
Height	Mean ± SD	168.6	6.3	168.9	7.05
BMI	Underweight (less than 18.5)	0	0	0	0
	Healthy weight (18.5 – 24.9)	6	15	2	5
	Overweight (25 – 29.9)	20	50	26	65

	Obese (30 and over)	**14**	**35**	**12**	**30**
Smoking	**Yes**	**26**	**65**	**23**	**57.5**
	No	**14**	**35**	**17**	**42.5**
Number of cigarettes per day	**Mean SD**	**23.25**	**19**	**20**	**19.2**
Duration of smoking	**Mean SD**	**8.65**	**8.9**	**7.22**	**7.5**
Alcohol drinking	**No**	**40**	**100**	**40**	**100**

Results in table 4.1. presented that mean age of the study group was 50.05 years old and approximately the same mean of age for the control group. Related to sex, most of the study group and control group were males who accounted for 67.5 for the study group and 72.5 for the control group respectively. The significant account of the study group (20 percent) have intermediate level of education and 17.5 of the control group have the same educational level as the highest percent among other levels of education. In addition, 75 percent of the study group were married, and 80 percent of the control group were also married. The same highest percent among other occupational levels (37.5) of both study and control groups have free work. Moreover, 67.5 percent of the study group have insufficient income and 50 percent of the control group have the same level of income. The mean year of duration of the DM among study group was 6.22 years, while it was 5.75 for the control group. Related to weight of the body, the mean weight was 80.27 for the study group and it was 81.4 for the control group. In addition, 50 percent of the study group have over weight, and 65 percent of the control group have over weight. Also, 65 percent of the study group were smoker in about 23 cigarette per day for about 8.6 years, and 57.5 of the control group were smoker in about 20 cigarette per day for 7.22 year.

Table 4.4. differences between study and control groups about their knowledge related to late complications of DM

Score	N	M	SD	T	Df	P.value	Sig.
Pretest and Post-test knowledge (Study Group)	40	1.6 2	.12 .14	25.35	39	.000	H.S
Pretest and Post-test knowledge (Control Group)	40	1.62 1.64	.16 .15	2.58	39	.41	N.S

Table 4.4. presented the differences between total knowledge of both study and control groups at pretest and posttest levels. Results reflected that there was only a high significant difference between total knowledge of the study group pretest and posttest levels at p = .000.

Table (4.6.): correlation between demographic characteristics of the study group with their knowledge at pretest and posttest levels.

Variables		Total pretest knowledge	Total posttest knowledge
age	Pearson Correlation	-.195	-.228
	Sig. (2-tailed)	.229	.157
	N	40	40
sex	Pearson Correlation	.034	-.163
	Sig. (2-tailed)	.834	.315
	N	40	40
Education level	Pearson Correlation	.876**	.723**
	Sig. (2-tailed)	.000	.000
	N	40	40
Marital status	Pearson Correlation	-.299	-.340*
	Sig. (2-tailed)	.061	.032
	N	40	40
Job	Pearson Correlation	-.359*	-.396*
	Sig. (2-tailed)	.023	.011
	N	40	40
Monthly income	Pearson Correlation	-.285	-.094
	Sig. (2-tailed)	.075	.565
	N	40	40
Duration of disease	Pearson Correlation	.046	.045
	Sig. (2-tailed)	.779	.784
	N	40	40
BMI	Pearson Correlation	.139	.022
	Sig. (2-tailed)	.391	.891
	N	40	40
Smoking	Pearson Correlation	.072	-.122
	Sig. (2-tailed)	.660	.454
	N	40	40
	Sig. (2-tailed)	.000	
	N	40	40

Results in table 4.4. reflected that there were significant correlation between patients knowledge with their level of education at both pretest and posttest level (P= .000 for both levels). Other

significant correlation was presented between job of participants with their knowledge at pretest and posttest level (P = .023 and .011 respectively).

Discussion:

This chapter presents a systematically organized interpretation and reasonably derived discussion of the results with the support of the available literatures and related studies. The data analysis finding showed the distribution of the sample according to demographic characteristics, which revealed that the mean age of the study group was 50.05 years old and approximately the same mean of age for the control group. This finding was similar to The study conducted by Shahad Abduljalil Abualhamael et al. (2024), which was conducted to evaluate the quality of life (QoL), depression, anxiety, and stress, along with associated factors among individuals with diabetes in Saudi Arabia. found that mean age mean age 50.1 ± 14.5 years) [20]. another study which was conducted by Mikhail Kosiborod et al. (2018), which was conducted to assessed Vascular complications in patients with type 2 diabetes: prevalence and associated factors in 38 countries (the DISCOVER study program), found that mean age in the mean age was 57.2 years[21] . The majority of the study sample in the current study was Related to sex, most of the study group and control group were males who accounted for 67.5 for the study group and 72.5 for the control group respectively. The study conducted by Sameer Razzaq Oleiwi & Batool A. AL Ani, (2012), in Neisseria city, to identify the diabetes type2 clients self-management skills toward dietary pattern, and find out the relationship between variables which are (Age, gender, educational level, duration of DM diagnosis, and monthly income) with diabetes type 2 clients self-management skills toward dietary pattern,find out gender the majority 118 (59.0%) of study sample are males and the remaining are females[22]. The current study showed that significant account of the study group (20 percent) have intermediate level of education and 17.5 of the control group have the same educational level as the highest percent among other levels of education. In contrast to some of the previous studies, one of these studies was conducted to assess the QoL and its associated factors among TIID patients in Cotonou, southern Benin, and the results show The majority of participants had primary education (31.3%) and secondary education (32.3%). (by Halimatou Alaofè et al.,2022) [23].and anathor study The study conducted by Amer M. Gabish& Widad K. Mohammed, (2018), in Baghdad, to assess the effectiveness of educational program on improving diabetic foot self-efficacy concerning managing their feet. find out The majority of the sample were less than a third are high school graduates (30.0%) [24]. In addition, 75 percent of the study group were married, and 80 percent of the control group were also married and Regarding occupation, the result of the current study showed that The same highest percent among other occupational levels (37.5) of both study and control groups have free work. This finding is similar to a study conducted by Shaofan Chen et al. (2019), to assess the impact of an education-based intervention to improve vertical integration and management of type 2 diabetes mellitus in primary care in rural China, which found Most participants (85.6%) were married and A majority of the participants (74.5%) were farmers or working in the home [25]. Moreover, 67.5 percent of the study group have insufficient income and 50 percent of the control group have the same level of income. This finding is similar to a study conducted by Janke Zwaneet al. (2023), study to determine the diabetes self-management practices and associated factors among out-patients in Tshwane, South Afric, which found Most participants were monthly income between 83.11–276.85 $ (53%), moderate monthly income [26]. The mean year of duration of the DM among study group was 6.22 years, while it was 5.75 for the control group. This finding is similar to a study conducted by Afsana Moosa Janke Zwaneet al. (2019), study to The purpose of the study was to assess the knowledge of patients with TIIDM attending a typical community health centre (CHC) regarding the management of their disease including risk factors and prevention to guide future initiatives. The study was conducted at Laudium CHC in Pretoria, South Africa. which found two-thirds of the patients interviewed indicated that they have been diagnosed for 5 years or more with

TIIDM (67.7%), and that they had been on their antidiabetic TIIDM (67.7%), and that they had been on their antidiabetic medication for more than 5 years (64.5%) [27]. In the current study, Related to weight of the body, the mean weight was 80.27 for the study group and it was 81.4 for the control group. In addition, 50 percent of the study group have over weight, and 65 percent of the control group have over weight. This finding is similar to a study conducted by Pedro L. Ferreira al. (2024), to assess the diabetes knowledge of a T2D population and to identify their major knowledge gaps, in order to prevent complications and to increase quality of life. The study was conducted in Portugal , which found 83.9% were overweighed or obese[28]. In the current study, the results showed that 65 percent of the study group were smoker in about 23 cigarette per day for about 8.6 years, and 57.5 of the control group were smoker in about 20 cigarette per day for 7.22 year. This finding is similar to a study conducted by This finding is similar to a study conducted by Shah Mohammad Abbas Waseem etal., (2024), in India, The study was designed to find the association between smoking and HBA1C. HBA1C increased significantly ($P < 0.0101$) with an increase in intensity of smoking, but the difference was insignificant between non-smokers and mild ($P = 0.125$) to moderate ($P = 0.07$) intensity smokers [29]. Table 4.4. presented the differences between total knowledge of both study and control groups at pretest and posttest levels. Results reflected that there was only a high significant difference between total knowledge of the study group pretest and posttest levels at $p = .000$. In the similar study conducted by Sumit Pal Singh Chawla etal,(2019), in india,To assess the impact of health education on knowledge, attitude, practices, and glycemic control in type 2 diabetes mellitus patients,that found In this study, end mean knowledge, attitude, practice, and KAP SUM scores of cases (10.28 ± 1.78, 3.46 ± 0.93, 3.14 ± 0.86, and 16.82 ± 3.40, respectively) showed significant increase from the baseline (3.86 ± 0.93, 1.00 ± 0.83, 0.40 ± 0.64, and 5.26 ± 2.10, respectively) compared to controls, accompanied by significant reduction in HbA1C of cases at the end of the study compared to the controls [30].

In the similar study conducted by Mohammed Jaber hamdi, etal,(2021), in Baghdad, The aim of this study is to assess diabetic patient's knowledge about early complications of type I and type II diabetes mellitus. The study results for the pre-test period display that the majority of study and control groups show a poor knowledge regarding general information about diabetes mellitus and early complications about diabetes mellitus. [31]. Table (4.6.): correlation between demographic characteristics of the study group with their knowledge at pretest and posttest levels (Table 4.6). Results in table 4.4. reflected that there were significant correlation between patients knowledge with their level of education at both pretest and posttest level ($P= .000$ for both levels). Other significant correlation was presented between job of participants with their knowledge at pretest and posttest level ($P = .023$ and .011 respectively). According to Md. Kaoser Bin Siddique etal. (2017), to determine diabetes related knowledge and factors affecting utilization of healthcare services among patients with type II diabetes mellitus in Bangladesh. Based on the results of this study, relationship was present between level of education and increasing physical activity ($P < 0.0001$) (Table 2). A great majority of the patients reported increased physical activity (72%) and reduced carbohydrate intake (70%) as first line diabetes control measure. Additionally, reducing weight and adherence to physician prescription accounted for 12% and 18% respectively [32].

Conclusion: Most of the diabetic patients in pre-test have poor knowledge about late complications for diabetes mellitus type II. patient's knowledge regarding diabetes mellitus type II in post-test increased after implementation of educational program. And this conclusion is proved through the statistical approaches which show that there is a significant increasing in the study group knowledge compared to the control group.

Recommendations: Due to the knowledge deficient among diabetic patients about late complications, the Ministry of Health should use a mass media to increase the patients knowledge about prevention late complications diabetes mellitus type II.

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Recommendations: Due to the knowledge deficient among diabetic patients about late complications, the Ministry of Health should use a mass media to increase the patients knowledge about prevention late complications diabetes mellitus type II.

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