The impact of health education program regarding knowledge of type 2 diabetic patients in kosti city white Nile state (Sudan) .2021-2024

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Abstract :-

Backe ground: Diabetes mellitus, commonly known as diabetes, is a group of metabolic disorders characterized by high blood sugar level (hyperglycaemia) over a prolonged period of time. estimated that diabetes resulted in 4.0 million deaths worldwide, using modeling to estimate the total number of deaths that could be directly or indirectly attributed to diabetes Diabetes mellitus is diagnosed with a test for the glucose content in the blood, and is diagnosed by demonstrating any one of the following Fasting plasma glucose level ≥ 7.0 mmol/L (126 mg/dL). Plasma glucose ≥ 11.1 mmol/L (200 mg/dL) two hours after a 75 gram oral glucose load as in a glucose tolerance test (OGTT) Glycated hemoglobin (HbA1C) ≥ 48 mmol/mol (≥ 6.5 DCCT %) . **aim of the study**: to assess the impact of health education on knowledge of type 2 diabetic patients regarding diabetes **.methodology** :this study was conducted in kosti healthy centers .total sample of 117 pre questionnaire done and conduct health education program after 3 months the data was collected by using standardized questionnaire and the researcher use liker scale for measuring knowledge t . the data was analyzed by computer soft program (spss).

. Result :As for the information of type 2 diabetics regarding diet, the percentage of those who followed a diet only to treat diabetes was about 15% before, and their number increased to 17% after . Patients who had good information about the optimal method for injecting insulin increased, their percentage increased from 43% before to 64% after. Regarding the signs and symptoms of low blood sugar, the percentage of those whose information was good increased from 66% before to 78% after.

Recommendation: Enhancing the important and effective role of diabetic educator's and conducting training courses and workshops to increase their competence and enhance their effective role in protecting against the dangers of sugar.

Keywords : diabetic, patients , program , health education

1.Introduction :

Diabetes mellitus, commonly known as diabetes, is a group of metabolic disorders characterized by high blood sugar level (hyperglycaemia) over a prolonged period of time. estimated that diabetes resulted in 4.0 million deaths worldwide, using modelling to estimate the total number of deaths that could be directly or indirectly attributed to diabetes[3] .

Type 2 diabetes is the most common type of diabetes, accounting for 90 to 95 percent of all diabetes patients. [9] This type of diabetes is typically associated with advanced age, obesity, genetics and family history, personal medical history (such as gestational diabetes), physical inactivity, and ethnicity. Approximately 80 percent of type 2 diabetes patients are overweight[1].

People with type 2 diabetes have a pancreas that produces enough insulin, but for unknown reasons, the body is unable to use the insulin effectively. This condition is known as insulin resistance. [12] .Type 2 diabetes patients are unable to activate insulin optimally in their bodies, which leads to the accumulation of insulin in the body over time. [7] After several

years, insulin production declines, and the patient's condition becomes similar to that of type 1 diabetes, as glucose accumulates in the blood and the body is unable to use its own energy source (glucose) effectively[5] .

This type usually affects adults - after the age of thirty - but it can also affect those younger than this age. This type is closely related to obesity, and genetic factors play a major role in its occurrence. [4] . Therefore, diabetes is highly prevalent in certain families as a result of this type. If one identical twin is affected, the other is definitely affected. [10] In this type, there is resistance in the body's cells to the action of insulin, and the pancreas cannot secrete a sufficient amount to overcome this resistance. Therefore, the patient needs to take medications (pills) to help the pancreas secrete more insulin. Its symptoms appear gradually[2] .

1.2 Problem statement : It is evident from the previous studies that the incidence of diabetes mullites is increasing and that although there is evidence that complications of diabetes can be prevented. There are still patients who lack the required knowledge and skills to mange and control their continuities generally accepted that diabetics' must take responspility for their own care and treatment .patient therefore have to acquire the relevant knowledge ,skills and attitude for successful diabetes management .this aduqet diabetes education of patient as well as family members as a support group(diabetes education).this is study is an attempt to determine patients knowledge and views on diabetes mellite's to make recommendation's to words improve diabetic education which might lead to improve adherence to the diabetic treatment regimen. the diabetic patients in the area of study they suffering from lack of knowledge about the diabetes .they complain from recurrent hypoglycaemia ,uti, and infected diabetic wound .hypoglycaemia if not treated can lead to coma. And lack care of diabetic wound lead to ambution. And uncontrolled diabetes can affect the kidney (renal failure).

1.3 research question: What is the health education program for type 2 diabetes patients in Kosti?

1.4 Hypothesis: Raising the level of knowledge for patients with type 2 diabetes leads to avoiding potential diabetes complications and reduces the rate of hospitalization of patients.

1.5 Justification:The goal of efficient diabetes care can be achieved through implementing a diabetes programme. This programme should be responsible for personnel training, establishing model care centres, patients' education, availability and affordability of insulin, scientific and clinical research and primary prevention.

2.Objective

2.1 General objective: To study The impact of Health education program regarding awareness of type 2diabetic patients in kosti city-

3. Material and methods

3.1 Study design:This is a quasi experimental design. community based studay

3.2 Study period :The duration of the study from (january2021-december 2024)

3.3 Study area:

The study was conducted at kosti healthy centre's selected by simple random selection . Kosti is one of the major cities in sudan that lies south of Khartoum the capital of sudan located in western bank of the white nile river.

3.4 Study population: The study population was included all (type 2) in healthy centers was mentioned before in study area during the period time .age from 30 and above .male &female educated and non educated from different culture's ,economic status gradient from good to poor status . A pilot study was done on a sample of 10 type 2 patents in an effort to test the validity of the questionnaire instrument

3.5 criteria Inclusion: The target group of all type2 patients in healthy centre's during the study period(january2021-december 2024)

3.6 Exclusion criteria: Non diabetic patients in health centre's

3.7 Sample size and : The sample size was calculated by the formula :

$$n = \frac{N * z^2 * S^2}{d^2}$$

N: community size

Z: The standard score corresponding to the level of significance (0.95) and equal to (1.96)

d: error rate.

S: variance

n = sample size

$$n = \frac{168*(1.96)^2*(1.4)^2}{(3.29)^2} = n = \frac{1264.96}{10.8}$$ sample size = 117

3.8 Data collection tool:

The data were collected using :

a- interview questionnaire sheet.

it content tow section: first part: socio demographic general characteristics of the study sample as (sex-age educational level –experience's –marital status)

second part: the knowledge of (type 2) regarding to diabetes mellitus type 2. define diabetes –type of diabetes –signs and symptoms –investigations-life style, Family history, Complications of diabetes ,insulin using .insulin injection.

This tool will be use to measure the patients knowledge before and after the program to evaluate the effect of the education program on their knowledge.

3.9 Data analysis : The descriptive data analysis was adopted which include the percentage distribution by using statistical package of social sciences (spss).and use chi-square test)to test the association between variables.

3.10 ethical consideration: before the conduction of the study first take the approval from the post graduate studies (neelain university) , written permission will obtained from the ministry of health and the managers of healthy centre's to collect the necessary data after explanation of the purpose of the study. also verbal agreement will take from every patient participating in the study. a brief explanation of the aim of the study will give to the patient.

4. Results :

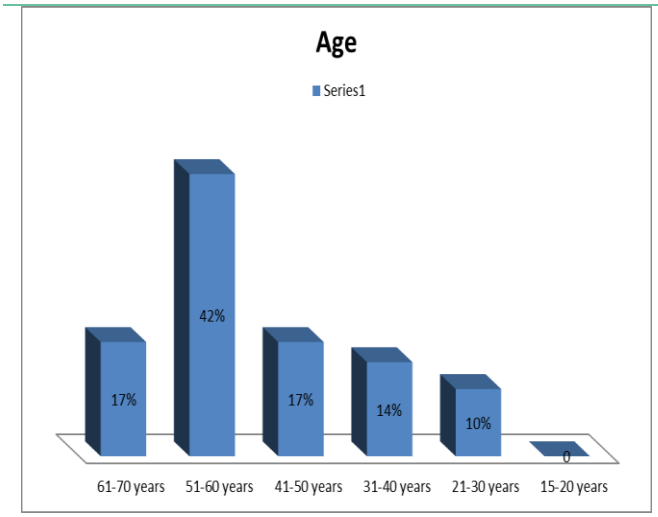
Table(1) demographic data analysis :

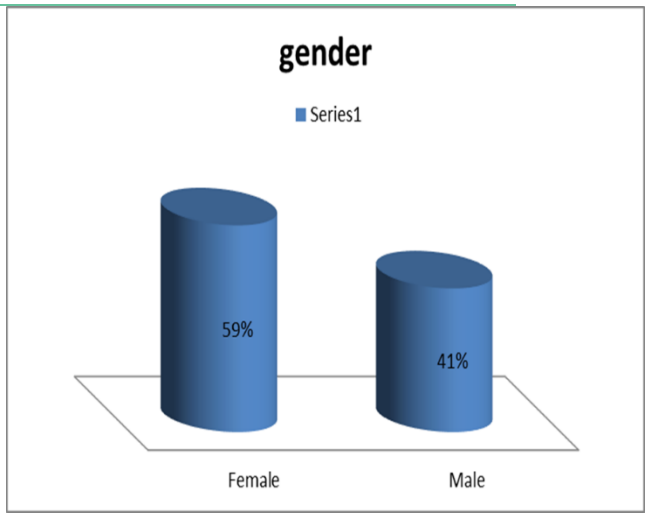
Social demographic	Items	Frequencies	Percentage
Age	15-20 years	-	-
	21-30 years	12	10%
	31-40 years	16	14%
	41-50 years	20	17%
	51-60 years	49	42%
	61-70 years	20	17%
Gender	Male	48	41%
	Female	69	59%
Family history for DM	Yes	77	66%
	No	40	34%
Education level	No education	4	3%
	Primary	32	27%
	Secondary	45	38%
	Graduate	36	31%

Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the study population their age range between (51-60 years) at percentage of (42%), and few of the study population their age range between (21-30 years) at percentage of (10%).

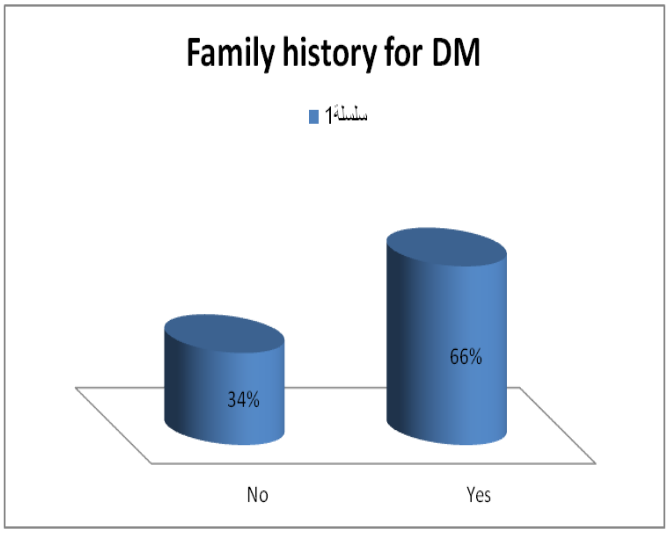
most of the study population are females at percentage of (59%), and males at percentage of (41%).





most of the study population has Family history for DM at percentage of (66%), and (34%) not has Family history for DM .

most of the study population their education level are secondary at percentage of (38%) , and (27%) their education level are primary, and (31%) their education level are Graduate , and (3%) are no education .



Source: Preparation of the researcher, based on the questionnaire data, 2025.

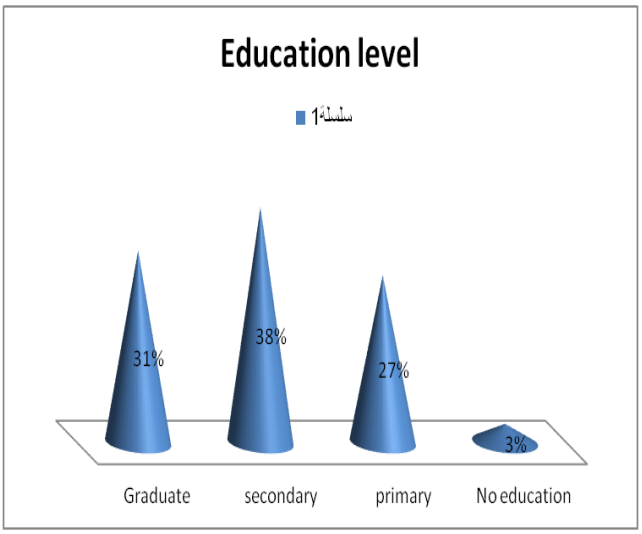
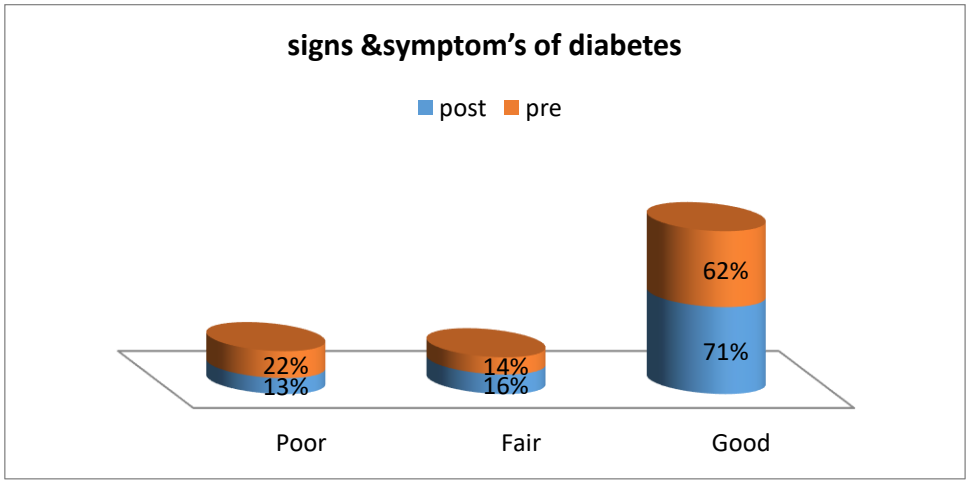


table (2) analysis of knowledge of patients about type 2 diabetic in pre and post :

Variables	Items	Pre		Post	
		Frequencies	Percentage	Frequencies	Percentage
signs &symptom's of diabetes	Good	73	62%	83	71%
	Fair	16	14%	19	16%
	Poor	28	22%	15	13%
sites of injection	Good	61	52%	79	68%
	Fair	36	31%	19	16%
	Poor	20	17%	19	16%
insulin storage	Good	101	86%	55	47%
	Fair	0	0%	39	33%
	Poor	16	14%	23	20%
suitable time for insulin using	Good	81	69%	75	64%
	Fair	0	0%	11	10%
	Poor	36	31%	31	26%
symptom's hypoglycemia	Good	77	66%	91	78%
	Fair	20	17%	11	10%
	Poor	20	17%	15	12%
hypo glycaemia management	Good	16	14%	63	54%
	Fair	28	24%	31	26%
	Poor	73	62%	23	20%
DM chronic complications	Good	61	53%	91	78%
	Fair	24	20%	11	10%
	Poor	32	27%	15	12%

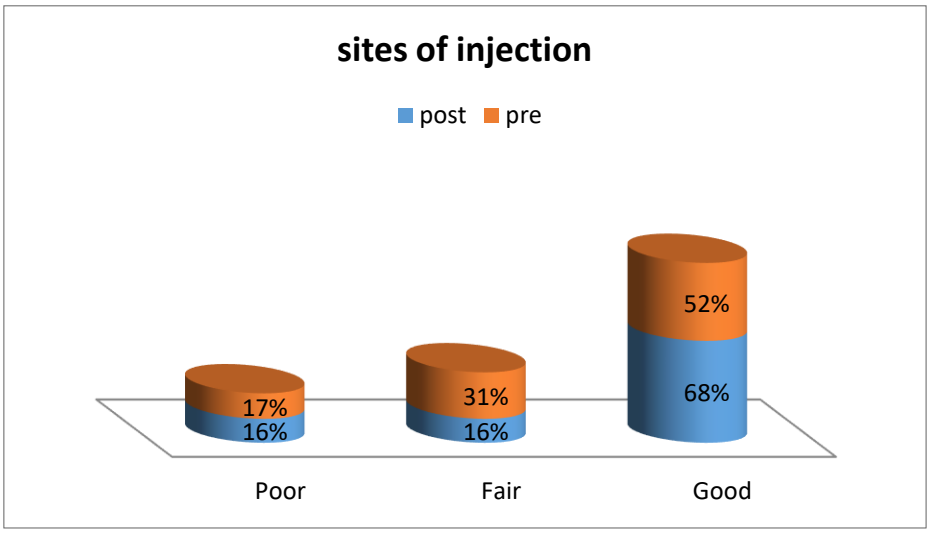
Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about signs & symptom's of diabetes is good at percentage of (62%) increase to (71%) percentage , fair percentage increase from (14%) to (16%) , poor percentage decrease from (22%) to (13%) .



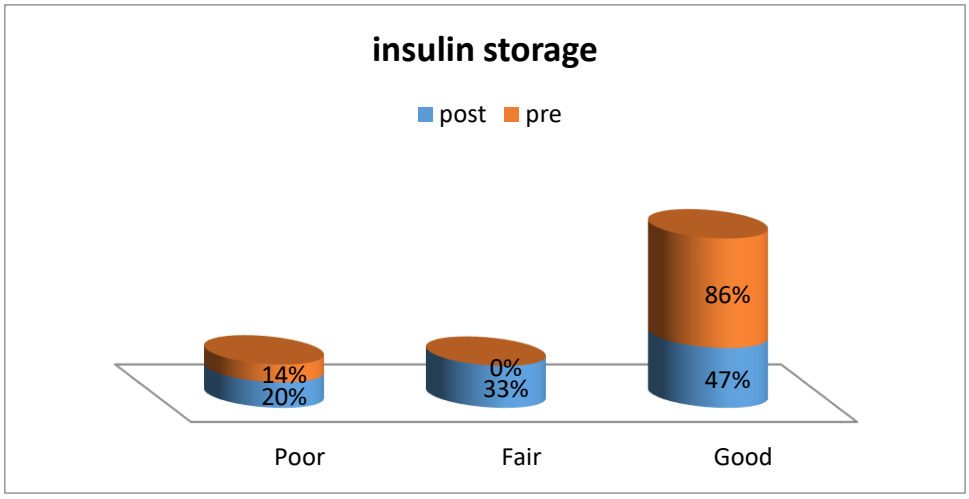
Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about sites of injection is good at percentage of (52%) increase to (68%) percentage , fair percentage decrease from (31%) to (16%) , poor percentage decrease from (17%) to (16%) .



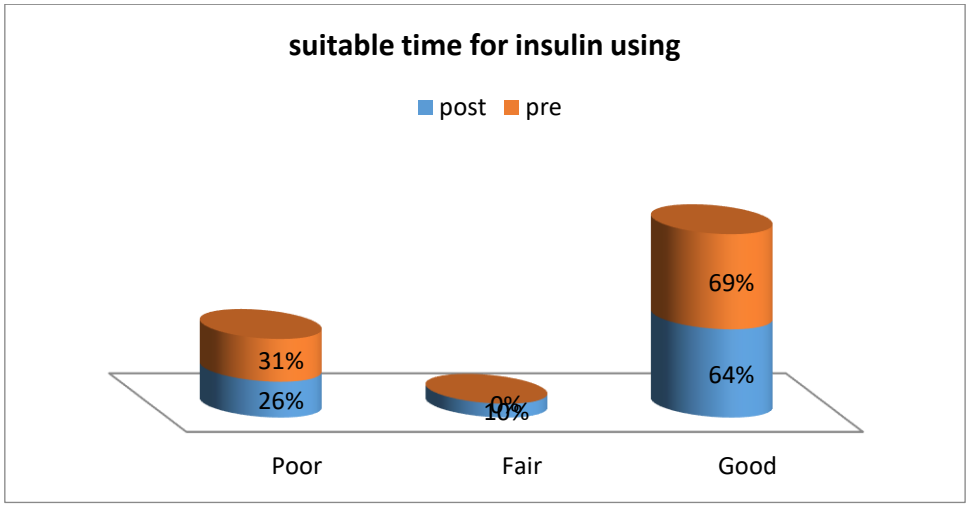
Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about insulin storage is good at percentage of (86%) decrease to (47%) percentage , fair percentage increase from (0%) to (33%) , poor percentage decrease from (14%) to (20%) .



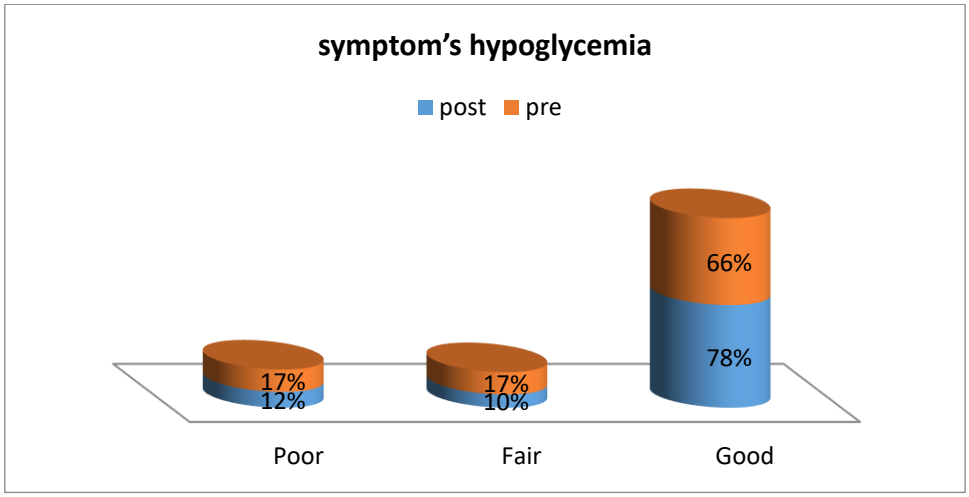
Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about suitable time for insulin using is good at percentage of (69%) decrease to (64%) percentage , fair percentage increase from (0%) to (10%) , poor percentage decrease from (31%) to (26%) .



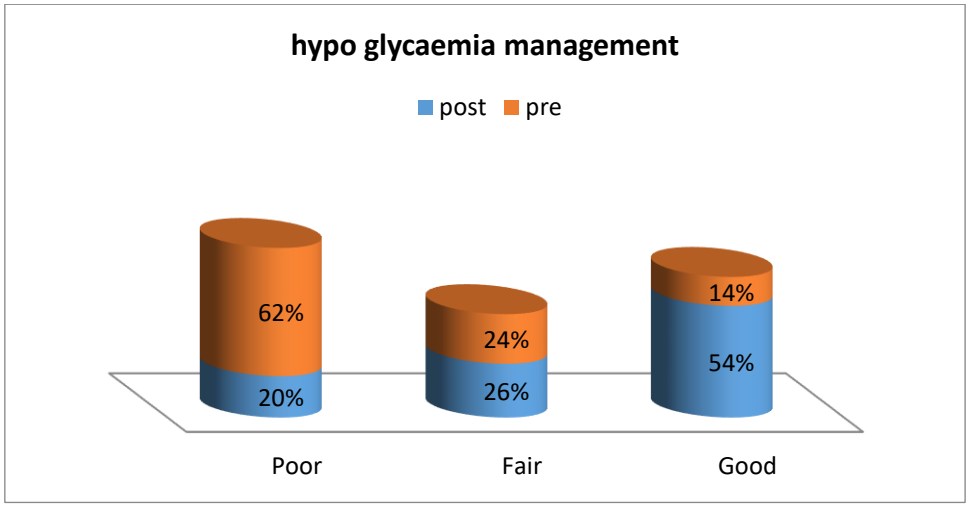
Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about symptom's hypoglycemia is good at percentage of (66%) increase to (78%) percentage , fair percentage decrease from (17%) to (10%) , poor percentage decrease from (17%) to (12%) .



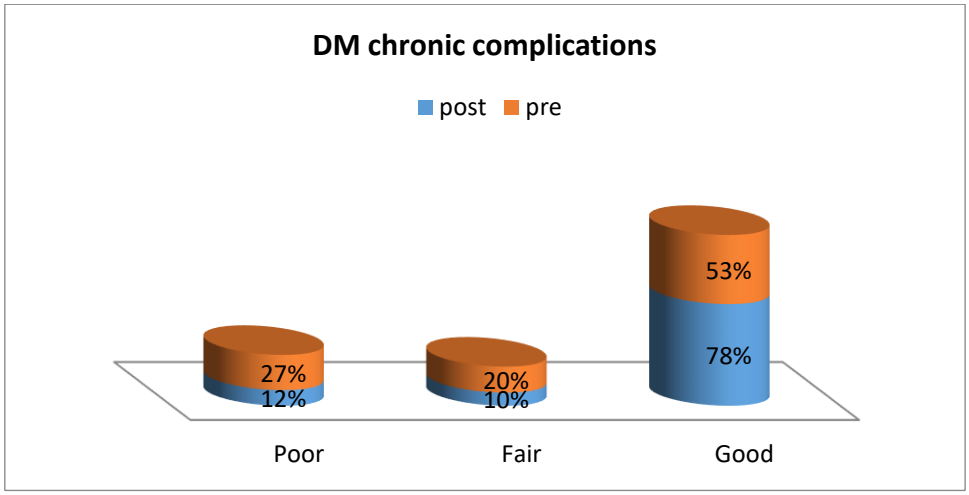
Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about hypo glycaemia management is good at percentage of (14%) increase to (54%) percentage , fair percentage increase from (24%) to (26%) , poor percentage decrease from (62%) to (10%) .



Source: Preparation of the researcher, based on the questionnaire data, 2025.

most of the participants their knowledge about DM chronic complications is good at percentage of (53%) increase to (78%) percentage , fair percentage decrease from (20%) to (10%) , poor percentage decrease from (27%) to (12%) .



Source: Preparation of the researcher, based on the questionnaire data, 2025.

Test the effect of the effect of the difference in the personal characteristics of the diabetes patients:

(Chi-Square) is a statistical test used for a test of an effect on one of the variables as a result of differences on the characteristics of the seam vocabulary[11] .

If the probability value of the test is less than 0.05, the result is explained as moral, and this means that there is an effect on the study variable resulting from the difference in the specific characteristic of the sample individuals, but if the test result is greater than 0.05, the result is interpreted as non -moral and this means that there is no effect The study variable is caused by the difference in the specific property of the sample individuals[8].

In this study, the (Chi-Square) test is used to test the effect of the difference in the personal characteristics of the diabetes patients (age, gender ,education level) on the knowledge and practices of type 2 diabetes patients .

1. Is there a difference in the knowledge and of type 2 diabetes patients between the diabetes patients caused by age ?
2. Is there a difference in the knowledge and of type 2 diabetes patients between the diabetes patients caused by gender ?
3. Is there a difference in the knowledge and of type 2 diabetes patients between the diabetes patients caused by education level?

table (3) shows the relationship between age and Knowledge

		Knowledge			Chi-Square-test	P-value
		Poor	Moderate	Good		
Age	15 less than20years	8	9	15	28.9	0.002
	21 less than30year	8	4	8		
	31 less than40year	5	4	8		
	41 less than50year	2	0	8		
	51 less than60year	4	8	4		
	61 less than70year	4	4	12		
Total		33	29	55		

source: preparing by researcher from questionnaire data , 2024.

Table (3) shows that the difference in the ages of diabetes patients has an effect on the knowledge and practices of type 2 diabetes patients, through the probability value of the (Chi-Square) test, which equals (0.002), which is less than (0.05).

table (4) shows the relationship between gender and Knowledge

		Knowledge			Chi-Square-test	P-value
		Poor	Moderate	Good		
Gender	Male	24	16	12	31.7	0.000
	Female	8	28	29		

Total	32	44	41		

source: preparing by researcher from questionnaire data , 2024.

Table (4) shows that the difference in the gender of diabetes patients has an effect on the knowledge and practices of type 2 diabetes patients, through the probability value of the (Chi-Square) test, which equals (0.000), which is less than (0.05).

table (5) shows the relationship between education level and Knowledge

		Knowledge			Chi-Square-test	P-value
		Poor	Moderate	Good		
education level	Diploma	12	8	16	26.4	0.000
	Bacalorhea	29	12	12		
	Master	4	12	12		
Total		45	32	40		

source: preparing by researcher from questionnaire data , 2024.

Table (5) shows that the difference in the education level of diabetes patients has an effect on the knowledge and practices of type 2 diabetes patients, through the probability value of the (Chi-Square) test, which equals (0.000), which is less than (0.05).

5. Discussion :

This study to evaluate the effect of health education program on information and performance of type 2 diabetics regarding diabetes. The result show that more the participants with in age group of 51-60 has the highest rate of diabetes at a rate of 42%. This Can be near as Study done in Saudia Arabia2020 it report that most of diabetic patients in age group 51 and 64 years old.. This study also showed that in terms of gender, females have the highest rate of diabetes compared to males, the rate was 59% for females and 41% for males as result done in pakistan 2023 showed that male 35.3% female 64.7%. This study also showed that most of the patients had a family history of diabetes, at a rate of 66% as studay done in china The disease-related characteristics of the participants were assessed and showed that 133 had a family history of diabetes, 79·12 %

Regarding the information of type 2 diabetes patients about symptoms and signs, the percentage of those who had good information increased from 62 %before to 71 % after .as

result done in sudan 2018 : Majority of the patients demonstrated good knowledge (54.6%), positive attitude (79%)..

result done in sudan 2022 :Six hundred Sudanese adults with a mean (SD) age of 44.9 (16.5) years were enrolled. More than two-thirds (70.3%) of the study participants were women. The prevalence of T2DM, newly diagnosed T2DM and uncontrolled T2DM was 20.8%, 10.0% and 80.0%, respectively. Logistic regression analysis showed no significant association between education, marital status, body mass index, waist circumference and DM. However older age (AOR = 4.88, 95% CI = 3.09–7.70) and a family history of DM (AOR = 2.58, 95% CI = 1.59–4.20) were associated with T2DM.

The number of those who did not have information decreased from 86 pre % to 18%post , Also, those who had good information about periodic blood sugar analyses increased by 31% before to 71% after.. near to result done in Pakistan 2023 showed that the participant knowledge regarding periodic sugar analyses decreased 10%.

The study showed that the participant who had good information about low blood sugar, the percentage increased from 43% before to 73% after.

As result done in sudan 2016 (Glycaemic control in Sudanese individuals with type 2 diabetes: Population based study 2016).showed positive result about the participant informations regarding hyopoglycimia.

Regarding the signs and symptoms of low blood sugar, the percentage of participants information increased from 66% before to 78% after.

The percentage of the participant's who had good information about How to mange low blood sugar increased from 14% before to 54% after.

The percentage of the participant's who had good information on how to prevent them self from low blood sugar was 20% before, then the percentage increased to more than half after, at 71%.

Patients who did not have information about diet decreased by more than half, from 56% before to 13% after.

As result done in sudan 2021 : study which report that there is positive attitude transfer Frome poor knowledge to good knowledge after heath education program. (Dietary knowledge, attitude and practice among type 2 diabetes mellitus patients in Sudan: a hospital-based cross-sectional study 2021

good information about Chronic complications of diabetes this had a percentage of 53% before and increased by 78% after . the same as Study done in Pakistan 2023 result increased to 40% from 10%.

The health education program conducted by this study in Kosti city led to good and satisfactory results due to shedding light directly on the causes of diabetes and its complications, correcting some concepts and clarifying information in a smooth and scientific way through direct lectures with patients and involving them and answering their questions related to diabetes. Also through distributing brochures and displaying educational panels, and informing them about the appropriate diet for diabetics by distributing healthy meals to patients.

. 6. Finding :

1-There is an effect of demographic characteristics (age, gender, education level) on knowledge of 2 type diabetes patients.

2-.In general most of the patients their knowledge about 2 type diabetes is good .

3-.the percentage of those who followed a diet only to treat diabetes was about 15% before, and their number increased to 17% after .

4-.Patients who had good information about the optimal method for injecting insulin increased, their percentage increased from 43% before to 64% after.

5-Regarding the signs and symptoms of low blood sugar, the percentage of those whose information was good increased from 66% before to 78% after.

7. Conclusion :

. The study conclude the following. Few of the participant's have suitable diet of diabetes pre and post. This study also indicates that most of the patients were in the 51-60 age group, and the majority of the participating patients were female. It also showed that most of the patients had a family history of diabetes. Most of the patients did not have blood sugar testing devices. This study can be used to focus in the future on some important points such as the importance of a proper diet for diabetics and exercise, how to use medications at the right time and how to store and take them. It can also be used to highlight the importance of having a blood sugar testing device to monitor .and reduce the death's rate resulting from low blood sugar.

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8**. Recommendations:**

The study recommended the following :

1. There is a need to Conducting health awareness campaigns in healthy centre's, schools, and even markets from ministry of health .
2. Enhancing the important and effective role of diabetic educator's and conducting training courses and workshops to increase their competence

3. **Acknowledgement's**:-

Thanks to my supervisor, Professor Muhammad Jabr Al-Dar, for his guidance and advice. Thanks also to everyone who participated in the research and to the healthy centre's that conducted the study.

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