RESULTS

The present study aimed to evaluate the effect of an educational program on self efficacy for patients with type 2 diabetes mellitus. This had been achieved through: Assessment of patients' needs to manage safely the five aspects of diabetes good control, assessment of self efficacy of patients through (DMSES), design and implement an educational program according to the patients' needs, and evaluate the outcome of the educational program according to the five aspects of diabetes management on self efficacy and glycemic control.

The results obtained from this study will be portrayed under the following parts:

Part I: Characteristics of the studied sample.

1) Socio-demographic characteristics of the studied sample (Table 1).
2) Patients' history (Table 2-4) & figures (1-5).

Part II: Knowledge of the studied sample before and after implementation of the educational program: (tables 5-11) & figure (6).

Part III: Practice of the studied sample before and after implementation of the educational program: (Tables 12- 18) & figure (7).

Part IV: Self efficacy & glycemic control of the studied sample before and after implementation of the educational program: (Tables 19, 20) & figures (8, 9).

Part V: Relations between variables of the study: Tables (21-27) & figures (10, 11).

Part I: Characteristics of the studied sample

Table (1): Percentage distribution of patients with type 2 DM according to their socio-demographic characteristics (No=50):

Item	No=50	(%)
Age in years		
• 20 -	1	2.0
• 30-	11	22.0
• 40 – 50	38	76.0
Mean ± SD = 44.14 ± 5.66		
Gender		
• Male	17	34.0
• Female	33	66.0
Residence		
• Rural	34	68.0
• Urban	16	32.0
Marital status		
• Single	1	2.0
• Married	43	86.0
• Widowed	6	12.0
Level of education		
• Read & write	25	50.0
• Secondary	18	36.0
• University	7	14.0
Occupation		
• Official	9	18.0
• Worker	14	28.0
• Retired	5	10.0
• House wife	22	44.0

Table (1) shows that (76.0%) of the studied sample were in age group of 40-50 years old, (66.0%) of them were females, and (68.0%) of the patients were living in rural areas. Regarding marital status and level of education, it was observed that, (86.0%) of the studied sample were married and (50%) of them could just read & write. As regard to patients' occupation, the table shows that (44% and 10.0%) of the patients were not working (house wives and retired) respectively.

Table (2): Percentage distribution of patients with type 2 DM according to their medical history (No=50):

Item	No=50	%
Duration of Diabetes		
< 1	3	6.0
1-	9	18.0
5 –	27	54.0
≥ 10	11	22.0
Mean ± SD= 6.8± 3.8		
Family history of diabetes		
Positive	38	76.0
Negative	12	24.0
Degree of relativity		
1st degree	35	70.0
2nd degree	3	6.0
Medication used		
Tablets	36	72.0%
Insulin	7	14.0%
Both	7	14.0%
Previous hospitalization		
Yes	4	8.0%
No	46	92.0%
Causes of previous hospitalization		
Hypoglycemia	4	8.0%
DKA	0	0.0%

Table (2) shows that, (54.0%) of the studied sample had diabetes for a period of five years to less than ten years, while only (6.0%) of the patients had diabetes for less than one year. (76.0%) of patients had positive family history of diabetes (70.0%) of them 1st degree relativity. About medication used, the table showed that (72.0%) of the studied sample were treated with tablets, while (14.0%) of them were using insulin alone or in combination with tablets. As regard to patients' previous hospitalization, the results illustrated that, (92.0%) of the patients didn't hospitalized before, and (8%) of them were hospitalized due to hypoglycemia.

Figure (1): Percentage distribution of patients with type 2 DM according to their family history of diabetes:

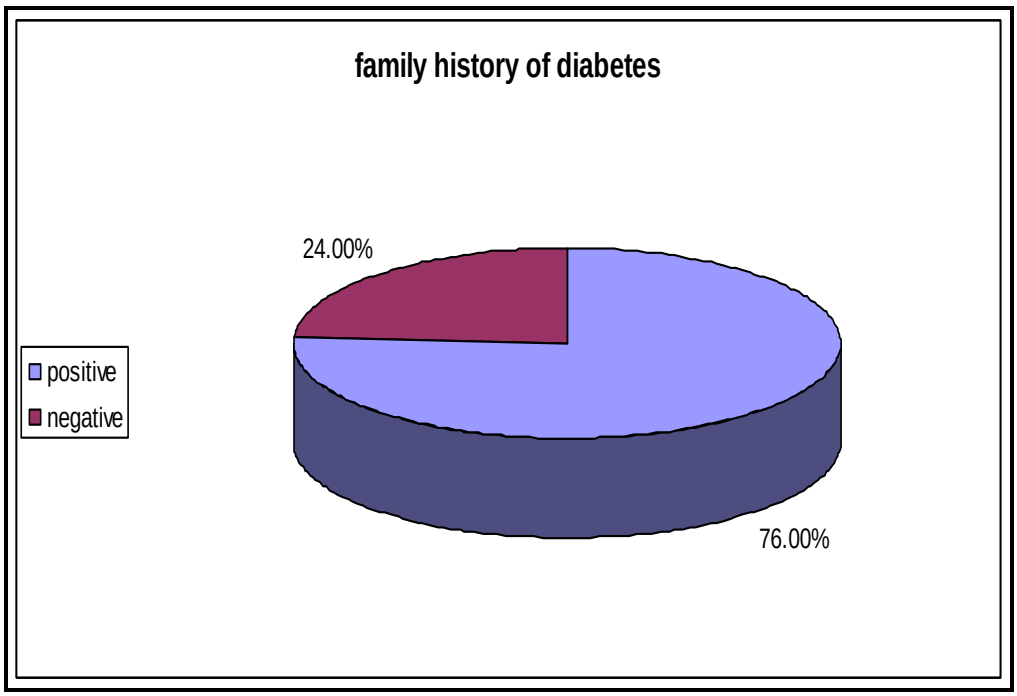


Figure (1) shows that (76.0%) of the studied sample had a positive family history of diabetes, (70.0%) of them with 1st degree relation.

Table (3): Percentage distribution of patients with type 2 DM according to complications occurred (No=50):

Item	Yes		No	
	No.	%	No.	%
Suffering from diabetic complications	**39**	**78.0**	**11**	**22.0**
History of hyperglycemia	33	66.0	17	34.0
One time	7	14.0	17	34.0
Two times	6	12.0	17	34.0
Three times	4	8.0	17	34.0
More than three times	16	32.0	17	34.0
Causes of experiencing hyperglycemia				
Sweaty substance	7	14.0	17	34.0
Heavy meal	13	26.0	17	34.0
Neglect medication	6	12.0	17	34.0
Psychological stress	26	52.0	17	34.0
More than one cause	15	30.0	17	34.0
History of hypoglycemia	31	62.0	19	38.0
One time	6	12.0	19	38.0
Two times	13	26.0	19	38.0
Three times	1	2.0	19	38.0
More than three times	11	22.0	19	38.0
Causes of experiencing hypoglycemia				
Drug over dose	5	10.0	19	38.0
Delayed meal	9	18.0	19	38.0
Hyperactivity	9	18.0	19	38.0
Without causes	8	16.0	19	38.0

Table (3) Shows that (78.0%) of the studied sample were suffering from diabetic complications; (66.0%) of the patients had a positive history of hyperglycemia, (32.0%) of them suffered from hyperglycemia for more than three times, and (52.0%) of them obtained hyperglycemia as a result of psychological stress.

Regarding history of hypoglycemia; it was observed that (62.0%) of the patients had a positive history of hypoglycemia; (18.0%) of them suffered from hypoglycemia as a result of delayed meal and hyperactivity.

Figure (2): Percentage distribution of patients with type 2 DM according to complications occurred.

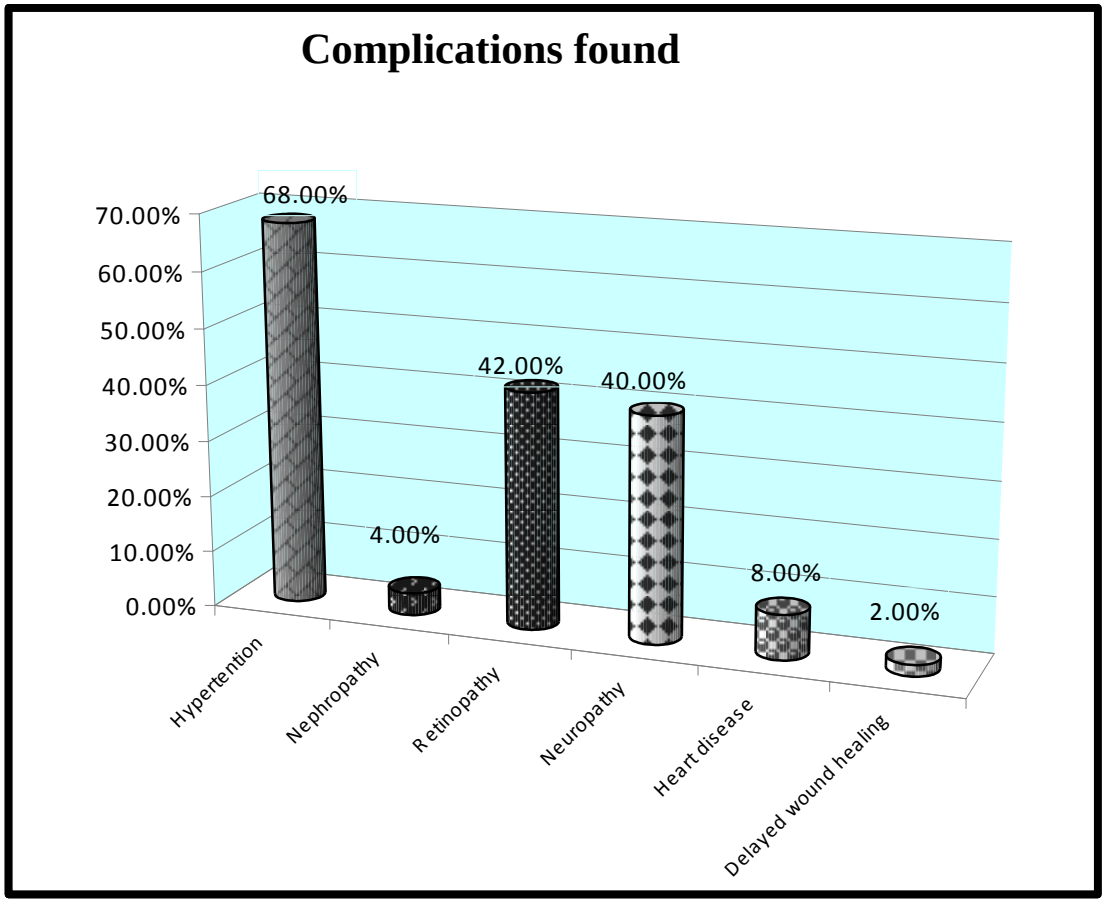


Figure (2) Illustrates that (68.0%), (42.0%), and (40.0%) of the studied sample had hypertension, retinopathy, and neuropathy respectively. While (8.0%, 4.0% and 2.0%) of the patients had heart diseases, neuropathy, and delayed wound healing respectively.

Figure (3): percentage distribution of patients with type 2 DM according to medication use:

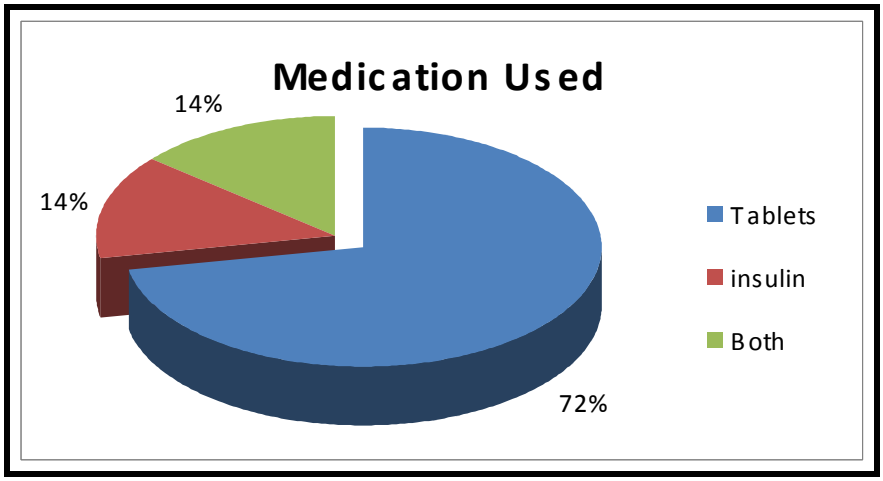


Figure (3) illustrates that (72.0%) of the studied sample had been treated with tablets only, while (14%) of them turned to insulin therapy to control their diabetes.

Table (4): Percentage distribution of patients with type 2 DM according to their results of physical assessment (No=50):

Items	No	(%)
Skin condition		
• Normal	16	32.0
• Abnormal, in form of :	36	72.0
Pale	28	56.0
Dry	22	44.0
Inflammation	9	18.0
Swelling	9	18.0
Corns	5	10.0
Localized atrophy of subcutaneous fat	5	10.0
Mouth Condition		
• Normal	12	24.0
• Abnormal in form of	38	76.0
Sore gums	11	22.0
Fissures of lips	7	14.0
Tooth aches	27	54.0
Dental caries	29	58.0
Extracted teeth	6	12.0
Eye Condition		
• Normal	20	40.0
• Abnormal in form of	30	60.0
Eye inflammation	4	8.0
Blurring vision	18	36.0
Weakness of vision	24	48.0
Neurological Condition		
• Normal	30	60.0
• Abnormal in form of	20	40.0
Numbness	18	36.0
Tingling	8	16.0
Burning	15	30.0
Prickling	4	8.0
Pain and muscle cramps	16	36.0
Foot Condition		
• Normal	26	52.0
• Abnormal in form of	34	68.0
Pale	20	40.0
Cyanosed	14	28.0
Dry skin	22	44.0
Blister	6	12.0
Calluses	8	16.0
Corns	5	10.0
Swelling	12	24.0
Pale nails	22	44.0

Items	No	(%)
Vital signs		
Blood pressure		
Normal	33	66.0
Hypertension	15	30.0
Hypotension	2	4.0
Pulse		
Normal	29	58.0
Tachycardia	18	36.0
Bradycardia	3	6.0
Respiration		
Normal	44	88.0
Tachypnea	5	10.0
Bradypnea	1	2.0
Temperature		
Normal	49	98.0
Hyperthermia	1	2.0
Hypothermia	0	0.0

Table (4) reveals that, (72.0%) of the studied sample had abnormal skin condition: (56.0%, 44.0%) of them were pallor and had dry skin. **About mouth condition**, it was found that (76.0%) of the studied sample had abnormal mouth condition; (58.0%, 54.0%, 22.0%) of them were suffering from dental caries, tooth ache, and sore gums respectively.

Regarding eye condition; it was found that (60.0%) of the studied sample had abnormal eye condition; (48.0%, 36.0%) of them were suffering from weakness of and blurred vision respectively. **As regard to neurological condition**; it was observed that (60.0%) of the studied sample were normal, 36.0% of the patients had numbness, pain, and muscle cramps, (30.0%) of them were suffering from burning sensation.

Concerning foot condition, physical assessment revealed that (68.0%) of the studied sample had abnormal foot condition; (44.0%, 28.0%, and 24.0%) were suffering from dry skin, pale nails, cyanosis, and swelling respectively.

Figure (4): Percentage distribution of patients with type 2 DM according to their results of vital signs assessment.

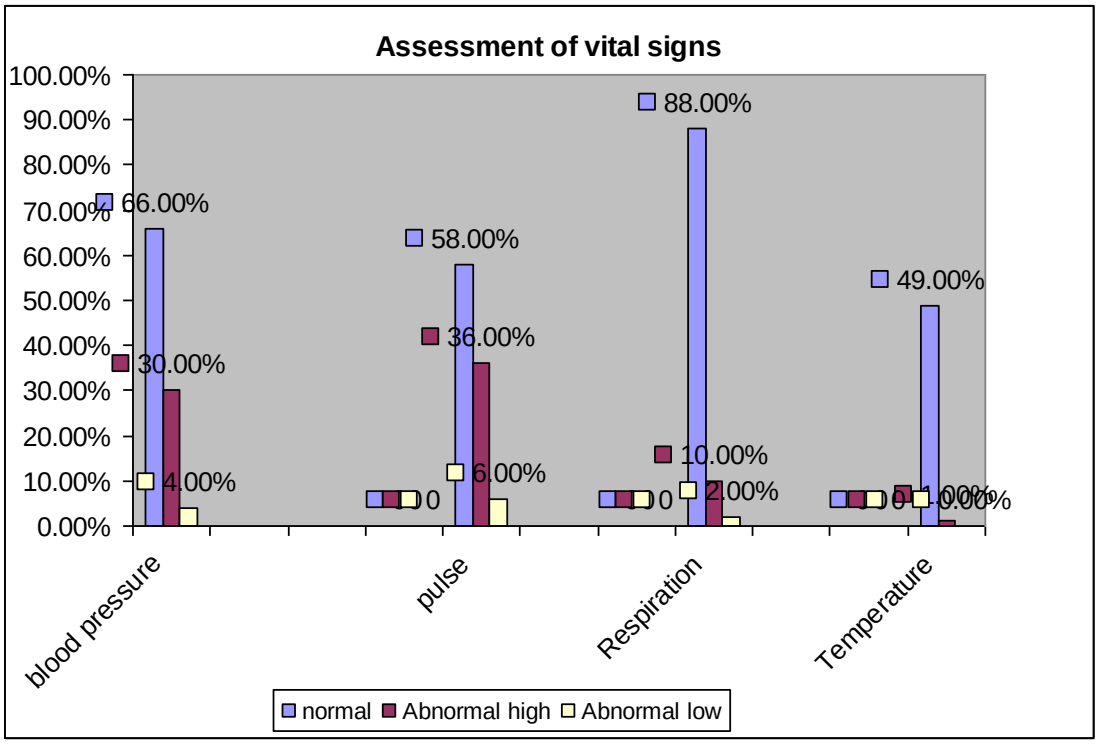
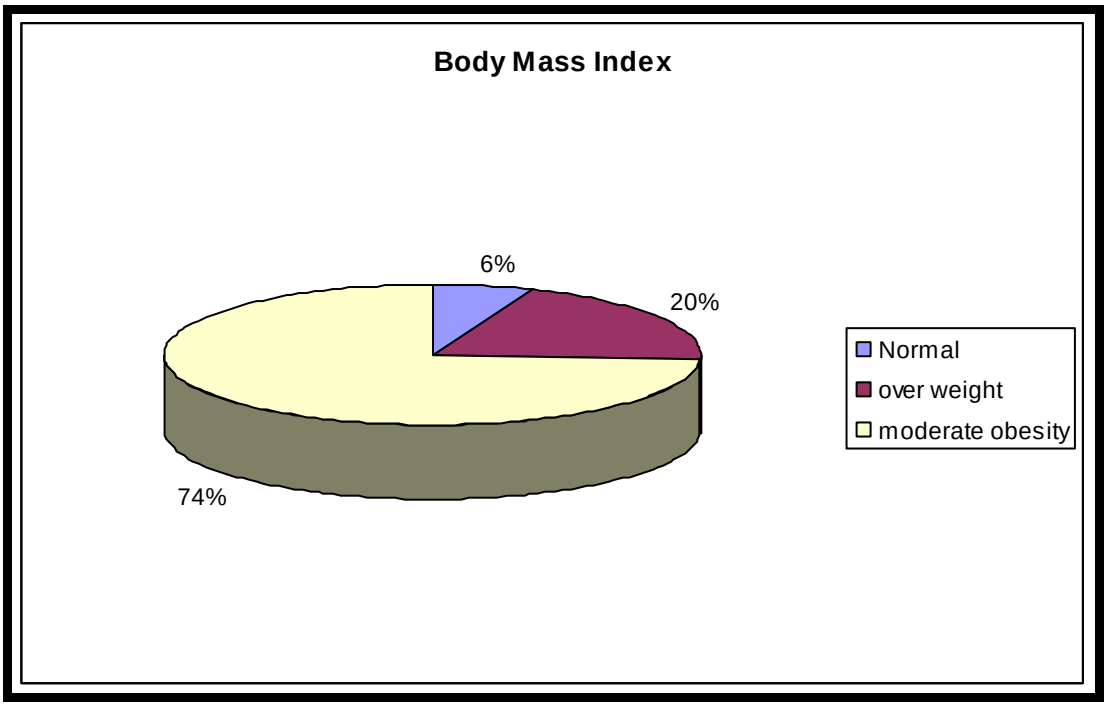


Figure (4) Shows that (66.0%) of the patients had normal blood pressure, (58.0%) had normal pulse, (88.0%) had normal respiration. And (98.0%) of them had normal temperature.

Figure (5): Percentage distribution of patients with type 2 DM according to their body mass index (BMI):



(Mean ± SD= 32.95 ± 5.25)

Figure (5) shows that (74.0%) of the studied sample had moderate obesity, while only (6.0%) of them had normal body weight.

Part II: Distribution of patients with type 2 DM according to their knowledge about diabetes mellitus before & after implementation of the program:

Table (5): Distribution of patients with type 2 DM according to their knowledge about nature of diabetes before & after implementation of the program:

Knowledge assessment variables / Nature of diabetes		Level of knowledge						Z	P- value
		Pre-program			Post- program				
		Poor	Average	good	poor	Average	good		
1. Knowledge about insulin	No	35	10	5	5	21	24	5.565	0.000***
	%	70.0	20.0	10.0	10.0	42.0	48.0		
2. Definition of DM	No	35	10	5	4	9	37	5.690	0.000***
	%	70.0	20.0	10.0	8.0	18.0	74.0		
3. Types of DM	No	32	13	5	11	38	1	4.074	0.000***
	%	64.0	26.0	10.0	22.0	76.0	2.0		
4. Causes and risk factors of DM	No	47	3	0	11	29	10	6.081	0.000***
	%	94.0	6.0	0.0	22.0	58.0	20.0		
5. Signs & Symptoms of DM	No	25	10	15	6	11	33	4.596	0.000***
	%	50.0	20.0	30	12.0	22.0	66.0		

(***) Extremely significant difference, $P < 0.0001$

Table (5) reveals that there was an extremely significant difference in patients' knowledge scores about the nature of diabetes after implementation of the educational program, ($P< 0.0001$).

Table (6): Distribution of patients with type 2 DM according to their knowledge about complications of diabetes before & after implementation of the educational program:

Knowledge assessment variables / Complications of diabetes		Level of knowledge						Z	P- value
		Pre-program			Post- program				
		Poor	average	good	Poor	Average	good		
1.Complications of DM	No %	26 52.0	14 28.0	10 20.0	0 0.0	12 24.0	38 76.0	5.357	0.000***
2. Causes of diabetic complications	No %	25 50.0	9 18.0	16 32.0	0 0.0	1 2.0	49 98.0	5.708	0.000***
3. Causes of diabetic coma	No %	3 6.0	31 62.0	16 32.0	1 2.0	1 2.0	48 96.0	5.134	0.000***
4. Which is more dangerous, hypoglycemic or hyperglycemic coma	No %	35 70.0	1 2.0	14 28.0	0 0.0	0 0.0	50 100.0	5.754	0.000***
5. Causes of hypoglycemia	No %	22 44.0	13 26.0	15 30.0	0 0.0	12 24.0	38 76.0	4.646	0.000***
6. Symptoms of hypoglycemia	No %	11 22.0	28 56.0	11 22.0	2 4.0	3 6.0	45 90.0	3.597	0.000***
7. Causes of hyperglycemia	No %	11 22.0	22 44.0	17 34.0	0 0.0	3 6.0	47 94.0	5.167	0.000***
8. Symptoms of hyperglycemia	No %	42 84.0	1 2.0	7 14.0	1 2.0	7 14.0	42 84.0	5.876	0.000***
9.Knowledge about acetone	No %	48 96.0	0 0.0	2 4.0	2 4.0	24 48.0	24 48.0	6.086	0.000***
10.Symptoms of DKA	No %	50 100.0	0 0.0	0 0.0	10 20.0	24 48.0	16 32.0	5.995	0.000***

(***) Extremely significant difference, $P < 0.0001$

Table (6) reveals that there was an extremely significant difference in patients' knowledge scores about diabetes complications after the implementation of the educational program, $P< 0.0001$.

Table (7): Distribution of patients with type 2 DM according to their knowledge about Treatment measures & investigations of diabetes before & after implementation of the program:

Knowledge assessment variables / Treatment measures of DM		Level of knowledge						Z	P- value
		Pre-program			Post- program				
		poor	Average	good	Poor	average	good		
1. Methods of treating diabetes	No	50	0	0	0	12	38	6.245	0.000***
	%	100.0	0.0	0.0	0.0	24.0	76.0		
2. Ways of investigating diabetes	No	32	15	3	1	40	9	5.297	0.000***
	%	64.0	30.0	6.0	2.0	80.0	18.0		
3. Green color mean in urine test	No	43	0	7	0	0	50	6.245	0.000***
	%	86.0	0.0	14.0	0.0	0.0	100.0		
4. Yellow color mean in urine test	No	45	2	3	0	20	30	5.911	0.000***
	%	90.0	4.0	6.0	0.0	40.0	60.0		

(***) Extremely significant difference, P < 0.0001

Table (7) shows that there was an extremely significant differences in patients' knowledge about treatment measures and investigations of diabetes after implementation of the educational program (P< 0.000)..

Table (8): Distribution of patients with type 2 DM according to their knowledge about diabetic diet before & after implementation of the program:

Knowledge assessment variables / Knowledge about diabetic diet		Level of knowledge						Z	P- value
		Pre-program			Post- program				
		Poor	average	good	Poor	Average	good		
1. Importance of diabetic diet	No	43	6	1	0	9	41	6.151	0.000***
	%	86.0	12.0	2.0	0.0	18.0	82.0		
2. Food elements	No	26	9	15	0	4	46	5.243	0.000***
	%	52.0	18.0	30.0	0.0	8.0	92.0		
3. Factors considered in choosing diet	No	31	5	14	22	27	1	2.248	0.25
	%	62.0	10.0	28.0	44.0	54.0	2.0		
4. Determining daily requirements of calories according to ideal weight	No	50	0	0	40	9	1	3.771	0.000***
	%	100.0	0.0	0.0	80.0	18.0	2.0		
5. Ways of reducing fat in diet	No	36	7	7	0	38	12	2.420	0.16
	%	72.0	14.0	14.0	0.0	76.0	24.0		
6. Ways of reducing salt in diet	No	0	47	3	0	20	30	4.426	0.000***
	%	0.0	94.0	6.0	0.0	40.0	60.0		

(***) Extremely significant difference, $P < 0.0001$

Table (8) illustrates that there was an extremely significant difference in patients' knowledge scores about the importance of diabetic diet, food elements, determining daily requirements of calories, and ways of reducing salt in diet ($P< 0.0001$) after applying the educational program. While there was no statistically significant difference in patients' knowledge about factors considered in choosing diet and ways of reducing fat after the implementation of the educational program $P<$ value (0.25 and 0.16)respectively.

Table (9): Distribution of patients with type 2 DM according to their knowledge about physical exercise before & after implementation of the program:

Knowledge assessment variables / Knowledge about physical exercise		Level of knowledge						Z	P- value
		Pre-program			Post- program				
		Poor	Average	good	Poor	Average	good		
1. Benefits of exercises for diabetic patients	No	41	7	2	12	28	10	4.811	0.000***
	%	82.0	14.0	4.0	24.0	56.0	20.0		
2. Considerations should be considered when practicing exercises	No	41	7	2	2	31	17	6.174	0.000***
	%	82.0	14.0	4.0	4.0	62.0	34.0		
3. Suitable period for practicing exercise	No	43	1	6	0	0	50	6.126	0.000***
	%	86.0	2.0	12.0	0.0	0.0	100.0		

(***) Extremely significant difference, $P < 0.0001$

Table (9) shows that there was an extremely significant difference in patients' knowledge scores about physical exercise after implementation of the educational program, P- value of (0.000).

Table (10): Distribution of patients with type 2 DM according to their knowledge about diabetic medications before & after implementation of the educational program:

Knowledge assessment variables / Knowledge about diabetic medications		Level of knowledge						Z	P-value
		Pre-program			Post- program				
		Poor	average	good	Poor	Average	good		
1. Types of medication used in diabetes treatment	No %	10 20.0	13 26.0	27 54.0	0 0.0	0 0.0	50 100.0	2.795	0.005**
2. Types of insulin	No %	11 78.57	1 7.14	2 14.28	0 0.0	1 7.14	13 92.86	3.276	0.001**
3. Sites of insulin injection	No %	1 7.14	6 42.86	7 50.0	0 0.0	0 0.0	14 100.0	2.530	0.011*
4. Types of insulin syringe	No %	3 21.32	5 35.60	6 42.86	0 0.0	0 0.0	14 100.0	2.598	0.009*
5. Complications of insulin overdose	No %	3 21.32	3 21.32	8 57.14	0 0.0	0 0.0	14 100.0	2.251	0.024*
6. Considerations which should be considered in insulin use	No %	12 85.72	0 0.0	2 14.28	0 0.0	0 0.0	14 100.0	3.464	0.001**

(*) Statistical significant difference, P<0.05

(**) Highly statistically significant difference, P<0.001

Table (10) reveals that there was a highly statistically significant difference in patients' knowledge scores about types of medication used in diabetes treatment, types of insulin, and considerations which should be considered in insulin use, P- value (0.005,0.001, and 0.001) respectively. While there were only statistically significant differences in patients' knowledge as regard to sites of insulin injection, types of insulin syringe, and complications of insulin overdose after implementation of the educational program, P- value (0.011, 0.009 and 0.024) respectively.

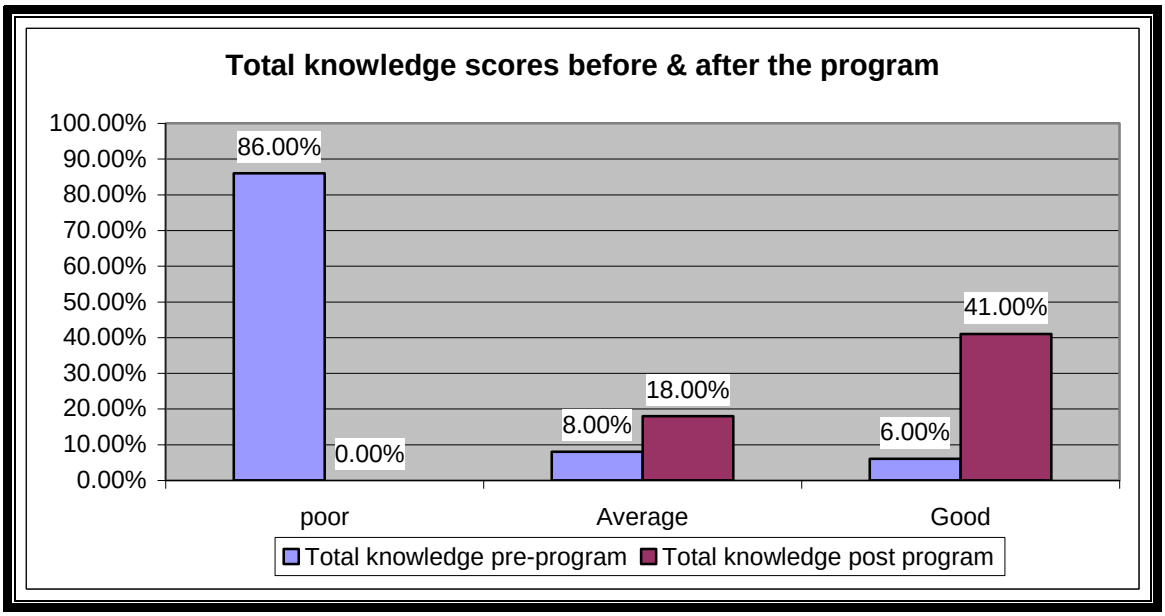
Table (11): Distribution of patients with type 2 DM according to their knowledge about hygiene and foot care before & after implementation of the program:

Knowledge assessment variables / Knowledge about hygiene & foot care		Level of knowledge						Z	P- value
		Pre-program			Post- program				
		Poor	Average	good	Poor	average	good		
1. Benefits of foot care	No %	14 28.0	16 32.0	20 40.0	0 0.0	0 0.0	50 100.0	4.797	0.000***
2. Causes of diabetic foot	No %	39 78.0	8 16.0	3 6.0	1 2.0	8 16.0	41 82.0	5.993	0.000***
3. Symptoms of diabetic foot	No %	35 70.0	10 20.0	5 10.0	0 0.0	2 4.0	48 96.0	5.896	0.000***
4. Correct methods of foot care	No %	34 68.0	9 18.0	7 14.0	0 0.0	4 8.0	46 92.0	6.079	0.000***
5. Correct methods of nail care	No %	21 42.0	11 22.0	18 36.0	1 2.0	0 0.0	49 98.0	4.464	0.000***
6. Risks of wounds for diabetic patients	No %	24 48.0	10 20.0	16 32.0	0 0.0	7 14.0	43 86.0	4.741	0.000***
7. Causes of delayed wound healing for diabetic patients	No %	34 68.0	6 12.0	10 20.0	3 6.0	29 58.0	18 36.0	4.737	0.000***

(***) Extremely significant difference, P < 0.0001

Table (11) indicates that there was an extremely significant difference in patients' knowledge scores about self hygiene and foot care after implementation of the educational program, P- value of (0.000).

Figure (6): Distribution of patients with type 2 DM according to their total knowledge about different items of diabetes mellitus before & after implementation of the program:



Mean ± SD: pre: 60.92±23.01 post: 118.30±15.41 P = (0.000)***

Figure (6) shows that there was a statistically significant difference in total knowledge scores of the studied sample with an extremely significant difference in mean knowledge scores after implementation of the educational program, p=(0.000).

Part III: Distribution of patients with type 2 DM according to their practice during applying treatment measures before & after implementation of the program

Table (12): Distribution of patients with type 2 DM according to their practice during exposure to diabetic complications before & after implementation of the program:

Practice assessment variables / Complication of DM		Level of practice						Z	P- value
		Pre-program			Post- program				
		Poor	average	good	Poor	average	good		
1. Practice during hypoglycemia	No	41	7	2	9	31	10	5.275	0.000***
	%	82.0	14.0	4.0	18.0	62.0	20.0		
2. Practice during hyperglycemia	No	28	9	13	0	21	29	5.052	0.000***
	%	56.0	18.0	26.0	0.0	42.0	58.0		
3. Practice during DKA	No	50	0	0	15	30	5	6.269	0.000***
	%	100.0	0.0	0.0	30.0	60.0	10.0		

(***) Extremely significant difference, $P < 0.0001$.

Table (12) clarifies that there was an extremely significant difference in patients' practice scores during exposure to diabetic complications after implementation of the educational program, (P=0.000).

Table (13): Distribution of patients with type 2 DM according to their practice toward diet and exercise before & after implementation of the program:

Practice assessment variables / Diet and exercise		Level of practice						Z	P- value
		Pre-program			Post- program				
		poor	Average	good	poor	Average	good		
1. Follow diabetic diet	No	29	8	13	5	24	21	3.711	0.000***
	%	58.0	16.0	26.0	10.0	48.0	42.0		
2. Practice physical exercises	No	19	8	23	3	28	19	2.666	0.008**
	%	38.0	16.0	46.0	6.0	56.0	38.0		
3. Practice physical exercises regularly	No	19	21	10	14	19	17	3.421	0.001**
	%	38.0	42.0	20.0	28.0	38.0	34.0		

(**) Highly statistically significant difference, P<0.001.

(***) Extremely significant difference, P < 0.0001.

Table (13) illustrates that there was an extremely statistical significancant difference in patients' practices scores during following diabetic diet, and a highly statistically significant difference was found in patients' practices during applying physical exercises after implementation of the educational program, P-value (0.000 and 0,008, and 0.001) respectively.

Table (14): Distribution of patients with type 2 DM according to their practice toward medication before & after implementation of the program:

Practice assessment variables / Medication		Level of practice						Z	P-value
		Pre-program			Post- program				
		Poor	Average	good	Poor	Average	good		
1. Take medication in correct way	No	4	0	46	0	0	50	2.236	0.025*
	%	8.0	0.0	92.0	0.0	0.0	100.0		
2. Take medication regularly	No	7	1	42	0	16	34	0.300	0.765
	%	14.0	2.0	84.0	0.0	32.0	68.0		
3. Inject insulin yourself	No	6	0	8	2	2	10	1.318	0.187
	%	42.86	0.0	57.14	14.28	14.28	71.43		
4. Change site of insulin injection each time	No	2	2	10	0	4	10	0.587	0.557
	%	14.28	14.28	71.43	0.0	28.57	71.43		
5. Keep insulin in refrigerator	No	1	0	13	0	0	14	1.000	0.317
	%	7.14	0.0	92.86	0.0	0.0	100.0		

(*) Statistically significant difference , P<0.05

Table (14) shows that there was a statistically significant difference in patients' practices toward taking medications correctly after implementation of the educational program (P= 0.025). However there were no statistically significant differences as regard to the patients' practices toward taking medication after implementation of the educational program, P- value > 0.005.

Table (15): Distribution of patients with type 2 DM according to their practice during insulin injection before & after implementation of the program:

Practice assessment variables / Insulin injection		Level of practice						Z	P- value
		Pre-program			Post- program				
		poor	Average	good	poor	Average	good		
1. Check that the syringe is suitable for type and concentration of insulin	No %	5 35.71	1 7.14	8 57.14	0 0.0%	0 0.0%	14 100.0%	2.333	0.20
2. Open syringe correctly	No %	10 71.03%	4 28.57	0 0.0%	0 0.0%	2 14.28	12 85.72	3.276	0.001**
3. Shake insulin vial before aspiration	No %	12 85.72	2 14.28	0 0.0%	0 0.0%	1 7.14	13 92.86	3.494	0.000***
4. Aspirate some amount of air equal to insulin dose and inject it into vial	No %	13 92.86	0 0.0%	1 7.14	0 0.0%	8 57.14	6 42.86	3.286	0.001**
5. Aspirate the correct dose of insulin	No %	6 42.86	0 0.0	8 57.14	0 0.0%	0 0.0	14 100.0%	2.449	0.000***
6. Choose the suitable site of insulin injection	No %	7 50.0	2 14.28	5 35.71	0 0.0%	0 0.0	14 100.0%	2.810	0.005**
7. disinfect the site with alkholic sponge	No %	12 85.72	0 0.0%	2 14.28	0 0.0%	10 71.43	4 28.57	2.952	0.003**
8. Collect the site with thumb and index	No %	8 57.14	4 28.57	2 14.28	0 0.0%	5 35.71	9 64.29	3.035	0.002**
9. hold the syringe correctly	No %	6 42.86	6 42.86	2 14.28	0 0.0%	0 0.0%0.0	14 100.0%	3.145	0.002**
10. Insert the syringe in 90 degree	No %	7 50.0	5 35.71	2 14.28	0 0.0%	0 0.0%	14 100.0%	3.153	0.002**
11. Inject all dose correctly	No %	6 42.86	0 0.0	8 57.14	0 0.0%	0 0.0%	14 100.0%	2.449	0.014*
12. Remove the syringe and do not rub the site	No %	6 42.86	5 35.71	3 21.43	0 0.0%	0 0.0%	14 100.0%	3.017	0.003**

(*) Statistically significant difference , P<0.05

(**) Highly statistically significant difference, P<0.001.

(***) Extremely significant difference, P < 0.0001.

Table (15) shows that patients' practices scores improved among statistically significant, highly significant, and extremely significant during all steps of applying self injection of insulin after implementation of the educational program, however a little improvement occurred in patients' practices during step 1 and 11, ($p<0.05$).

Table (16): Distribution of patients with type 2 DM according to their practice during Investigation, hygiene, and follow up before & after implementation of the program:

Practice assessment variables / Investigation, hygiene, and follow up		Level of practice						Z	P- value
		Pre-program			Post- program				
		Poor	Average	good	poor	Average	Good		
1. Self monitor of blood glucose level	No %	40 80.0	0 0.0	10 20.0	29 58.0	0 0.0	21 42.0	2.132	0.033*
2. Frequency of checking blood glucose level	No %	22 44.0	24 48.0	4 8.0	6 12.0	27 54.0	17 34.0	4.193	0.000***
3. Apply hygienic care regularly	No %	3 6.0	2 4.0	45 90.0	0 0.0	17 34.0	33 66.0	1.287	0.198
6. Practice during wound care	No %	23 46.0	14 28.0	13 26.0	0 0.0	1 2.0	49 98.0	5.309	0.000***
7. Frequency of follow up	No %	22 44.0	1 2.0	27 54.0	4 8.0	18 36.0	28 56.0	3.814	0.000***

(**) Highly statistically significant difference, P<0.001.

(***) Extremely significant difference, P < 0.0001.

Table (16) indicates that there were extremely significant difference in patients' practice scores after applying the educational program (P<0.0001)**,** a statistically significant difference was observed in self monitor of blood glucose level (P=0.033). However there was no statistically significant difference in applying hygienic care after implementation of the educational program as 90% of patients already had good practice scores before applying the program.

Table (17): Distribution of patients with type 2 DM according to their practice during applying urine test for glucose and ketone body before & after implementation of the program:

Practice assessment variables / Urine test for glucose& ketones		Level of practice						Z	P- value
		Pre-program			Post- program				
		Poor	average	good	poor	Average	good		
1. Take urine sample in clean test cup	No %	49 98.0	0 0.0	1 2.0	0 0.0	13 26.0	37 74.0	6.378	0.000***
2. Wash hands properly	No %	49 98.0	0 0.0	1 2.0	2 4.0	17 34.0	31 62.0	6.206	0.000***
3. Open test strip container in correct way and take off the strip correctly	No %	49 98.0	0 0.0	1 2.0	0 0.0	14 28.0	36 72.0	6.472	0.000***
4. Close the container and immerse the strip in urine correctly	No %	50 100.0	0 0.0	0 0.0	0 0.0	8 16.0	42 84.0	6.617	0.000***
5. Take the strip off the urine correctly	No %	49 98.0	0 0.0	1 2.0	0 0.0	20 40.0	30 60.0	6.329	0.000***
6. Wait 30_60 seconds to get the correct result	No %	49 98.0	0 0.0	1 2.0	0 0.0	14 28.0	36 72.0	6.451	0.000***
7. Able to differentiate colors correctly	No %	50 100.0	0 0.0	0 0.0	0 0.0	19 38.0	31 62.0	6.431	0.000***
8. Discard used equipments in right way	No %	50 100.0	0 0.0	0 0.0	1 2.0	17 34.0	32 64.0	6.379	0.000***
9. Register results in a specific pamphlet	No %	49 98.0	0 0.0	1 2.0	25 50.0	0 0.0	25 50.0	5.578	0.000***

(***) Extremely significant difference, P < 0.0001.

Table (17) shows that there were extremely significant differences in patients' practice scores during applying urine test for glucose and ketone bodies after implementation of the educational program (P< 0.0001).

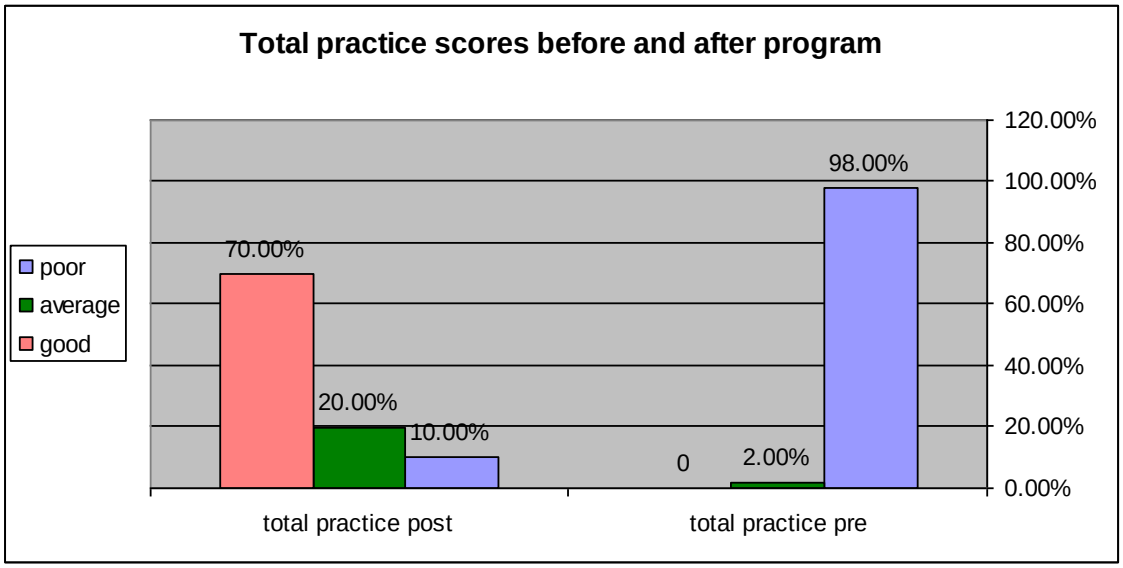
Table (18): Distribution of patients with type 2 DM according to their practice during applying blood test for glucose using glucometer before & after implementation of the program:

Practice assessment variables / Blood test		Level of practice						Z	P- value
		Pre-program			Post- program				
		poor	average	good	Poor	average	good		
1. Wash hands and dry them correctly	No %	47 94.0	1 2.0	2 4.0	21 42.0	0 0.0	29 58.0	5.578	0.000***
2. Open the glucometer correctly	No %	47 94.0	0 0.0	3 6.0	9 18.0	0 0.0	41 82.0	6.481	0.000***
3. Disinfect the site and let it dry	No %	47 94.0	1 2.0	2 4.0	8 16.0	18 36.0	24 48.0	5.804	0.000***
4. Pin the side of the finger to reduce pain	No %	49 98.0	0 0.0	1 2.0	0 0.0	45 90.0	5 10.0	6.463	0.000***
5. Collect enough amount of blood before applying it on the strip	No %	45 90.0	0 0.0	5 10.0	0 0.0	0 0.0	50 100.0	6.708	0.000***
6. Put a dry sponge on the selected site to stop bleeding	No %	43 86.0	4 8.0	3 6.0	0 0.0	0 0.0	50 100.0	6.726	0.000***
7. Register the results in blood test results	No %	48 96.0	2 4.0	0 0.0	21 42.0	8 16.0	21 42.0	5.246	0.000***

(***) Extremely significant difference, P < 0.0001.

Table (18) shows that there were extremely significant differences in patients' practices scores during applying blood test for glucose after implementation of the educational program (P<0.000).

Figure (7): Distribution of patients with type 2 DM according to their total practice toward different items of diabetes mellitus before & after implementation of the program:



Mean ± SD	Pre: 20.0±10.53	Post: 57.98±17.80	0.000

Figure (7) Show that there was a highly statistically significant difference in total practice scores of the studied sample after implementation of the educational program (P < 0.000).

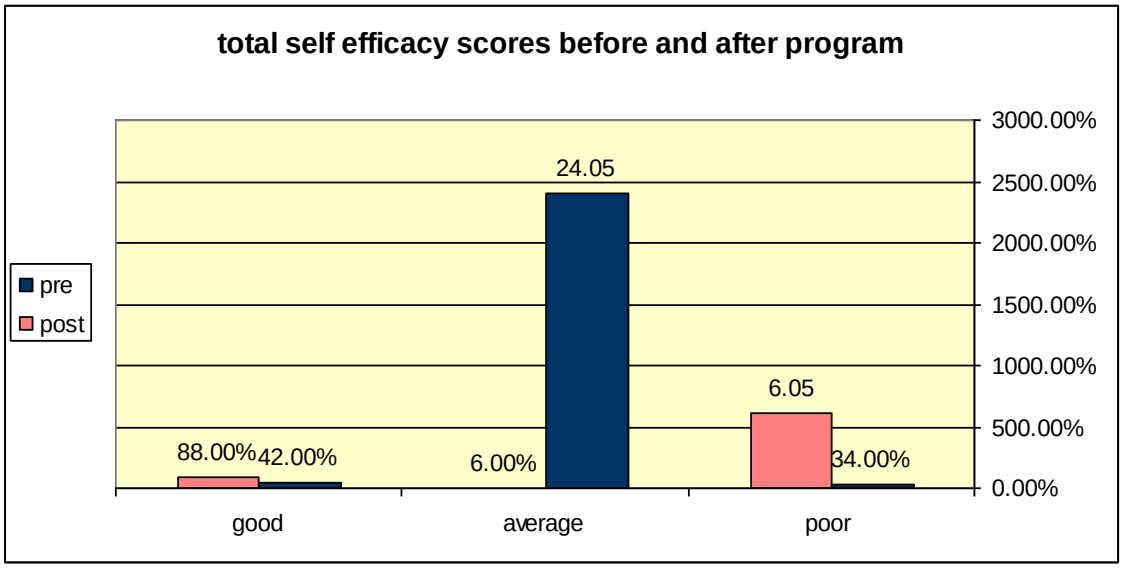
Part IV: Self efficacy & glycemic control of the studied sample before and after implementation of the educational program

Table (19): Distribution of patients with type 2 DM according to their concepts of self efficacy before & after implementation the educational program (n=50):

Concepts of self efficacy I am able to:	Test	Level of self efficacy						Z	P-value
		Can't do at all		May be yes May be no		Certain can do			
		No	%	No	%	No	%		
1- Check my blood sugar if necessary?	Pre	9	18.0	14	28.0	27	54.0	1.355	0.175
	Post	0	0.0	24	48.0	26	52.0		
2- Correct my blood sugar when my sugar level is too high?	Pre	14	28.0	20	40.0	16	32.0	4.625	0.000 **
	Post	0	0.0	14	28.0	36	72.0		
3- Correct my blood sugar when my sugar level is too low?	Pre	6	12.0	30	60.0	14	28.0	4.838	0.000 **
	Post	0	0.0	6	12.0	44	88.0		
4- Choose my correct foods?	Pre	17	34.0	18	36.0	15	30.0	1.000	0.000 **
	Post	0	0.0	12	24.0	48	96.0		
5- Keep my weight under control?	Pre	8	16.0	22	44.0	20	40.0	5.488	0.000 **
	Post	0	0.0	7	14.0	43	86.0		
6- Examine my feet for cuts?	Pre	8	16.0	15	30.0	27	54.0	3.963	0.000 **
	Post	0	0.0	1	2.0	49	98.0		
7- Adjust my eating plan when ill?	Pre	3	6.0	28	56.0	19	38.0	5.568	0.000 **
	Post	0	0.0	3	6.0	47	94.0		
8- Follow a healthy eating pattern most of the time?	Pre	12	24.0	21	42.0	17	34.0	4.359	0.000 **
	Post	8	16.0	10	20.0	32	64.0		
9- Take more exercise if the doctor advises me to?	Pre	14	28.0	17	34.0	19	38.0	5.292	0.000 **
	Post	0	0.0	18	36.0	32	64.0		
10- Adjust my eating plan when taking more exercises?	Pre	15	30.0	28	56.0	7	14.0	6.325	0.000 **
	Post	0	0.0	15	30.0	35	70.0		
11- Follow a healthy eating pattern when I am away from home?	Pre	10	20.0	25	50.0	15	30.0	5.745	0.000
	Post	0	0.0	11	22.0	39	78.0		
12- Follow a healthy eating pattern when I am eating out or at a party?	Pre	13	26.0	25	50.0	12	24.0	6.252	0.000 **
	Post	0	0.0	12	24.0	38	76.0		
13- Adjust my eating plan when I am feeling stressed or anxious?	Pre	22	44.0	23	46.0	5	10.0	2.646	0.000 **
	Post	14	28.0	30	60.0	6	12.0		
14- Take my medication as prescribed?	Pre	3	6.0	11	22.0	36	72.0	3.500	0.000 **
	Post	0	0.0	0	0.0	50	100.0		
15- Adjust my medication when I am ill?	Pre	7	14.0	26	52.0	17	34.0	4.123	0.000 **
	Post	5	10.0	13	26.0	32	64.0		

Table (19) indicates that there was a highly statistically significant improvement in all concepts of patients' self efficacy scores toward different areas of diabetes treatment after implementation of the educational program ($P < 0.000$).

Figure (8): Distribution of patients with type 2 DM according to their total self efficacy toward diabetes mellitus before & after implementation of the educational program.



Mean ± SD Pre: 17.88±6.47 Post: 25.06±3.49 P (0.000)

Figure (8) show that there was a highly statistically significant improvement in total self efficacy scores with an extremely significant increase in their mean scores after implementation of the educational program ($P < 0.000$). This means that the total self efficacy scores of the studied sample has been improved significantly after applying the educational program.

Table (20): Distribution of patients with type 2 DM according to their glycemic control before & after implementation of the program.

Mean ± SD	Pre-program		Post-program		Test of Significance	
	No	%	No	%	T	P
R.B.G	206.48±81.243		196.48±51.126		1.155	0.254
A1c	8.41±1.817		7.10±.929		7.013	0.000**

(**) Highly statistically significant difference, P<0.001.

Table (20) Illustrates that there was no statistically significant difference in mean scores of random blood glucose levels after implementing the educational program (P=0.254), however there was an extremely significant difference in mean scores of hemoglobin A1c levels after applying the educational program (P < 0.000).

Figure (9): Distribution of the studied sample according to their means of glocosulated hemoglobin (A1c) before and after applying the educational program:

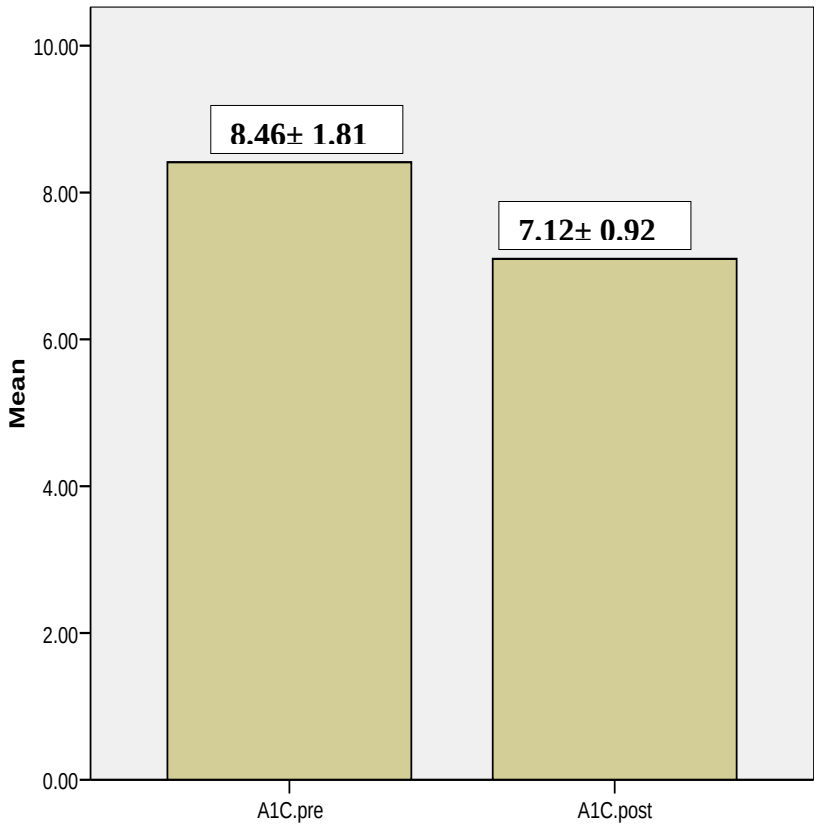


Figure (9): Reveals that, the mean scores of A1c has been decreased significantly from (8.46± 1.81) before the program to (7.12± 0.92) after applying the educational program.

Part V: Relations between variables of the study.

Table (21): Relation between duration of diabetes and complications found:

Items	Complications				Total		X^2	P-value
	Found		Not found					
	No	%	No	%	No	%		
Duration of diabetes								
< one year	2	4.0	5	10.0	7	14.0		
1-	13	26.0	5	10.0	18	36.0	15.220	0.002**
5-	13	26.0	1	2.0	14	28.0		
≥ 10	11	22.0	0	0.0	11	22.0		
Total	39	78.0	11	22.0	50	100.0		

(**) Highly statistically significant difference, P<0.001.

Table (21) Reveals that, there was a strong positive relation with a highly statistically significant difference between duration of diabetes and complications found (P = 0.002). This means that the longer the duration of diabetes, the more complications occurred.

Table (22): Relation between total patient's knowledge about different areas of treatment regimen and their socio-demographic characteristics before and after implementing the educational program:

Item	Total knowledge												X^2	P- value
	Pre-program						Post-program							
	Poor		Average		Good		Poor		Average		Good			
	No	%	No	%	No	%	No	%	No	%	No	%		
Age														
20-	0	0.0%	0	0.0	1	100%	0	0.0%	0	0.0%	1	100%	-	-
30-	11	100%	0	0.0	0	0.0%	0	0.0%	0	0.0%	11	100%	3.317	0.001**
40-50	30	78.9%	6	15.8	2	5.3%	0	0.0%	9	23.7%	29	76.3%	5.410	0.000**
Sex														
Male	11	64.7%	3	17.6%	3	17.6%	0	0.0%	4	23.5%	13	76.5%	3.391	0.001**
Female	30	90.9%	3	9.1%	0	0.0%	0	0.0%	5	15.2%	28	84.8%	5.304	0.000**
Marital status														
Single	0	0.0%	0	0.0%	1	1.00%	0	0.0%	0	0.0%	1	100.0%	-	-
Married	36	83.7%	5	11.6%	2	4.7%	0	0.0%	6	14.0%	37	86.0%	5.877	0.000**
Widowed	5	83.3%	1	16.7%	0	0.0%	0	0.0%	3	50%	3	50%	2.271	0.023*
Residence														
Urban	13	81.3%	2	12.5%	1	6.3%	0	0.0%	4	25.0%	12	75.0%	-	-
Rural	28	82.4%	4	11.8%	2	5.9%	0	0.0%	5	14.7%	29	85.3%	5.185	0.000**
Education														
Read &write	24	96.0%	1	4.0%	0	0.0%	0	0.0%	7	28.0%	18	72.0%	4.562	0.000**
Secondary	15	83.3%	2	11.1%	1	5.6%	0	0.0%	2	11.1%	16	88.9%	3.827	0.000**
University	2	28.6%	3	42.9%	2	28.6%	0	0.0%	0	0.0%	7	100.0%	2.070	0.038*
Occupation														
Retired	4	80.0%	1	20.0%	0	0.0%	0	0.0%	1	20.0%	4	80.0%	2.070	0.038*
House wife	20	90.9%	2	9.1%	0	0.0%	0	0.0%	4	18.2%	18	81.8%	4.315	0.000**
Official	5	55.6%	2	22.2%	2	22.2%	0	0.0%	1	11.1%	8	88.9%	2.428	0.015*
Worker	12	85.7%	1	7.1%	1	7.1%	0	0.0%	3	21.4%	11	78.6%	3.314	0.001**
Total	41	100.0%	6	100.0%	3	100.0%	0	100.0%	9	100.0%	41	100.0%		

(*) Statistically significant difference , P<0.05

(**) Highly statistically significant difference, P<0.001.

(***) Extremely significant difference, P < 0.0001.

Table (22) Illustrates that, all socio-demographic characteristics had a highly statistical significant effect on patients' knowledge scores after implementation of the educational program (P< 0.001).

Table (23): Relation between total patient's practice during different areas of treatment regimen and their socio-demographic characteristics before and after implementing the educational program:

Item	Total practice												X^2	P-value
	Before						After							
	Poor		Average		Good		poor		Average		Good			
	No	%	No	%	No	%	No	%	No	%	No	%		
Age														
20-	0	0.0%	1	100.0%	0	0.0%	0	0.0%	0	0.0%	1	100%	-	-
30-	11	100%	0	0.0%	0	0.0%	1	9.1%	3	27.3%	7	63.6%	2.919	0.004**
40-50	38	100%	0	0.0%	0	0.0%	3	7.9%	5	13.2%	30	78.9%	5.601	0.000**
Sex														
Male	16	94.1%	1	5.9%	0	0.0%	1	5.9%	1	5.9%	15	88.2%	3.819	0.000**
Female	33	100%	0	0.0%	0	0.0%	3	9.1%	7	21.2%	23	69.7%	5.069	0.000**
Marital status														
Single	0	0.0%	1	100.0%	0	0.0%	0	0.0%	0	0.0%	1	100.0%	-	-
Married	43	100%	0	0.0%	0	0.0%	3	7.0%	6	14.0%	34	79.1%	5.973	0.000**
Widowed	6	100%	0	0.0%	0	0.0%	1	16.7%	2	33.3%	3	50.0%	2.070	0.038*
Residence														
Urban	16	100.0%	0	0.0%	0	0.0%	1	6.3%	3	18.8%	12	75.0%	-	-
Rural	33	97.1%	1	2.9%	0	0.0%	3	8.8%	5	14.7%	26	76.5%	5.200	0.000**
Education														
Read & write	25	100.0%	0	0.0%	0	0.0%	2	8.0%	5	20.0%	18	72.0%	4.460	0.000**
Secondary	18	100.0%	0	0.0%	0	0.0%	2	11.1%	3	16.7%	13	72.2%	3.755	0.000**
University	6	85.7%	1	14.3%	0	0.0%	0	0.0%	0	0.0%	7	100.0%	2.530	0.011*
Occupation														
Retired	5	100.0%	0	0.0%	0	0.0%	2	40.0%	1	20.0%	2	40.0%	1.633	0.102
House wife	22	100.0%	0	0.0%	0	0.0%	1	4.5%	4	18.2%	17	77.3%	4.291	0.000**
Official	8	88.9%	1	11.1%	0	0.0%	1	11.1%	1	11.1%	7	77.8%	2.640	0.008**
Worker	14	100.0%	0	0.0%	0	0.0%	0	0.0%	2	14.3%	12	85.7%	3.557	0.000**
Total	49	100.0%	1	100.0%	0	100.0%	4	100.0%	8	100.0%	38	100.0%		

(*) Statistically significant difference , P<0.05

(**) Highly statistically significant difference, P<0.001.

(***) Extremely significant difference, P < 0.0001.

Table (23) Reveals that, all socio-demographic characteristics had a highly statically significant effect on patients as practices' scores after implementation of the educational program (P< 0.001).

Table (24): Relation between total self efficacy of diabetic patients and their socio-demographic characteristics before and after implementing the educational program:

Item	Total self efficacy												X^2	P-value
	before						After							
	Poor		Average		Good		poor		Average		Good			
	No	%	No	%	No	%	No	%	No	%	No	%		
Age														
20-													-	
30-													2.07	
40-50	0	0.0	0	0.0%	1	100%	0	0.0%	0	0.0%	1	100.0%	0	-
	2	18.2%	3	27.3%	6	54.5%	0	0.0%	0	0.0%	11	100.0%	4.24	0.038*
	13	34.2%	10	26.3	15	39.5%	1	2.6%	3	7.9%	34	89.5%	4	0.000**
Sex														
Male													2.12	
Female													1	
	3	17.6%	3	17.6%	11	64.7%	1	5.9%	1	5.9%	15	88.2%	4.23	0.034*
	12	36.4%	10	30.3%	11	33.3%	0	0.0%	2	6.1%	31	93.9%	5	0.000**
Marital status														
Single													-	
Married													4.34	
Widowed	0	0.0%	0	0.0%	1	100.0%	0	0.0%	0	0.0%	1	100.0%	4	-
	12	27.9%	12	27.9%	19	44.2%	1	2.3%	2	4.7%	40	93.0%	1.85	0.000**
	3	50.0%	1	16.7%	2	33.3%	0	0.0%	1	16.7%	5	83.3%	7	0.063*
Residence														
Urban													-	
Rural	3	18.8%	4	25.0%	9	56.3%	0	0.0%	0	0.0%	16	100.0%	4.05	-
	12	35.3%	9	26.5%	13	38.2%	1	2.9%	3	8.8.0%	30	88.2%	3	0.000**
Education														
Read& write													4.05	
Secondary													3	
University													2.07	
	10	40.0%	10	40.0%	5	20.0%	0	0.0%	2	8.0%	23	92.0%	0	0.000**
	5	27.8%	1	5.6%	12	66.7%	1	5.6%	1	5.6%	16	88.9%	1.41	0.038
	0	0.0%	2	28.6%	5	71.4%	0	0.0%	0	0.0%	7	100.0%	4	0.157
Occupation														
Retired													1.63	
House wife													3	
Official													3.87	
Worker													4	
	2	40.0%	2	40.0%	1	20.0%	1	20.0%	0	0.0%	4	80.0%	1.89	0.102
	9	40.9%	9	40.9%	4	18.2%	0	0.0%	3	13.6%	19	86.4%	0	0.000**
	3	33.3%	1	11.1%	5	55.6%	0	0.0%	0	0.0%	9	100.0%	1.34	0.059*
	1	7.1%	1	7.1%	12	85.7%	0	0.0%	0	0.0%	14	100.0%	2	0.180
Total	15	100.0%	13	100.0%	22	100.0%	1	100.0%	3	100.0%	46	100.0		

(*) Statistically significant difference , P<0.05

(**) Highly statistically significant difference, P<0.001.

Table (24) Reveals that, all socio-demographic characteristics had a highly significant difference effect on patients as regard to their self efficacy scores after implementation of the educational program (P< 0.001).

Table (25): Relation between means of A1c levels & total knowledge, practice, and self efficacy scores of diabetic patients before and after implementation of the program:

Items	No	%	A1c levels		Test of Significance	
			Pre-program	Post-program		
			Mean ± SD	Mean ± SD	P1	P2
Knowledge						
Pre-program						
Poor	41	82.0%	8.42 ± 1.94	7.09 ± 0.91	0.962	0.000***
Average	6	12.0%	8.48 ± 0.94	7.43 ± 1.13		
Good	3	6.0%	8.13 ±1.80	6.53 ± 0.85		
Post-program						
Average	9	18.0	10.59 ± 2.02	7.76 ± 0.95	0.396	0.01*
Good	41	82.0	7.94 ± 1.39	6.95 ± 0.87		
Practice						
Pre-program						
Poor	49	98.0%	8.46 ± 1.81	7.12 ± 0.92	0.267	0.03*
Average	1	2.0%	6.40 ± 0.0	5.90 ± 0.0		
Post-program						
Poor	4	8.0%	9.53 ± 0.97	7.63 ± 0.59	0.196	0.05*
Average	8	16.0%	9.60 ± 1.87	7.66 ± 1.03		
Good	38	76.0%	8.05 ± 1.75	6.92 ± 0.88		
Self-efficacy						
Pre-program						
Poor	15	30.0%	8.59 ± 2.11	7.29 ± 1.04	0.53	0.56
Average	13	26.0%	8.75 ± 1.97	7.32 ± 0.95		
Good	22	44.0%	8.09 ± 1.53	6.83 ± 0.80		
Post-program						
Poor	1	2.0%	7.00 ± 0.0	6.10 ± 0.0	0.19	0.55
Average	3	6.0%	9.20 ± 1.56	7.03 ± 0.21		
Good	46	92.0%	8.39 ± 1.84	7.12 ± 0.96		

N.B: P1 for pre test & P2 for post test.

(*) Statistically significant difference , P<0.05
(***) Extremely significant difference, P < 0.0001.

Table (25) Shows that patients' knowledge and practices had a significant effect on their A1C levels after implementation of the educational program, however A1C levels didn't influenced by their self efficacy scores.

Table (26): Correlation co-efficient between total knowledge of patients with type 2 DM and their practices and self efficacy before and after the educational program:

Item	Total knowledge			
	pre		Post	
	T	P	T	P
Total practice				
Pre	0.479	0.000***		
Post			0.657	0.000***
Total self efficacy				
Pre	0.510	0.000***		
Post			0.405	0.000***

(***) Extremely significant difference, P < 0.0001.

Table (26) shows that patients' knowledge correlated positively with their practices and self efficacy.

Table (27): Correlation co-efficient between total practice of patients with type 2 DM and their self efficacy before and after the educational program:

Item	Total self efficacy			
	pre		Post	
	T	P	T	P
Total practice				
Pre	0.479	0.000***		
Post			0.657	0.000***

(***) Extremely significant difference, P < 0.0001.

Table (27) Shows that self efficacy scores of the studied sample correlated positively with their practices.

Figure (10): Correlation co-efficient between mean scores of random blood glucose & A1c levels before implementing the educational program

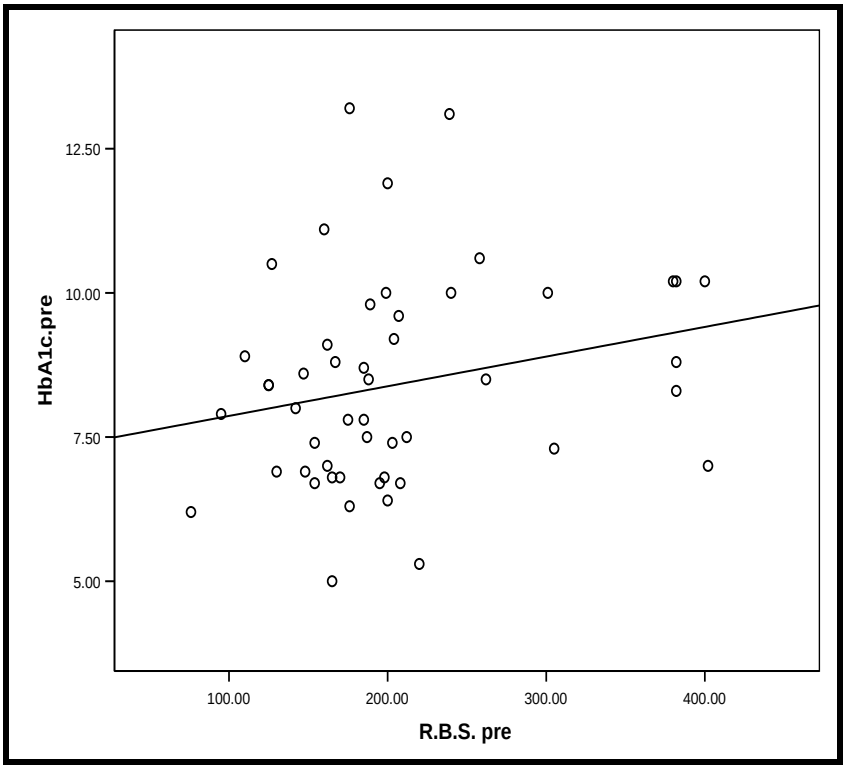


Figure (10) Shows that, there was a positive correlation with a statistical significant difference between mean scores of random blood glucose & A1c levels before implementing the educational program. The higher the RBS, the higher the A1C. P value (0.0001).

Figure (11): Correlation co-efficient between mean scores of random blood glucose & HbA1c levels after implementing the educational program

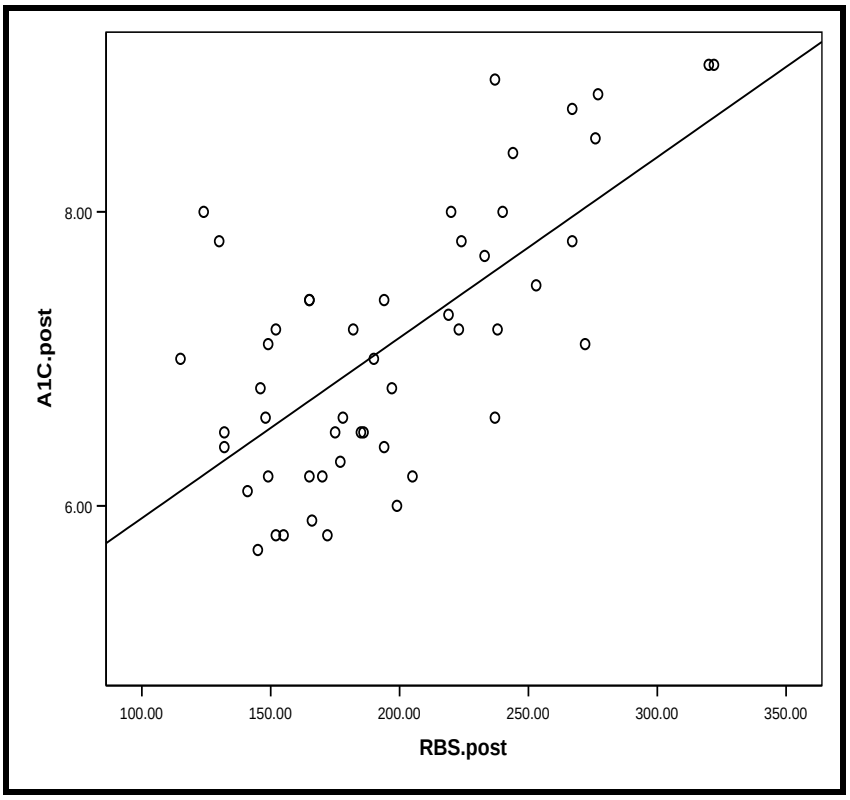


Figure (11): Reveals that, there was a strong positive correlation with an extremely statistical significant difference between mean scores of random blood glucose & A1c levels after implementing the educational program. The lower the RBG, the lower the A1C. P value (0.0001).