

Impact of Educational Health Intervention on Diabetic Control among Elderly Diabetics

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Abstract

Background: Diabetes in the elderly is emerging as one of the most important public health problems of the 21st century. In developing countries, the majority of people with diabetes are in the age range of 45-64 years. **The aim of the study** was to assess knowledge and practices of the elderly diabetic patients and Plan, implement and evaluate the effect of health educational intervention on the control of diabetes among elderly. **Subject & Methods:** **Research design:** A quasi-experimental design . **Setting:** The study was conducted at the diabetic out-patient clinic, Ismailia University Hospitals followed by home visit to elderly. **Subjects :** A purposive of 100 elderly diabetic. **Tools of Data Collection:** Four types of tools were used for collecting data, include, questionnaire, anthropometric measurement, food roster, observation sheet. **Results:** revealed present of statistical significant difference between pre-post and follow up the level of knowledge among the study subjects in all items of knowledge ($P < 0.000$). Also significant statistical difference of all items of nutrition between pre, post and follow up post health education intervention. Also, elderly practice improved regard practice of blood sugar analysis and foot & nail care. **Conclusion:** the elderly knowledge & practice related to diabetic control improve post health education intervention. **Recommendation:** Health education of elderly & their caregiver about diabetes control, booklets contain information about diabetes & its management should be available in all health care setting.

Key words: Diabetic Control, Elderly Diabetics, interventions for diabetes.

1. Introduction:

Aging is gradual, irreversible changes in the structure and function of an organism that occur as a result of the passage of time. Old age begins with the deterioration of physical abilities such as sight, hearing, walking (stick required)⁽¹⁾. Older adulthood traditionally begins after retirement, usually between 65 and 75 years of age. The number of people in this age group is increasing ⁽²⁾.

The aging process is associated with varied hazards, due to progressive impairment of physiological functioning and pathological changes and their sequel⁽³⁾. Aging doesn't inevitably lead to disability and dependence. Most older people remain functionally independent despite the increasing prevalence of chronic diseases⁽⁴⁾.

Worldwide, the number of people 65 or older is increasing faster than ever before. Most of this increase is occurring in developed countries⁽⁵⁾.

The percentage of the Elderly population (65+) in Egypt increased from 3.0 per cent in 1950 to 5.5 per cent in 2005 and remained as such in 2010. It is projected to continue increasing to reach 12.3 per cent in 2050⁽⁶⁾.

The numbers of older people are growing in our society. There are many illnesses that occur in association with age⁽⁷⁾. The most common chronic conditions are hypertension, diabetes, arthritis and cardiac problems. Diabetes mellitus is one of the most common chronic diseases which can lead to serious

complications affecting quality of life and life span⁽⁸⁾.

Egypt will have at least 8.6 million adults with diabetes. Diabetes is the eleventh most important cause of premature mortality in Egypt, and is responsible for 2.4% of all years of life lost (YLL). Similarly, diabetes is the sixth most important cause of disability burden in Egypt⁽⁹⁾.

Diabetes is associated with reduced life expectancy, significant morbidity due to related micro vascular complications, increased risk of macro vascular complications (ischemic heart disease, stroke and peripheral vascular disease), and diminished quality of life⁽¹⁰⁾. With the growing prevalence of overweight and obesity in Egypt. National health programmers are urgently required to educate the public on the importance of maintaining an optimal body weight⁽¹¹⁾.

The prevalence of diabetes increases with wealth, even after adjustment for educational level. In countries which are currently industrializing, the highest rates of diabetes are found in higher socio-economic groups, probably due to increasing obesity related to changes in diet, and reduced physical activity⁽¹²⁾.

Mass health education programmer should be implemented to reduce obesity as an important risk factor of diabetes. Patient education is critical in the management of diabetes in the elderly.⁽¹³⁾

Community nurses play several key roles in the diabetes prevention and treatment and community nurses are responsible for providing education to diabetics regarding self-care, nutrition and general disease management. Public awareness of diabetes must be raised by community nurses to encourage early recognition of symptoms and prevent new cases⁽¹⁴⁾.

Significance of study

With the passing of the time, the number of elderly people will go on

increasing at much faster rate than the total population. And elderly people are often more frail and susceptible to the occurrence of the disease such as diabetes. And many complications occur related to diabetes and harder to manage. Also diabetes and aging, increase the risk of arteriosclerosis and cardiovascular mortality. Diabetes further increases the risk of cardiovascular mortality in older people

Furthermore, exercise and adopting a diet can be more difficult for elderly people, and problems can arise in these areas So community health nurse has an excellent chance to perform this educational role through for diabetic elderly in different community health services or through home visits. And special efforts are necessary in the villages and rural areas where education and awareness is limited particularly in the older generation.

Aim of study:

The aim of the present study is to assess knowledge and practices of the elderly diabetic patients and evaluate the effect of health educational intervention on control of diabetes among elderly.

Research Hypothesis:

Health education intervention will improve elderly knowledge and practice related to control diabetes among elderly diabetic patient.

Subjects & Methods

Study Design:

A quasi-experimental research design was used with pre/post assessment of the impact of health

education intervention on diabetic control among elderly diabetics.

Study Settings:

The study was conducted at the diabetic out-patient clinic, Ismailia University Hospitals followed by home visit to elderly.

Study Subjects:

A purposive sample of elderly

The elderly patients were selected based on the following criteria

Inclusion criteria:

- Age (60 years and above).
- Male and female workers.
- Not institutionalized or bed ridden.
- Total sample 100 elderly diabetic

Tools of data collections:

The scoring system of observation checklist consisted of giving one for step done correctly & zero for not done the total score for blood analysis for sugar and foot & nail care. The total score for blood sugar was 15 parts and for foot & nail care was 11 parts.

An questionnaire (pre- post format)

A questionnaire sheet was prepared for the purpose of assessing elderly knowledge about diabetes. Develop of the questionnaire was guided by relevant articles in periodical, scientific lectures, and the internet. It was composed 3 parts:

- Part I:

This part concerned with demographic characteristics of the study subject as age, residency, level of education, source of income, social class, marital status, psychological, health status.

-Part II:

Entails knowledge about the diabetes, such as duration of disease, medication, and reason for coming to the outpatient clinic.

-Part III:

This part composed of questions about elderly diabetic knowledge about diabetes, such definition, causes, sign increase glucose in blood & its sings, also singe of hypoglycemia, causes, how to deal with complication, and how to carry the blood sugar analysis, medication taken, diet, physical exercises, personal hygiene(bathing, food & nail care, part identification card ect.

Anthropometrics measurement

For weight and height were used for every diabetic patient before and after the health education intervention for all elderly diabetic patients using weighing scales to weight the subjects before and after the program. Standing adult scale tapes were used to measure the heights of subjects.

- Blood analysis for sugar will be carried out pre and post intervention.

Food roster pre & post:

Assessment of knowledge and practices (pre-post test). The contents of this questionnaire covered knowledge and practices were related to knowledge, to the meals received by elderly throughout the day and composition of each meal

Observation sheet:

It was developed by the investigator. Its aim was to assess teaccuracy of practical profile of the patient. It consists of two sections the first section includes a Checklist for blood analysis for sugar & insulin injection it consisted of Fifteen steps. The second section includes a checklist for Foot and nail care it consisted of eleven steps.

• Preparatory phase:

Construction of the health education intervention, the first step in contracting this program was to determine the objectives. A review of the past, current related literature, covering various aspects of elderly diabetics in addition to use available books, articles, periodicals magazines, and internet search, to get acquainted with the research

problem and develop the study tools, and intervention content.

Content Validity & reliability :

The tool was distributed among a group of experts (three in the field of community health nursing), and (two of occupational medicine), (two of medical surgical). The researcher made all modifications . The reliability of the modified scale, this was done using the internal consistency method. The reliability proved to be high with Acronbach alpha coefficient 70.8.

Field work:

Data were collected from July 2013 up to the end of Mars 2014. It was carried out by the researcher for elderly diabetics in the outpatient clinic carried at Ismailia University hospital, an official approval was obtained from the study setting to carry out the study. A clear explanation was given about the nature, and the expected outcomes of the study. The researcher started to collect data and explain the objectives of the study during the interview. The researcher started each phase with a summary of a previous one. The researcher used different teaching strategies, evaluate elderly knowledge and practice pre – post implementation of the program.

1. Assessment phase:

The researcher first introduced herself and explained the purpose of the study briefly to the elderly diabetes. Every elderly diabetes was met individually and an oral consent for participation was obtained. The elderly diabetes, was assured that the obtained information will be treated confidentially, and used only for the purpose of the study. The researcher reads, explained each items of the study scales in front of the elderly diabetes separately and recorded his/her responses to each item. The time consumed for answering the study questionnaire ranged from 45-60 minutes. The time in which the data were collected was at the

beginning of July 2013 end an mars 2014.

2. Planning phase:

Based on the result obtained from the assessment phase, the researcher designed the health education intervention session contents according to the elderly diabetes needs. The health education intervention sessions were developed after reviewing of related literature. Detected needs, requirements and were clarified and discussed in the form of a booklet. The contents of the booklet were selected on the base of identifying needs. The booklet consisted of two main parts, the first theoretical part included knowledge about diabetes, such as definition, types, signs and symptoms, Causes, complications, hyperglycemia, hypoglycemia, identifying diagnosis, Exercise, nutrition, treatment, and discussing the management of diabetes.

The second part is a practical, which included, Analysis of blood sugar, Preparation of insulin & areas of injecting insulin. Foot & nail care.

Teaching methods:

Include lecture and discussion, question and answer, demonstration, give life situation examples, brain storming, role-play and reinforcement were frequently applied during sessions. Media such as PowerPoint; pictures, and handbook prepared by the researcher.

3. Program implementation phase:

The individual interviewing questioner sheet was applied pre – and post – test with each patient, which took 30 – 45 minutes. Educational program with target group was started, and the study group was divided into three subgroups (15 -20 elderly diabetic patients). The educational program was divided into session, each

session look 45 – 60 minutes and was applied three times /week. So, it look 6 month period.

To ensure that the elderly diabetes understands the booklet content, each session started by a summary about what was given through the previous session and objectives of the new one, taking into consideration the use of simple language to .Suite the educational level of elderly diabetes; motivation and reinforcement techniques as praise, recognition during the session were used to enhance motivation and learning.

To ensure exposure of all subjects to the same learning experience, all members received the same content using same teaching methods, discussion and same booklet. The session was aided by using pictures, posters and the booklet.

The sessions were done according to the following schedule:

1st session: (Time: 45-30 min)

During the initial session the researcher explained the aim of the study, determine the meeting time that was one time/week and give a pre - assessment.

2nd session: (Time: 45-30 min)

This session focused on the disease process. The main objectives were to identify the definition of diabetes, type, cause and symptom.

3rd session: (Time: 45-30 min)

The focus of this session was to provide knowledge about High blood sugar, such as definition of high blood sugar, cause, symptom, .And treatment.

4th session: (Time: 45-30 min)

The focus of this session was to explain low blood sugar, cause and symptoms, and treatment.

5th session: (Time: 45-30 min)

This session focus on knowledge concerning the complications of diabetes in elderly.

6th session: (Time: 45-30 min)

This session focuses on knowledge importance of sport and - Mention of reserves, which given to the elderly during sports exercise.

7th session: (Time: 45-30 min):

This session focus on knowing about balance diet, mentioned example to certain meals need for diabetic elderly.

8th session: (Time: 45-30 min)

This session focuses on knowledge, scientific method for the analysis of blood sugar

9th session: (Time: 45-30 min)

This session focus on knowledge for knowing the preparation of insulin and locations give

10 sessions: (Time: 45-30 min):

This session focus on continue health education for information about foot care & nail care.

11 sessions: (Time: 45-30 min):

The focus of this session was to help the elderly to acquire

12 sessions: (Time: 45-30 min):

This session focuses on knowledge about explaining how to prepare a complete balanced meal

4. Evaluation phase:

Evaluation of the health education intervention protocol was done immediately after its implementation by using the knowledge assessment, through applying the same tools of post-test to evaluate the degree of knowledge and effectiveness of health education program on elderly diabetes patient practice

Pilot study:

A pilot study was performed on 10 % elderly diabetics, males and females, to evaluate the content of the tools. A pilot study was used to assure clarity of questions, to remove any ambiguity, also helped to estimate the time required for application of the tools and to provide the program. Those who shared in the pilot were excluded from the main sample after modification of the tools.

Administrative & ethical consideration:

Permission to conduct the study was obtained by submission of an official letter issued from the Dean of the Faculty of Nursing Suez canal University to the director of Suez Canal University Hospital. The researcher visited this setting, met with the director of outpatient client safety, explained the study aim and procedures and asked for their agreement to carry out the study and their cooperation.

The agreement for participation of the subjects was taken after the aim of the study explained to them, they were given an opportunity to refuse participated, they were notified that could withdraw at any time stage of the research, also they were assured that the information would renower confidential and used for the research purpose only.

Statistical Design:

The collected data were coded and entered in a data base file using the foxporo for windows program. After complete entry, data were transferred to the SPSS a version 10.0 program by the analysis was conducted applying frequency tables with percentage and cross tabulation. The tests used were chi-square, wilcoxon test, mean & standard deviation, paired t-test. For all statistical tests, the significance level was set at p-value <0.05.

Results :

Table (1): shows sociodemographic characteristics of the **studied** subjects. The table showed more than half of the studied subject (52.0%) were at the age of 60 years old, and 48% of them there age between 65 years old and 73 years old. Concerning residence more than half of study subjects (70.0%) come from urban area and 41.0% of them had basic education. The table also indicates that the majority of study subjects (66.0%) belonged to middle social class.

Fig: (1): portray the source of information about diabetes were relatives, physician and neighbors (50%, 40% &10% respectively).

Table (2): reveals a statistical significant difference between pre-post and flow satisfactory level of knowledge among the study subjects in all items of knowledge ($P=<0.000$). This high percentage of knowledge at the post and flow health education intervention were for symptoms of diabetes and causes of high blood sugar. While the lowest percentage for definition, types and causes of diabetes respectively.

Table (3): flow of the table shows none of study subjects mentioned complete, correct answer about how to deal with foot injury at pre intervention while post, flow intervention their statistically significant difference in elderly knowledge about how to prevent foot problem as foot damage , cuts, blisters can become serious infections . severe damage might require toe, foot or even leg amputation. ($P. < 0:000$).

Table (4): According the table present of statistically significant difference betweenstudy, elderly knowledge related tothe investigation need for their diabetic condition ($P = 0.0001$) except for the method used for analysis and source of their knowledge about the investigation.

Table (5): indicates improvement in elderly mean knowledge about the compositions of each meal throughout the intervention phases.

Table (6): reveales statistically significant difference in elderly total mean scores of all items of knowledge about diabetes throughout the program phases ($P=0.000$).

Table (7): indicates presence of statistically significant difference among the study, elderly practice

regarding blood sugar analysis, given insulin injection and foot care analysis throughout the intervention phase ($P = 0.000$).

Discussion:

The study revealed that nearly half of elderly diabetic patients at age 60 year. This result is in agreement with Abdo and Mohamed⁽¹⁵⁾, who studied the effectiveness of health education program for type 2 diabetes mellitus patients attending Zagazig university diabetes clinic and found that the life expectancy of males jumped to be 60.4 years and 62.8 years of females, as 61.0 in the year 2000 for males and 69.5 for females, which reflected better health services in our Egyptian community.

As regards to gender, the results of the present study showed that, male patients represent more than female. These findings were in disagreement with Jared⁽¹⁶⁾, who found that the most of their patients shared in their studies were females.

As regard to marital status the result of this study showed that more than three quarters of patients were married. On the same line with Jossey⁽¹⁷⁾, who mentioned that the majority of patients were married, and this finding might be due to same age groups of the studied sample.

Regarding residence, the results of this study revealed that more than half of the study sample were from urban areas. This was disagreement with Shokry⁽¹⁸⁾, he carried out his study to identify the effect of his educational program on elderly diabetic patients at Zagazig university hospitals, he reported that the majority of their studied subjects from rural area, this may be due to the rural population had low medical services in their places so they go to Zagazig University hospitals to received medical services.

Concerning the educational level of the studied sample, the result of current study showed that the majority of patients had illiterate and basic education This was in agreement with Abd El Aziz⁽¹⁹⁾, who studied knowledge and health behaviors of the elderly

regarding osteoporosis. Faculty of Nursing, Alexandria University. He reported that more than two third of the study sample were illiterate.

As far as source of income it was found that the majority of study sample depend on pension source of their income and less than half of the studied elderly mentioned the income after pension sufficient, the same percentage reported it was insufficient. This finding was in the same line with William and Hiris⁽²⁰⁾, who reported that pension represented the highest percentage of the source of income of the elderly people of both sexes (66% and 54% respectively).

As far as the social level, it was found that more than two third of the study sample belonged to intermediate social class. This finding was accordance the study of Lcc⁽²¹⁾, who reported that the rural elders in Africa suffer from high rates of poverty, and belonged to low or middle social class.

Concerning the elderly source of knowledge about DM, half of them mentioned their relative and nearly less than half the physician. Fass⁽²²⁾, stated that most of the important therapeutic measure offered by the physician to individuals with diabetes as follow-up and counseling on nutritional matters and learning self-analysis for urine.

Pre intervention assessment of elderly knowledge about diabetes, definition, causes, single & symptom, causes of hypo & hyperglycemia revealed lack of their knowledge about two items but post health education intervention there were significant statistically difference between pre – post elderly knowledge about diabetes Which prove the effect of health education program on improved their knowledge about diabetes.

This finding was supported with Hooks and Bell⁽²³⁾, who found that the majority of diabetic patients had poor knowledge in pretest, while they had good score of knowledge in post test after the program. Fass⁽²²⁾ added the

evaluation of the diabetes education program was carried out by comparing the knowledge the patients obtained about their disease before and after the educational program.

Regarding to knowledge elderly diabetic about diabetic complications it was found that the majority of the diabetic patients had poor knowledge scores in pre test and most of the patients had good knowledge after health education intervention and became aware about complications. The results accordance to Pamela and Nyhlin⁽²⁴⁾, who studied the Knowledge of Diabetes, its Treatment and Complications amongst Diabetic Patients in a Tertiary Care Hospital in England, and found that there was statistical significant difference between pre and post test. It was found three quarter of diabetic in his sample didn't know diabetic complication before the health education. This result also supported by Nick and Michool⁽²⁵⁾, who reported that diabetics have to recognize the complications of the disease in order to be able to take measures lifesaving.

The current study showed that there was significant deficiency in elderly diabetic knowledge about investigations practice in pre program as knowing how to analyze for blood sugar, method used, who learned you, analyze blood sugar daily, doing investigations at lab, keep the results while post conducting the program there were improvement in knowledge regarding to the investigations practice. The results go with Charles and Griffi⁽²⁶⁾, who found that there was statistical significant difference between pre and post test. And majority of the elderly patients didn't know how to analyze for blood sugar. Also disagree with Abd El Aziz⁽¹⁹⁾, who found that the doctor was the main source of information either in theory or practice.

In present study indicate improvement in elderly mean knowledge about the composition of each meals throughout the

intervention phases. The finding of results revealed presents of statistically significant difference in elderly knowledge in relation to the correct items of food composition in each meals in pre, post and follow up phase. This findings agree with Pollock and Kirkman et al.⁽²⁷⁾, who found that dietary treatment is an integral part on overall therapeutic plan in all-diabetic patients. Also, Dupuis⁽²⁸⁾, stated that diet management was the most difficult component of compliance for diabetic patients.

Regarding pre, post and follow up test among study sample, it was found statistically significant difference in elderly total mean score of all items of knowledge (general knowledge, lab investigations, medication, nutrition, physical activities, foot care, total knowledge) about diabetes through phase of intervention. This result is in agreement with Craig⁽²⁹⁾, who found the importance of formal process of education in caring enormous advantage to the health and life of diabetic patient and consequent social and economic advantages to society. Lubitz and Caiet et al.⁽³⁰⁾, added that the increasing of knowledge and decreasing the feeling of uncertainty are essential for new adoption. This finding was supported with what was found by Dupuis⁽²⁸⁾, who reported that the diabetic patients have unsatisfactory knowledge about their disease before health education program.

Regarding the total mean score of practice among the study diabetic elderly (for blood sugar analysis, insulin injection, foot & nail care ect..). throughout the program revealed statistical significance difference in all items, and elderly total mean score of practice improve post health education intervention. This finding goes in same line with studies conducted by Pollock et al and Desalu et al^{(27),(31)}, their finding reveal the total mean score of patient practice regarding blood sugar analysis, foot & nail care increased post implementation of

training program about how to perform sugar analysis, foot & nail care in USA and Canada.

Conclusion:

Based on the study funding, it could be concluded that the elderly diabetic patient had insufficient knowledge and practice about diabetics, causes, complication, dietary regimen, and management of hypoglycemia, also in proper practice of given insulin injection, blood sugar test and foot and nail care.

Implement health education intervention about control of diabetes among elderly lead to improve elderly knowledge and practice for controlling diabetics among study elderly.

Recommendations:

- Educational programs for both diabetic elders and their caregivers about diabetes and its management

in order to increase and update their knowledge and skills needed to apply self care practices. Special attention and reinforcement should be paid to the areas of less adherence as physical exercises, oral care, and self monitoring of blood glucose.

- Booklet contain information about diabetics, care, prevention of complication should be available in all health care setting.
- Educate elderly & care giver about important of periodical medical examination to detect any complication.
- Diabetes identification card should be given to every diabetic patient. It should include name, address, telephone number, diagnosis, and what must be done in case of emergency.

Table (1) : Number and percent distribution of study sample of elderly diabetic patient according to their socio-demographic characteristic (No = 10).

Items	No.	%
Age (years)		
60-	52	52.0
65-73	48	48.0
Gender		
Male	55	55.0
Female	45	45.0
Marital status		
Married	71	71.0
Widow	29	29.0
Residence		
Urban	70	70.0
Rural	30	30.0
Level of education		
Illiterate	39	39.0
Basic education	41	41.0
Secondary education	10	10.0
University education	10	10.0
Source of income		
Pension	59	59.0
Pension & aids	31	31.0
Private resources	10	10.0
Income after pension		
More than sufficient	20	20.0
Sufficient	40	40.0
Insufficient	40	40.0
Social level		
High	25	25.0
Middle	66	66.0
Low	9	9.0

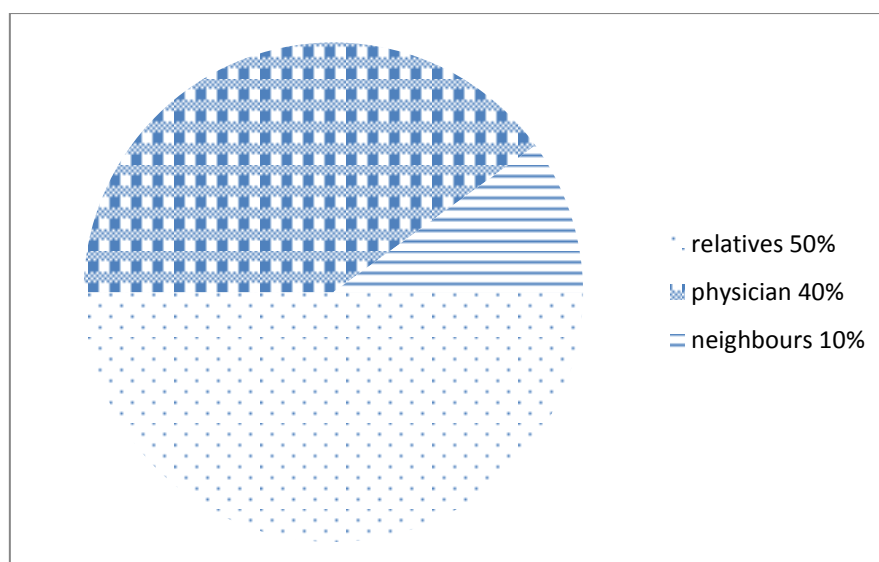


Figure 1 : source elderly knowledge about diabetes.

(Table 2): Number and percent distribution of study sample of elderly diabetic patient according to diabetes mellitus knowledge items. (N = 100)

knowledge about diabetes	Pre		Post		FU		Post
	No	%	No	No	%	No	P2
Definition							
▪ Wrong answer /don't know	40	40	10	10	10	10	0.000*
▪ Complete correct answer	0	0	30	30	40	40	
Types							
▪ Wrong answer /don't know	60	60	20	20	10	10	0.000*
▪ Complete correct answer	10	01	30	30	40	40	
Causes							
▪ Wrong answer /don't know	59	59	20	20	10	10	0.000*
▪ Complete correct answer	10	10	10	10	30	30	
Symptoms							
▪ Wrong answer /don't know	0	0	0	0	0	0	0.000*
▪ Complete correct answer	40	40	70	70	80	80	
Causes of high blood sugar							
▪ Wrong answer /don't know	0	0	0	0	0	0	0.000*
▪ Incomplete correct answer	100	100	50	50	50	50	
▪ Complete correct answer	0	0	50	50	50	50	

X^2 : Friedman test for related samples

* P < 0.05 (significant)

Table (3): Number and percent distribution of study sample of elderly diabetic patient according to complications of diabetes Foot problems (N = 100).

Foot problem	Pre		Post		FU		χ^2	P
	No	%	No	%	No	%		
Present of any foot problems								
Yes	30	30.0	30	30.0	20	20.0	30.2	0.000*
No	70	70.0	70	70.0	80	80.0		
Dealing with injury								
Wrong answer /don't know	50	50.0	30	30.0	10	10.0	31.5	0.000*
Incomplete correct answer	50	50.0	70	70.0	90	90.0		
Complete correct answer	0	0.0	0	0.0	0	0.0		
Prevention of occurrence								
Wrong answer /don't know	20	20.0	0	0.0	0	0.0	35.7	0.000*
Incomplete correct answer	69	69.0	40	40.0	40	40.0		
Complete correct answer	11	11.0	60	60.0	60	60.0		

 χ^2 : Friedman test for related samples

* P < 0.05 (significant)

Table (4): Number and percent distribution of study sample of elderly diabetic patient according to their knowledge about investigation throughout the intervention (N = 100).

Knowledge about investigation	Pre		Post		FU		χ^2	P
	No	%	No	%	No	%		
Analyze for blood sugar								
▪ No	61	61.0	30	30.0	20	20.0	35.4	0.000*
▪ Yes	39	39.0	70	70.0	80	80.0		
The method used								
▪ Others	21	21.0	20	20.0	10	10.0	7.2	0.187
▪ Strips	79	79.0	80	80.0	90	90.0		
Source of knowledge								
▪ Physician	21	21.0	20	20.0	20	20.0	5.6	0.241
▪ Nurse	30	30.0	30	30.0	30	30.0		
▪ Relatives	49	49.0	50	50.0	50	50.0		
Do perform blood sugar dail								
▪ No	90	90.0	90	90.0	60	60.0	0.0	1.000
▪ Yes	10	10.0	10	10.0	40	40.0		
Investigations at lab								
▪ Yes	60	60.0	60	60.0	60	60.0	0.0	1.000
▪ No	40	40.0	40	40.0	40	40.0		
Keep the results								
▪ Yes	40	40.0	60	60.0	60	60.0	0.0	1.000
▪ No	60	60.0	40	40.0	40	40.0		

 χ^2 : Friedman test for related samples

* P < 0.05 (significant)

Table (5): The elderly diabetic mean knowledge about food element in each meal throughout the intervention.

Items	Phase						F	P
	Pre		Post		FA			
	Mean	SD	Mean	SD	Mean	SD		
Breakfast								
Prot	13.5	4.5	12.0	3.0	10.9	4.9	10.1	0.000*
CHO	10.5	4.5	10.7	4.1	7.5	3.1	22.6	0.000*
Fat	6.9	3.3	6.2	3.1	5.4	2.3	52.7	0.000*
Vit	19.2	2.0	16.1	3.3	16.8	3.4	51.3	0.000*
Lunch								
Prot	11.1	3.3	10.3	5.5	13.5	4.5	51.4	0.000*
CHO	10.0	4.6	7.8	2.8	10.4	4.5	53.0	0.000*
Fat	5.7	3.1	5.4	2.3	6.8	3.3	52.4	0.000*
Vit	16.9	3.6	16.8	3.4	19.2	2.0	51.8	0.000*
Dinner								
Prot	10.8	4.9	13.2	4.7	11.1	3.3	52.1	0.000*
CHO	7.4	3.1	10.7	4.5	9.8	4.7	48.6	0.000*
Fat	5.4	2.3	7.1	3.4	5.6	3.1	41.7	0.000*
Vit	16.7	3.3	16.8	3.4	16.7	3.6	0.03	0.868

F: repeated measures ANOVA* P < 0.05 (significant)

Table (6): The total mean score of all items of knowledge about diabetes among the study elderly throughout the intervention phase.(N =100).

Knowledge items	Study phase						F	P
	Pre		Post		FU			
	Mean	SD	Mean	SD	Mean	SD		
General knowledge	17.3	5.2	33.9	3.9	33.8	4.1	20.4	0.000*
Lab investigations	4.3	1.7	7.2	2.2	7.9	2.1	18.6	0.000*
Medication	4.0	1.6	7.7	1.4	7.5	1.5	18.3	0.000*
Nutrition	5.8	1.3	10.6	1.5	10.2	1.5	20.7	0.000*
Physical activities	3.6	1.6	7.5	1.9	7.6	2.0	18.2	0.000*
Foot care	10.9	3.9	21.1	3.9	19.8	3.7	17.9	0.000*
Total knowledge	45.9	8.2	88.0	7.4	86.7	8.2	18.4	0.000*

F: repeated measures ANOVA* P < 0.05 (significant)

Table (7): Mean and standard deviation of blood sugar level, method of giving insulin injection, foot & nail care among the studied subjects throughout the program (N= 100).

Checklist items	Mean	SD	F	P
Blood sugar analysis				
▪ Pre intervention	6.4	1.4	58.6	0.000*
▪ Post intervention	10.5	1.8		
▪ Follow-up	10.7	1.5		
Given insulin injection				
▪ Pre intervention	6.2	1.6	48.5	0.000*
▪ Post intervention	10.8	1.3		
▪ Follow-up	10.4	1.8		
Foot & nail care				
▪ pre intervention	2.6	0.9	42.9	0.000*
▪ pre intervention	6.1	1.0		
▪ Follow-up	4.6	0.9		

F: repeated measures ANOVA* P < 0.05 (significant)

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