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The Effect of Diabetic Foot Care Training Program on Elderly Adults' Outcome

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Abstract: *Diabetic foot problems are the leading cause of diabetes-related hospital admissions and are responsible for approximately 50% of all lower limb amputations worldwide (Desalu et al., 2011 and Al-Wahbi, 2010). This study aims to evaluate the effect of diabetic foot care training program on elderly adults' outcome. The study was carried out using quasi-experimental* ***design*** *with pre-post test at the diabetic out-patient clinic, Minia university hospital (Teaching and training hospital). A non-probability* ***sample*** *of 53 diabetic elderly adults was selected. Data were collected using three* ***tools****; the first tool included questions related to demographic characteristics, health profile, medical history regarding diabetes, diabetic foot care, problems and knowledge about diabetes in general and diabetic foot in specific. The second tool is an attitude sheet regarding diabetes control measures in general and foot problems and care in specific, and the third tool is an observational check list regarding foot care.*

Results*: the mean age of elderly adults in the study sample was 65±.87, 62.3% of them had disease duration less than 5 years. All diabetic elderly adults of the study sample had inadequate knowledge about diabetes in general and 94.3% had inadequate knowledge regarding diabetic foot before implementation of the program. There was improvement of knowledge immediately after implementation of the program and there was statistical significant difference between knowledge, attitude and practices pre-post test one (immediate) after program implementation and post test two three months after.*

Conclusion*: there was positive statistically significant relationship between knowledge of studied diabetic elderly and their practice regarding diabetic foot care.*

Recommendations*: Diabetic health education programs should be developed on a community level to improve knowledge, attitude and practice toward diabetes in general and diabetic foot problems and care in specific. Research in the area of diabetic foot as well as diabetes prevention and care should be encouraged.*

Keywords*: Diabetes Mellitus, Diabetic foot, Training Program, Elderly Adults' outcome*

I. Introduction

It has been estimated that by the year 2030, there will be 8.6 million adults with diabetes in Egypt, making it the country with the tenth largest population of diabetics in the world. Diabetes is associated with reduced life expectancy, significant morbidity due to related cardiovascular complications, increased risk of cardiovascular complications (ischemic heart disease, stroke and peripheral vascular disease), and diminished quality of life [1]. Also the prevalence of diabetic foot ulcers has been found to be high due to inappropriate footwear and the lack of knowledge regarding diabetic foot problems [2].

Diabetic foot problems are the leading cause of diabetes-related hospital admissions and are responsible for approximately 50% of all lower limb amputation worldwide. Diabetic foot problems are associated with substantial morbidity, mortality, reduced quality of life and high costs [3, 4].

Clients' education becomes a central component in the prevention and control of this disease Such education should lead to diet modification, increased physical exercise and lifestyle changes including the promotion of weight loss . These educational programs should help people assess individual's risks of diabetes, motivate them to seek proper treatment and care and inspire them to take charge of their disease. In addition, it should enable early detection and treatment of complications as well as enhanced early referrals of cases to specialized centers for management and follow-up [5].

Gerontological nurses play a vital role in empowering older adults to better manage diabetes through self-care and improving the quality of life through providing them and their families with the needed information. Nurses as care providers should consider client-centered care and effective communication with clients and their families through health education [6].

The **aim** of the study is to evaluate the effect of diabetic foot care training program on elderly adults' outcome. Three hypotheses were formulated: (1) the knowledge of elderly adults regarding diabetic foot care will be improved after attending the proposed training program. (2) Attitudes of elderly adults toward diabetic foot care will be positively changed after attending the proposed training program. (3) The practice of elderly adults will be improved after attending the proposed training program.

II. Subjects And Methods

2.1 Research design;

A quasi-experimental study design was used for this study which was conducted in the diabetic out-patient clinic, at Minia university hospital (Teaching and training hospital).
A non-probability sample of 53 diabetic elderly adults who were 60 years or older who were able communicate effectively were approached to participate in the current study.

2.2Tools

Data was collected utilizing three tools that were developed by the researchers; (1) Structured face to face interview which was used to collect demographic data such as age, sex, education, marital status; health data such as diabetic history and health information regarding diabetes and diabetic foot. The total score for knowledge regarding diabetes is 42 and participants who get 70% or more are considered to have good knowledge. For knowledge regarding diabetic foot and care, the total score was 38 and participants who got 70% or more are considered to have good knowledge regarding diabetic foot and care. (2) Attitude tool that was used to collect data pertinent to elders' attitude towards diabetes in general and diabetic foot specifically. The total score for this tool is 110 and participants who got 50% or more are considered to have positive attitude toward diabetic foot, otherwise are considered negative(3) Observation check list was used to collect information regarding diabetic foot care practiced by the elderly. The total score for this tool was 32 and participants who got 70% or more were considered to have satisfactory done, otherwise are considered unsatisfactory done. A pilot study was conducted to ensure relevance and clarity of data collection tools and to determine the time required to complete them.

2.3 Administrative phase

An official written permission was obtained from the director of Minia University Hospital after approval of ethical committee of the faculty of nursing, Cairo University. This study was conducted through three phases: Assessment phase, pre-intervention phase & post-intervention phase (immediately and after 3 months). The study was conducted during the period from first of December 2013 until end of October 2014.

2.4 Filed work

Assessment of elderly adults was done using the three study tools as pre-test to assess their base line knowledge, attitude and practice. Before participating in the study, elderly adults were given brief explanation about the purpose and procedure of the study and their oral consent was obtained. Each elderly adult was interviewed face to face and individually at the clinic by the researchers, Glucose level was measured for all elderly adults in the study sample by using gluco-check (one touch), then they were divided into small groups of 3-5 for the educational program which took place in the educational room in Minia University Hospital. The program was implemented over 15 sessions (12 theoretical, 2 practice and 1 wrap up). Each session ranged between 20-30 minutes taking into consideration the short attention span of the elderly. One family member of each elderly was asked to attend the training sessions in order to act as coach for the elderly at home. The three tools were used immediately after program implementation to assess the impact of program on elderly knowledge, attitude and practice. Three months later the three research tools were used through home visits to collect data from study sample to ensure retention of knowledge, attitude and practice.

III. Results

In the study sample, 50.9% were males, 71.7% their age ranged from 60 years to less than 65 years, with mean age 65±.87. Their educational level revealed that, 50.9% cannot read and write and 18.9% had a diploma degree. Regarding work status, 45.3% were not working (either retired or housewives if females), 30.2% had governmental work 24.5% had non-governmental work, 84.9% of elderly in the sample live in rural areas, 92.5 were married and 88.7% live with their extended families. Regarding care, 49% of the study sample received care by spouse, 32.2% by sons, and11.3% received care by relatives. Regarding monthly income; 56.6% of elderly adults get more than 250 pounds, and 1.9% get less than 100 pounds monthly.

Table (1) shows the distribution of diabetic elderly adults according to medical history; 62.3% had a duration of disease less than 5 years, 13.2 % 5 years to more than 10 years, and 11.3% don't know the duration of disease. Regarding the age at which the patient was diagnosed as DM, 43.4% had DM at age from 41 to 60 years, and 7.5% had DM at age from 20- 30 years, 18.9% had DM above 60 years. Considering family history, 30.2% had no family history of DM, 28.4% had one parent who had DM, and 15.2% had brother or sister with DM. Additionally 56.5% had renal problems, 28.3% had heart problems and hypertension, 3.8% had ocular problems and 5.7% had other problems. The mean body weight of the study sample was 85±15.1 Kg. Regarding

the mean height of the study sample, it was 168±8.3Cm. The body mass index of the study group ranged between < 20 to > 36 with a Mean ± SD 29±5.7.

Table (2) shows that all diabetic elderly had inadequate knowledge about diabetes in general and diabetic foot in particular before implementation of the program with a mean knowledge scores± SD 14.4± 6.5, 12.2 ± 7.9 respectively. The knowledge of study subjects regarding diabetes mellitus in general and diabetic food in particular was improved immediately after implementation of the program with a mean scores ± SD 30 ± 9.4 and 29 ± 8.6 respectively, while in post test II it was noticed that a mean scores± SD 25 ±11.4 and 23±10.9 respectively.

Table (3) shows reported practices of elderly subjects regarding care of diabetic foot before implementation of the program where 49.1% had unsatisfactory scores with a mean ± SD 23±4.4while there were improvements of reported practices after implementation of the program where 86.8% had satisfactory practice scores with a mean ± SD 30±5.6. In post test II it was noticed that 58.5% had satisfactory reported practices with a mean ± SD 27±6.1.

Table (4) shows the distribution of diabetic elderly clients according to their attitudes about diabetes in general and diabetic foot care in specific. Around 41.5% had negative attitudes with a mean ±SD 55±14.6 before implementation of the program while in immediate post test, it was noticed that 92.5% had positive attitudes towards diabetes mellitus and diabetic foot care with mean ±SD 76±13.6. In post test II it was noticed that 79.2% had positive attitudes towards diabetes mellitus and diabetic foot care with a mean± SD 67±18.4.

Table (5) shows that correlations between knowledge, attitudes and reported practices of diabetic elderly clients after implementation of the training program, had highest strong positive statistically significant correlation.

Table (1).Distribution of diabetic elderly adults according to their medical history (n=53)

Items	N	%
Duration of disease		
Less than 5 years	33	62.3
5- 10 ears	7	13.2
+10	7	13.2
Don't know	6	11.3
Age of onset of disease		
Under 20 years	1	1.9
20-30 years	4	7.5
31-40 years	7	13.2
41-60 years	23	43.4
+60 years	10	18.9
Don't know	8	15.1
Family history of DM		
Father or mother	15	28.4
Brother or sister	8	15.2
Grandfather or mother	10	18.8
Third degree	2	3.7
Don't know	2	3.7
No family history	16	30.2
Other health problem		
Hear problem	15	28.3
Renal problem	30	56.5
Neurologic problem	3	5.7
Ocular problem	2	3.8
Others	3	5.7
Body weight		
60-70	9	16.9
71-80	15	28.4
81-90	17	32.0
+90	12	22.7
Mean± SD	85±15.1	
Height		
150-160	14	26.5
161-170	20	37.7
171-180	19	35.8
Mean± SD	168±8.3	
Body mass index		
20-25	9	16.9
26-30	26	49.0
31-35	12	22.7
+36	6	11.4
Mean± SD	29±5.7	

Table (2) Distribution of diabetic elderly adults according to their knowledge about diabetes in general and foot care in specific (n=53)

	Pretest		Posttest I		Posttest II	
	NO.	%	NO.	%	NO.	%
Knowledge about DM						
Adequate	0	0	35	66.0	22	41.5
Not Adequate	53	100.0	18	34.0	31	58.5
	Mean ± SD 14± 6.5		30 ± 9.4		25 ±11.4	
Knowledge about diabetic foot						
Adequate	3	5.7	36	67.9	20	37.7
Not Adequate	50	94.3	17	32.1	33	62.3
	Mean ± SD 12 ± 7.9		29 ± 8.6		23±10.9	

Table (3) Distribution of diabetic elderly adults according to their reported practices regarding foot care (n=53)

Practices	Pretest		Posttest I		Posttest	
	NO.	%	NO.	%	NO.	%
Satisfactory done	27	50.9	46	86.8	31	58.5
Un satisfactory done	26	49.1	7	13.2	22	41.5
Mean ± SD	23±4.4		30±5.6		27±6.1	

Table (4) Distribution of diabetic elderly adults according to their attitudes regarding diabetes in general and foot care in specific (n=53)

Attitudes	Pretest		Posttest I		Posttest II	
	N	%	N	%	N	%
Positive	31	58.5	49	92.5	42	79.2
Negative	22	41.5	4	7.5	11	20.8
Total	53	100	53	100	53	100
Mean ± SD	55±14.6		76±13.6		67±18.4	

Table (5) Correlations between knowledge, attitudes and reported practices of diabetic elderly adults after implementation of the program (n=53)

Variables	Knowledge	Attitudes	Practices
Knowledge			
r.Value	1	.686**	.836**
P.Value	-	.000	.000
Attitudes			
r.Value	.686**	1	.825**
P.Value	.000	-	.000
Practices			
r.Value	.836**	.825**	1
P.Value	.000	.000	-

N.B *significance is considered at (p-value <0.05).
Significance is considered highly significant at p-value <0.01) **

IV. Discussion

Older diabetic adult clients' education on appropriate foot care has the potential to play a key role in preventing complications. Understanding the factors that contribute to sub-optimal behavioral outcomes in foot care is important if ulceration and amputation rates are to be decreased [7]. So educating and training diabetic patients and their family members increase their knowledge of diabetic foot care and help bridge the gap between knowledge and integrated into daily activities.

Regarding demographic characteristics of diabetic elderly adults in the study sample, more than half of clients were males, less than three quarters aged between 60 years to less than 75 years with a mean age ± SD 65±4.8 and more than half could not read and write and less than half were not working. Less than one third were employed in governmental jobs, less than one quarter had non-governmental work and the majority of the sample was married, live with their extended families in rural areas but minority live in nuclear family. Regarding care, less than half received care by spouse, less than one third received care by sons, minority received care by relatives. The mean BMI are 29±5.7. Conversely with the results of Fouad [8] and Abd El-Hamid [9], who stated that more than half of Egyptian diabetic elderly clients were females and more than half of diabetic elderly clients were married while the majority were illiterate.

Concerning the duration of disease the current study indicates that less than two third had a duration of disease less than 5 years, minority don't know the duration of disease. Less than half had diabetes at age from 41 to 60 years. This correlates with Jaisy [10] who found that the majority of patients suffer from diabetes for less

than 5 years and more than half of the patients were affected by diabetes between ages 40-60 years. A study conducted to estimate the prevalence of diabetes in developing countries showed that the majority of people with diabetes are in the age group 45-64 years and in developed countries more than 64 years [11].

In our study less than one third had no family history of DM, more than one quarter had one parent who had DM, and minority had brother or sister with DM. In contrast with a study conducted in Belgaum showed that only 16% of participants' father or mother was diabetics [12]. Family history of DM was present in 55.6% [13]. The DM can develop both among people who have and don't have a family history of diabetes.

Regarding the body mass index the current study reveals that the BMI of the study group ranged between >20 to <36 with the mean ±SD 29 ±5.7 which contradicted with Jaisy [10], who found that majority of patients' BMI were within normal limit. This finding revealed that diabetes can develop among people whose BMI within normal limits. This study was supported by a study conducted in Korea they identified that BMI for all patients were within normal limits. This study has proven that diabetes can occur among people whose BMI within normal limit.

Concerning diabetic elderly's knowledge about diabetes in general and diabetic foot care in specific, the current study shows that all diabetic elderly had inadequate knowledge about diabetes in general and diabetic foot in specific before implementation of the program with a mean ± SD 14± 6.5 and 12 ± 7.9 respectively. This finding come inconsistence with studies conducted in Egypt by Hassan [14], who showed that all diabetic elderly patients in study group compared with 99% in control group had poor knowledge before implementation of the educational program. Abdo and Mohamed [15], in a study conducted on patients with type 2 diabetes mellitus attending Zagazig University Diabetic Clinic revealed that the majority of the studied patients had low levels of correct knowledge (ranging from 16.39% to 49.18%) regarding different aspects of diabetes, such as; symptoms of the disease, symptoms of hypoglycemia and its prevention, effect of diabetes on the eye, foot care and treatment

Also Mersal [16] revealed that the patients in the study group and majority in the control group had unsatisfactory knowledge before the intervention. The areas of major deficiency in knowledge were related to causes, symptoms and signs, and complications of DM, as well as the hypo- and hyperglycemia, and treatment. A deficient knowledge about food items to be decreased and importance of snacks were also revealed. Lastly, the knowledge about exercise was very deficient. In the same way another study conducted in Nigeria by Desalu et al [3], showed that a greater proportion of diabetic patients had poor knowledge about diabetic foot care. In contrast another studies done by Rocha et al [17] and Titis et al [18] reported that knowledge of diabetic elderly patients about diabetic foot care was satisfactory.

The similarity between our finding and Egyptian studies might be explained by common share of the cultural background of diabetic patients in Egypt as values, beliefs, attitudes and practice despite their geographic variation. Therefore, the researchers concluded that the implementation of a national policy on diabetic foot management and better patient follow-up would have helped.

Regarding knowledge immediately after implementation of the program: there are improvements of knowledge immediately after implementation of the program as it was noticed that about two third of diabetic elderly adults had adequate knowledge about DM in general and diabetic foot in specific. This comes in consistence with study done by Abdo and Mohamed [15], who revealed that after the application of educational message, a significant improvement in knowledge and attitude of the studied group towards all aspects of diabetes was observed. Moreover, in a Meta-analysis involving eleven interventional studies, an improvement in knowledge of the intervention groups after application of culturally appropriate health education was revealed [19]. This was in the same line with Mersal [16], who pointed to the success of the intervention in improving the knowledge of diabetic older adults in the study group, and the improvement was retained after three months of follow-up and improvement in patients' knowledge about diabetes after implementation of the self-care guidelines program.

Increasing the knowledge in post test I can be attributed to the planned teaching program which was effective in increasing the knowledge of clients with diabetes. Therefore, it is of importance for persons with newly diagnosed diabetes to understand self-management and its impact on blood glucose level, and overall health in order to improve clinical outcomes and to avoid complications. The continuation of follow-up and support avoided or delayed chronic complications in diabetic patients.

Regarding to reported practices, more than half of diabetic elderly had satisfactory practices about diabetic foot care before implementation of the program with the mean ± SD 23±4.4, while there are improvements of practices after implementation of the program as it noticed that the majority had satisfactory practices with the mean ± SD 30±5.6 while in post-test II it is noticed that more than half of elderly adults in the study sample had satisfactory practices with the mean ± SD 27±6.1.

At the same line Mersal et al [16] showed very low levels of adequate practice and no statistically significant difference between the study and control group regarding foot and nail care practice before program implementation. Aly [20] added that none of the patients had adequate self-care skills related to foot care or insulin self-injection. The importance of self-care practices in diabetes was emphasized by Vinter et al [21], who reported that health care providers should train diabetic patients in self-care, which could enhance good compliance. Additionally, finding from qualitative interpretive phenomenological study done by Abu-Qumar and Wilson [22] found that Jordanian participants were not practicing in preventive foot care behaviors due to personal beliefs about health care. The researchers also found that the structure and culture of health care practice had an influence on preventive foot care behaviors.

This study further emphasized the need to address the problem of diabetic foot self-care as demonstrated by the low number of people performing foot care practice, this is certainly due to lack of training in such skills, which is also an essential role of nurses in the management of diabetes. The lack of performance of such roles might be attributed to lack of time, as well as shortage of staff in these general hospitals, where a large number of diabetics are admitted. This highlights the need for foot care education and training to limit the complications, and improve practices after program implementation.

The current study reveals that there are positive statistically significant relationship between knowledge, attitudes of studied diabetic elderly and their practice. Similarly Hassan [14] showed that positive statistically significant relationship was observed between knowledge and total mean scores of feet self- care practice after program implementation. Also Jinadasa et al [23] reported statistically significant difference between knowledge and practice, as diabetic self-management education improves daily foot care regimens. Also Somaroo et al [24] indicated that significant association was found between provision of foot care education and proper foot care practice. Thus, highlight the need for diabetes self-management education in order to improve patients' knowledge which facilitates better self-care practice. This can be attributed to that patient education can improve preventive foot problems and thus help reduce complications as amputation and foot ulceration.

V. Conclusion

Based on the study finding we can conclude that there is a marked gap between knowledge, attitudes and practice among diabetic elderly adults. The clients are not provided with foot care education and don't have regular foot examination to detect early problems. So the reported study highlights the need to adopt diabetes health education programs about foot care.

VI. Recommendation

Diabetic health education programs should be developed on a community level to increase positive attitudes towards diabetic care in general and foot care in specific. Booklets about diabetes and foot care should be available in diabetic clinics in Arabic versions and should be given to each diabetic elderly adult for free. Future studies should follow the long-term effect of diabetic foot prevention program to reflect sustained change in the reduction of risk attitudes. Gerontological Health Nurses should have performed a continuous health assessment and observation to the lower extremities of diabetic elderly adults (health status, skin integrity, color, temperature, edema, pain and sensation of the foot. etc.). Gerontological Health Nurses must teach the clients how to detect a problem in their feet and take care of their feet on a daily basis.

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