Effect of Diabetic Foot Program on High Risk Patient's Health Status

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Abstract: **Diabetes mellitus is chronic illness requires continuous medical care and serial education about self-care activities to prevent complications such as coronary heart disease and diabetic foot problems which is the leading cause of hospital admission, amputation and mortality in diabetic patients. Aim of the study: This study was conducted to evaluate effect of diabetic foot program on high risk patients' health status. Research design: A quasi- experimental design was used in this study. Setting: the study was conducted in diabetic foot outpatient clinic in Beni–Suef university hospital at Beni–Suef city Egypt. Subjects: A purposive sample of 60 patients admitted in diabetic foot outpatient clinic. Data Collection Tools: Tools of the study consist of four tools, tool (1) Lower limb assessment sheet for diabetic patients (2) Patient's interview questionnaire sheet (3) Diabetic foot observational check list (4) health status assessment sheet. Results: (88.8%) of studied patients had satisfactory level of total knowledge regarding diabetes mellitus post educational program. (80.2%) of them had satisfactory self-care of foot post educational program. Concerning the effect of educational program on hemoglobin AIC and blood pressure, the study results revealed that more improvement in HbA1c, reduced systolic and diastolic blood pressure, reduced medication doses. There is high statically significant relation between patients' health status before and after educational program. Conclusion: This study concluded that the patients' health status improved after educational program. Recommendation: Diabetic foot programs for high risk patients' health status recommend to be conducted in diabetic foot outpatient clinics by specialized well trained nurses.**

Keywords: **Diabetic Foot, Health Education Program- Health Status.**

1. INTRODUCTION

It is estimated that diabetes affects 422 million people worldwide, 8.5% of the adult population and the increase in prevalence is occurring at a faster rate in low and middle income countries **(World Health Organization, 2016).** Around one in four people with diabetes will develop a diabetic foot ulcer (DFU) in their lifetime. The risk of developing a DFU and the factors associated with development of complications such as hospitalization, lower extremity amputation (LEA), and mortality **(Armstrong et al., 2017).**

Diabetic foot ulcer is one of the severe consequences of diabetes causing large economic burden. Amputation is another severe complication of diabetes, which is preceded by a foot ulcer. According to some studies it has been proven that approximately, 15% of people with diabetes develop foot ulcers eventually resulting approximately 85% of lower limb amputations. Too many ulcers fail to heal, become indolent, develop an infection, and come to amputation **(Pengzi et al., 2017).**

The risk of ulcers or amputations is increased in people who have the following risk factors: previous amputation, past foot ulcer history, peripheral neuropathy, foot deformities, peripheral vascular disease, visual impairment and poor

glycemic control, so early detection, close monitoring and proper treatment for diabetic foot ulcers is another serious challenge for diabetic patient to prevent development of complications including diabetic foot amputation **(Abbas, 2015).**

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 **(Omoleke, 2017).**

The diabetic foot care program implemented is a comprehensive approach to maintaining the health of diabetic patients' feet in order to reduce the lower limb amputation rate, thereby dramatically reducing the cost to patients, society, and the health care system. Knowledgeable and consistent care can help patients avoid the potential problems that may lead to amputation. The patients' continued walking ability and quality of life depend on close inspection, proper footwear, a few specific "do's and don'ts", and the commitment of the medical care team **(Fitzgerald & Keyes, 2016).**

Aim of the study:

This study aims to assess effect of diabetic foot care program on high risk patients' health status.

The aim was fulfilled through:

1- Assessment the patient's knowledge and practice regarding foot care.

2- 2- Develop diabetic foot program.

3- Implementation of diabetic foot program regarding (diet, foot care, medication and follow up).

4- Evaluation of diabetic foot care program post implementation on high risk patients' health status.

Research Hypothesis:

At the end of the study high risk diabetic patients who will received the diabetic foot program will have better health status after than before receiving the program as measured by health status assessment sheet.

Research design: A Quasi experimental research design was used in this study. **Setting:** This study was carried out at diabetic foot outpatient clinic in Beni–Suef university hospital. **Subjects:** A Purposive sample of 60 patients who met the inclusion criteria and agree to participate in the study, and then they were divided alternatively into groups.

Inclusion and Exclusion criteria: The inclusion criteria of the current study include: Diabetic patient type I or type II, If the patient has one or more of the following: Past or recent history of diabetic foot ulcer, Past or recent history of foot amputation, Absent pedal pulses in one or both feet, Positive monofilament test in one or both feet and Free from psychotic and mental disorders.

Tools for data Collection: Data were collected using the following tools: **Tool (I): Patients interview questionnaire sheet:** This tool was developed by the researcher based on review of relevant recent literatures and including three parts: **Part I- Demographic data assessment tool:** It was developed by the researcher and written in Arabic language. It aimed to assess the patients 'demographic characteristics including age, gender, level of education, marital status, occupation and residence.

Part II- Medical data assessment tool: It was developed by the researcher based on related literature. It was used to assess and collect medical data about patients' history which include present, past and family health history. **Part III – Patients knowledge assessment**: It was developed by the researcher based on related literature. It was used to assess patient's knowledge directly before conducting the health teaching program and after conducting the health teaching program.

Tool (II): Lower limb assessment sheet for diabetic patient: This tool was adopted from **Sibbald et al., (2012).** It was aimed to assess high risk patients before implementation of the program as past or recent history of diabetic foot ulcer, past or recent history of foot amputation, absent pedal pulses in one or both feet, positive monofilament test in one or both feet.

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Tool (III): Diabetic foot self-care observational check list: It was developed by the researcher based on related literature and it was filled by the researcher directly before conducting the health teaching program and after conducting the health teaching program to assess foot self-care for foot. **Tool (V): Health status assessment sheet:** It was developed by the researcher based on literature review to assess patients' health status after implementation of the program as fasting blood sugar level, post prandial blood sugar level, blood pressure and HbA1C.

Scoring system:

The total score of lower limb assessment sheet for diabetic patients' was10 grades. a) Positive Screen- Results when there are one or more "Yes" responses. These individuals are at increased risk of a foot ulcer and/or infection. b) Negative screen- Results when there are all "No" responses. ≥ 60% of correct knowledge was satisfactory level of knowledge when the total grades were ≥ 12 grades. < 60% of incorrect knowledge was unsatisfactory level of knowledge when the total grades were < 12 grades. ≥ 60% of correct practice was satisfactory level of foot self –care for foot when the total grades were ≥ 8 grades. < 60% of incorrect practice was unsatisfactory level of foot self- care for foot when the total grades were < 8 grades.

Field Work:

1- An official permission for conducting the study was obtained from the director of Beni-suef university hospital.

2- Development of tool I, II, III&V after reviewing recent relevant literatures.

3- Data collection started and completed within 9 months from beginning of April (2019) until the end of December (2019).

4- A Purposive sample of 60 patients from both genders, with different ages and educational levels were selected for this study.

5- Data collection was done 2 day/weak by the researcher, two times per day at the morning shift.

Ethical Considerations:

Ethical approval was obtained from the scientific ethical committee of Helwan University. In addition, written informed consent was obtained from each participant prior to data collection. The participants assured that anonymity and confidentiality would be guaranteed and the right to withdraw from the study at any time. Ethics, values, culture and beliefs were respected.

4. Statistical Design:

The collected data were organized, categorized, tabulated, and statistically analyzed using the statistical package for social science (SPSS) version (20). Data were presented in tables and graphs. The statistical analysis included; percentage (%), the arithmetic mean ($\overline{X}$), standard deviation (SD), chi-square (X^2), and Pearson correlation (r).

2. RESULTS

A) Demographic characteristics of the studied patients.

Table (1) clarifys, the mean age of the studied patients was (56.1± 10.25) and 73.3% of them were females. Also 51.7% were Illiterate, Moreover.91.7% of them were married and 80.0% were not working. Lastly concerning residence, 60.0% of them resided in rural area as illustrated in tables (1).

Table (1): Percentage distribution of demographic characteristics of the studied patients (N=60).

Items	N	%
Age		
<40 years	3	5.0%
40- 60 years	32	53.3%
> 60 years	25	41.7%
Mean + SD 56.1± 10.25		
Sex		
Male	16	26.7%
Female	44	73.3%

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Educational level		
Illiterate	31	51.7%
Reads &writes	17	28.3%
Basic	10	16.7%
Bachelor	2	3.3%
Marital status		
Single	1	1.7%
Married	55	91.7%
Widow\ divorced	4	6.7%
Profession		
Work	12	20.0%
Does not work	48	80.0%
Residence		
Rural	36	60.0%
Urban	24	40.0%

Table (2): Distribution of diabetic foot observational checklist for care of foot among the study group (N=60).

(80.2%) of them had satisfactory self-care of foot totally post educational program compared with 49.0%of them pre educational program. there is highly statistically significant difference in self-care of foot before and after educational program.

Self-care of foot	Pre		Post		Z	P value
	No	%	No	%		
- Check foot every day for cuts, cracks, bruises, blisters, sores, infections or unusual markings.	22	36.7%	58	96.7%	6.97	0.00000
- Use a mirror to see the bottom of the foot if can't lift up.	9	15.0%	12	20.0%	0.72	0.47106
Check the foot for						
• Color	15	25.0%	49	81.7%	6.22	0.00000
• Swelling	31	51.7%	58	96.7%	5.63	0.00000
• Warmth	15	25.0%	41	68.3%	4.76	0.00000
- Clean a cut or scratch with a mild soap and water and cover with a dry dressing for sensitive skin.	55	91.7%	60	100.0%	2.28	0.02236
- Trim nails straight across.	45	75.0%	55	91.7%	2.45	0.01431
- Check the water temperature with wrist or a thermometer (not by using foot), before getting into a bath	34	56.7%	60	100.0%	5.76	0.00000
- Wash and dry foot every day, especially between the toes.	56	93.3%	59	98.3%	1.37	0.17053
- Dry foot completely.	12	20.0%	47	78.3%	6.39	0.00000
- Apply a good skin lotion every day on foot heels and soles.	1	1.7%	12	20.0%	3.23	0.00123
- Always wear a good supportive shoe.	44	73.3%	53	88.3%	4.30	0.00002
- Check for foreign objects in shoes before wearing them.	8	13.3%	36	60.0%	5.30	0.00000
- Choose shoes with low heels (under 5 cm high).	58	96.7%	59	98.3%	0.58	0.55875
- Avoid going barefoot outside or indoors	36	60.0%	56	93.3%	4.32	0.00002
Total score	441	49.0%	722	80.2%	13.85	0.00000
Pre: Mean + SD = 49.00 ± 13.82 Post: Mean + SD = 80.22 ± 11.31						

❖ **Significant   P.-value at 0.05**

Table (3): Distribution of health status of the studied patients (N=60).

There is highly statistically significant difference in fasting blood glucose level, post prandial blood glucose level and hemoglobin A1C regarding health status before and after educational program as P < 0.01, but there is no statistically significant difference in systolic and diastolic blood pressure before and after educational program as (P > 0.05) as illustrated in table (3).

	Minimum	Maximum	Mean	Z	P value
Fasting blood glucose level					
Pre	81.00	450.00	195.73	7.74	0.00000
Post	65.00	260.00	115.57		
Post prandial blood glucose level					
Pre	90.00	600.00	271.62	7.19	0.00000
Post	99.00	375.00	177.93		
Blood pressure					
Systolic blood pressure					
Pre	100.00	210.00	139.33	-0.21	0.83111
Post	110.00	170.00	139.83		
Diastolic blood pressure					
Pre	70.00	110.00	88.17	-1.67	0.10019
Post	70.00	100.00	89.82		
HbAIC					
Pre	5.90	13.00	8.91	9.80	0.00000
Post	4.80	9.50	7.08		

* **Significant   P.-value at 0.05**

Table (4): Relation between patients' health status, diabetic foot observational check list and knowledge before and educational program.

There is statically significant relation between patients' health status and knowledge before educational program as P < 0.05., but there is no statically significant relation between patients' health status and knowledge post educational program as P > 0.05. Also there is no statically significant relation between patients' health status and diabetic foot observational check list before and after educational program as P > 0.05.

patients' health status	Total Knowledge									
	N		Mean		SD		T		P value	
	Pre	Post	Pre	Post	Pre	post	Pre	post	Pre	Post
Good	-	16	-	88.44	-	8.31	-	0.22	-	0.80049
Fair	6	20	79.17	88.00	13.57	12.50	3.09		0.01286	
Poor	54	24	59.26	90.00	24.04	9.78				
patients' health status	diabetic foot observational check list									
Good	-	16	-	82.50	-	9.39	-	0.71	-	0.49459
Fair	6	20	54.45	78.00	13.61	12.06	1.02		0.31310	
Poor	54	24	48.40	80.28	13.84	11.71				

* **Significant   P.-value at 0.05**

3. DISCUSSION

The current study is a Quasi-experimental study aimed to assess effect of diabetic foot care program on high risk patients' health status.

Regarding the studied patients demographic characteristics, the results of the present study revealed that more than half of the studied patients were 40- 60 years old and around three quadrant of them were female, This result is in accordance with **kirkman et al., (2012)** who confirmed that older adults with diabetes are substantial risk for foot problem. This may be due to increased risk of chronic disease related foot problem such as diabetes among females at the same age group in Egypt.

Regarding to educational level, this study result revealed that more than half of the studied patients had Illiterate. This finding is in accordance with that of a recent study of **Soomro et al., (2013),** they assessed and found that low educational level has been a major significant predictor for foot problem among diabetic patients. This result may due to lack of information about importance of foot self-care and lack of educational programs for those patients.

In the current study the result showed that the majority of studied patients were married. This result is supported by **El Sebaee & Mohamed (2011),** who assessed patients with diabetes and reported that about three quarters of study sample were married. This may due to the most of the studied patients aged from forty to sixty or more years old. Also could be due to life stressors and lack of self care time of married patients.

Concerning working status, this study finding revealed that more than three quadrants of studied patients investigated in this study were not working (unemployed & housewives). This result is consistent with **Srinivasan et al., (2017),** they assessed patients and revealed that more than of the study group didn't work and lower education. This could be due to more than one third of studied patients were aged more than sixty years old (Retirement age).

As regards, residence of the studied patients, this study findings indicated that around two thirds of them were from rural areas. This result is in agreement with **Khawaga & Abdel-Wahab, (2015),** they reported that most of patients included in study group are residing in urban areas. This may be due to not availability of health services in rural areas through health insurance hospitals in the governorate of Beni-suef town.

Regarding patients' level of knowledge about diabetic foot care before educational program, the present study reveals that around half of them had unsatisfactory knowledge about diabetic foot care. This result is in agreement with **Muhammad et al., (2014)** who showed that the majority of patients who were admitted for diabetic foot infections had poor knowledge and poor practice of foot care.

Regarding self-care of the foot, the present study revealed that more than one third of them had unsatisfactory level about regular inspections of their feet. This result is in accordance with **Apelqvist &Larsson, (2016),** who revealed that the majority of diabetic individuals do not get regular inspections of their feet, adequate shoes or proper foot care. This result may due to lack of information about importance of foot self-care and lack of educational programs.

Regarding patients' level of knowledge about diabetic foot care post educational program, the present study reveals that more than three quadrants of them had satisfactory knowledge about diabetic foot care. This result is in according with **Matricciani & Jones (2015)**, who showed that patients with self-care management programs have a positive impact on self-care behaviors, as well as health outcomes.

Concerning the effect of educational program on hemoglobin AIC. The current study revealed improvement in hemoglobin AIC after educational program. This finding is in agreement with **Situ et al., (2019)**, who revealed that patients with Diabetes Self-Management Education program (DSME) improves hemoglobin A1C and points to the value of Diabetes Self-Management Education program (DSME). Thus, DSME should be promoted and widely utilized as a standard care regiment in the out-patient setting.

Concerning the effect of educational program on health status of the studied patients. The present study revealed that more improvement in HbA1c and blood pressure after educational program. This finding is in agreement with **Varma, (2019)** who revealed that a reduction in plasma glucose concentrations, reduced HbA1c, reduced BMI, reduced systolic blood pressure and reduced medication doses and increased knowledge of diabetes after education regarding diabetes.

Regarding relation between patients' health status and knowledge post educational program. The presented study revealed that there was no statistically significant relation between patients' health status and knowledge post educational program. The finding is in contrary with **Skeie et al., (2017)** who showed that the more patients know about their condition, the better glycemic control can be achieved. This result may be due to that the better knowledge of diabetes was not associated with better glycemic control.

Regarding relation between patients' health status and knowledge pre educational program. The presented study revealed that there is statistically significant relation between patients' health status and knowledge pre educational program. The finding is in agreement with **Forde et al., (2020)** who showed that patients have good knowledge about their disease which lead to reducing complications and improving their health-related quality of life.

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4. CONCLUSION

Health status among the study group improved after implementing of educational program than before receiving the program. There is high statically significant relation between patients' health status before and after educational program.

5. RECOMMENDATION

Diabetic foot programs for high risk patients' health status recommend to be conducted in diabetic foot outpatient clinics by specialized well trained nurses.

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