Assessment the Factors aggravating unhealed wounds among diabetic foot patients

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Abstract

Background: Diabetic foot ulcer is one of complications of diabetes that imposes a significant burden on the community. **Aim of the study**: the study aimed to assess the factors aggravating unhealed wounds among diabetic foot patients. **Research design:** Descriptive exploratory design was utilized to fulfill the aim of study**. Research questions:** 1-What is the level of patient's knowledge regarding diabetes and foot ulcer? 2-What is the level of patient's foot care practices regarding diabetic foot ulcer? 3-What are the factors that aggravating unhealed wounds among diabetic foot patients? **Setting:** the present study conducted at surgical departments at Benha University Hospital,Qalyubia ,Egypt. **Subject:** the study subject included 92 patients with diabetic foot ulcer. **Tools of data collection:** four tools were used in the study **(Tool I)** Patient interviewing questionnaire, consist of three parts **Part 1**: Patient's personal data, **Part 2**: Patient's clinical health status, **Part 3**: Patient's knowledge questionnaire. **(Tool II)** Foot care practice questionnaire, **(Tool III)** wound assessment sheet, consist of three parts **Part 1:** wound characteristics sheet, **Part 2:** treatment regimen, **Part 3**: Assessment factors aggravating unhealed wounds**, (Tool IV)** Wagner classification system. **Results** showed that 71.7% of the studied patients had unsatisfactory level of knowledge regarding diabetes and diabetic foot ulcer, 55.4% of the studied patients had satisfactory level of practice regarding diabetic foot ulcer, 14.0% of the studied patients have high level of aggravating factors affecting unhealed wound and 54.0% of the studied patients have moderate level. **Conclusion:** the study finding concluded that there was a statistically significant relation between aggravating factors of unhealed wound and age of the patients **Recommendation:** Providing booklet to the patients including basic information about diabetic foot care.

Key Words: Aggravating factors, Diabetic foot, Unhealed wounds.

Introduction

Diabetes mellitus is considered a silent disease with possible late chronic complications such as diabetic foot ulcer which is one of complication of diabetes that imposes a significant burden on the community. It leads to amputation and increased disability if untreated and thus bears profound implications on the individual, the community and the health system at large. Diabetic foot is an area of research interest where interdisciplinary researchers are trying to elucidate the best strategy to halt the progression of chronic diabetic wounds. **(Jodheea, et al .2022).**

Diabetic foot ulcer is infection, ulceration, or destruction of tissues patient's foot with currently or previously diagnosed diabetes mellitus, usually accompanied by neuropathy and peripheral artery disease in the lower extremity. (**Peng, et al 2022).**

Diabetic foot ulcer has a significant cause of physical, psychological, and financial burden for both patients and health care sectors in patients with diabetes. Several studies reported that factors that contribute to development diabetic foot ulceration were: -old age, duration of diabetes mellitus, poor self-care practice, and delay in medical attention typically in the setting of peripheral arterial disease, peripheral neuropathy, and trauma. In addition, the presence of comorbidities like ischemia from peripheral vascular disease, obesity, and hypertension.(**Atinafu, et al .2022).**

The effects of diabetic foot ulcer reflect the need for strategic interventions to manage diabetic foot ulcer which include (Patient education, special care, clear referral pathways, use of professional teams, and other stringent interventions have

significantly reduced foot ulcers). The International Working Group on the Diabetic Foot (IWGDF) in its evidence-based guidelines suggested that all preulcerative signs on the foot of persons with diabetes must be treated and recommended that recurrent foot ulcers should be prevented through the provision of integrated foot care. This integrated foot care includes professional foot care, and structured education about foot care. **(Suglo, Winkley& Sturt 2022).**

Prevention of diabetic foot ulcer requires that patients with diabetes engage in appropriate self-care behaviors relating to wearing off-loading footwear, exercise, diet, blood glucose monitoring, medication, and foot care. Also, the social environment consisting of family members, friends, influence patient's ability to manage diabetic foot ulcer. (**Abbott, et al .2022).**

Nurses play a critical role in the patient education, advanced care and psychological support for patients with diabetic foot ulcer, also nurses have a major effect when counselling patients on self-management of diabetic foot. Thus, improving nurses' ability to assist their patients in developing a grounded conceptual perspective on diabetes self-management is critical **(Crocker, et al .2022).**

Significance of the study:

Diabetes mellitus (DM) is considered one of the main global health emergencies of the 21st century. The prevalence of DM is increasing in both developed and developing countries, recent estimates indicate that there were 463 million adults living with diabetes in 2019 which is projected to increase to 642 million in 2040. In the Middle East and North Africa (MENA) region, the number of patients with diabetes is expected to increase from 34.6 million in 2013 to 67.9 million by 2035. (**Azeem, Khan& Liaquat 2022).**

The International Diabetes Federation (IDF) classified Egypt among the top 10 countries in the world with the highest prevalence of diabetes, where about 9 million adults between 20 and 79 years of age were living with DM in 2019. **(Galal, et al .2021).**

According to **(Assaad&Khalil, 2020)** who studied The Burden of Diabetic Foot Disease (DFD) in the Middle East (ME), they found that Egypt is currently in the top 14 countries with the highest number of patients with diabetes. Diabetic foot patients are one of major complications of diabetes. The risk of developing diabetic foot ulceration is 10-15% Most of foot ulcers (60–80%) will heal, while 10–15 %of them will remain active**,** and 5–24% of them will end with limb amputation.

The prevalence of DFU in hospitalized patients ranges from 4 to 10% and the risk of patients with diabetes developing a foot ulcer in their lifetime could be as high as 25% **(Choudhry, 2019).** at Benha university Hospital. Statistical record revealed that the number of patients with diabetic foot ulcer at year 2020 were approximately 120 patients **(Statistical Office in Benha University Hospital, 2020).** So, the current study conducted to assess the factors aggravating unhealed wounds among diabetic foot patients.

Aim of the study: -

The aim of the current study was assessed the factors aggravating unhealed wounds among diabetic foot patients.

Research questions: -

1-What is the level of patient's knowledge regarding diabetes and foot ulcer?

2-What is the level of patient's foot care practices regarding diabetic foot ulcer?

3-What are the factors that aggravating unhealed wounds among diabetic foot patients?

Research design:

Descriptive exploratory design was utilized to fulfill the aim of this study.

Setting:

The study was conducted in surgical departments at Benha University Hospital. It is in the second and fourth floor contains 48 beds included in 12 rooms; six rooms for male patients contains 24 beds and six rooms female room contains 24 beds and there was a room in second floor to follow and care wounds of diabetic foot patients.

Sample:

Purposive sample of 92 conscious, adult male and female, patient's age ranged from 20-60 years old with diabetic foot ulcer admitted to surgical departments, Patients who had type1 or type 2 diabetes mellitus and agreed to participate in the study.

Exclusion criteria

1- Associated other medical disease and mental disorders.
2- Unconscious Patients.

Tools of data collection:

Data was collected using the following tools:

Tool I: Patient interviewing questionnaire

This questionnaire was presented in simple Arabic structured items related to different aspects.

It included three parts:

Part1: Patient's personal data.

This part included the patient's personal data composed of 7closed end questions**.** related to (age, sex, marital status, residence, educational level, occupation, and living status).

Part2: patient's clinical health status, composed of 7closed end questions.

It aimed to assess (height& weight, family history, type of diabetes mellitus, duration of diabetes, risk factors, complications, and numbers of hospital admission).

Part 3: Patient's knowledge questionnaire. composed of 13closed end questions**.**It was adapted from **(Garciaca and Association, (2001),** and

aimed to assess patients' level of knowledge regarding to diabetic and diabetic foot ulcer such as (definition, signs and symptoms, causes, risk factors, normal range of fasting blood glucose, normal range of random blood glucose, normal range of cumulative sugar test (HbA1c), complications of diabetes and ways to maintain level of blood glucose).

-foot ulcer (definition, signs, symptoms, causes, and risk factors of foot ulcer).

Scoring system: -

The score was distributed as: one mark for each correct answer and zero for incorrect answer, the total score converted into percentage as: -

- **Score< 75%** was considered unsatisfactory level of knowledge.
- **Score ≥ 75%** was considered satisfactory level of knowledge.

Tools II: Foot care practice questionnaire, composed of 25closed end questions**.**

It was be adapted from **(Pollock, et al. 2004& Bijoy, et al. 2012)** and aimed to assess patients foot care practice (examination feet, wash feet every day, dry well between the toes ,cutting toenails carefully, using offloading devices such as therapeutic shoes, crutches, walkers, wheelchair).

Scoring system: -

The score was distributed as: one mark for each step correctly done, and zero for incorrectly done & not done, the total score converted into percentage as: -

-**score < 75%** was considered unsatisfactory level of practice.

-**Score ≥ 75%** was considered satisfactory level of practice

Tools III: wound assessment sheet **(including factors aggravating unhealed wounds)** It was be adapted from **(Bates-Jensen, et al 2019)**.

Part 1: wound characteristics sheet composed of 8closed end questions.

This part was designed to assess wound such as site, color, duration of wound, infection, care of wound, check foot for any wounds or changes, types of solution (normal saline or beta dine), and debridement.

Part 2: treatment regimen composed of 15closed end questions.

This part aimed to assess: - **pharmacological treatment regimen** include types of treatment (insulin or tablets), dose, and time of take medication, follow up for blood glucose level. **non pharmacological treatment regimen** include diet (number, component of meal) drinking water, exercise (types, number), activities of daily living.

3: **Assessment factors aggravating unhealed wounds of diabetic foot patients,** composed of 19closed end questions**, w**hich include **physical factors** included (smoking, chronic diseases, obesity, varicose veins**,** malnutrition, visual impairment, foot deformities, having high cholesterol level, take any other types of medications other than diabetes medication, feeling numbness or prick the needle shacks with feet, having swelling & redness in the foot and atherosclerosis)

Social factors included (economic capacity, access to health care, living alone at home and don't find anyone to support or provide care)

. **Psychological factors** included (psychological stress, neurological disorders, depression)

Scoring system: - the total score converted into percentage as: -

Low <50% of aggravating factors
Moderate 50-70% of aggravating factors
High >70% of aggravating factors

Tools IV: Wagner classification system

It was adapted from **(Wagner, 2001)** and aimed to assess the wound grade of diabetic foot ulcer.

Scoring system: -

- **Grade (0):** No open lesions; may have deformity or cellulitis.
- **Grade (1):** Superficial diabetic ulcer (partial or full thickness).
- **Grade (2):** Ulcer extension to ligament, tendon, joint capsule, or deep fascia without abscess or osteomyelitis.
- **Grade (3):** Deep ulcer with abscess, osteomyelitis, or joint sepsis.
- **Grade (4):** Gangrene localized to portion of forefoot or heel.
- **Grade (5):** Extensive gangrenous involvement of the entire foot.

Content validity

- The tools were revised and ascertained by a panel of five experts (jury) from medical surgical nursing department (4 Assistant professor, 1 lecturer) Faculty of Nursing, Benha University. Their opinions were regarding the content, format, layout, consistency, accuracy and relevancy of the tools according to their opinion's modifications were applied.

Reliability

- Testing reliability of the developed tools was done statistically through Cronbach's alpha test that was 0.96 for the patient's knowledge questionnaire and 0.80 for the barthel index. Indicating satisfactory level of reliability or high level.

Pilot study

- Pilot study was conducted on 10% of the study sample 9 patients with diabetic foot in order to test feasibility, clarity and applicability of the tools then necessary modifications were carried out. Also, the pilot study had served to estimate the needed time for each patient to fill the questionnaires. The patients who were included in the pilot study were excluded from the study sample because modifications were done after conducting the pilot study.

Ethical consideration:

- The aim of this study was explained to patients and they were assured that all information would be confidential and it would be used only for research purpose. Patients were informed that they are allowed to choose to participate or not in the study and they had the right to withdraw from the study at any time without giving any reasons.

Fieldwork :(Data collection)

- Data were collected from the beginning of January 2022 to the end of June 2022. After taking proper permission from hospital director, the investigator visited surgical departments at Benha University Hospital three days /week (Saturday, Monday, and Wednesday) from 1Pm to 3Pm according to hospital policy.The total number of patients during six months was 92 patients.
- The investigator started by introducing herself to the patients, the aim of the study and the components of the tools were explained to the patients who agreed to participate in the study prior to any data collection.

- Firstly, Patient's personal data obtained from patients. The investigator assessed each patient individually assessed clinical health status, and assessed patients' level of knowledge regarding to diabetes and diabetic foot ulcer using tool 1 and time required to fill the questionnaire was ranged from 10-15 minutes. Then the investigator assessed foot care practice using tool 2 and time required to fill the tool was ranged from 10-15 minutes, After that the investigator assessed wound characteristics ,treatment regimen , factors that aggravating unhealed wounds among diabetic foot patients using tool 3 and time required to fill the tool ranged from 10-15 minutes .Finally the investigator assessed wound grade of diabetic foot using tool 4 and time required to fill the tool ranged from 10-15 minutes. After data collection the investigator gave the patients proshour about diabetic foot and factors that aggravating unhealed wounds to increase their knowledge .
- **Results**

Table (1) shows, the personal data among studied patients. As regards age, 45.7% were within age group of (50- 60) years with a mean age of 49.08± 1.04 years. Concerning sex, 67.4 % of the studied group were male, 73.9 % were married and 56.5 % were residing in rural area. As for education and occupation, 45,7 % of the studied patients were illiterate and had free works as reported by 44.6% as well as 79.3% were living with the family.

Table (2) shows that the studied patients had overweight among 38.1% with a mean BMI of (29.34 ± 4.05), 26.1% of them had a family history of diabetes in the first degree relatives among 91.7%, especially of type I diabetes mellitus among 82.6%, where 54.3 % of them had been diagnosed since ≥ 10 years, besides 67.4 % reported that Bad habits as smoking and no exercise was the causative factor of diabetes. As regards to complications being experienced due to diabetes, 86.9% reported higher incidence of diabetic foot moreover 57.6% were admitted to hospital more than 3 times due to diabetes

Table (3) shows that This table, shows that aggravating level in psychological factors constituted high and moderate levels (15.2% & 71.7%, respectively). Also, regarding the percentages of the total score of aggravating factors of studied patients, the highest was psychological factors constituting 66.7 %, followed by physical factors constituting 58.0 %, while, the lowest was social factors constituting 33.0%.

Figure (1) illustrates grade of diabetic foot ulcer among patients with diabetes where grade 2 (Ulcer extension to ligament, tendon, joint capsule, or deep fascia without abscess or osteomyelitis) was of highest incidence among 32.6% of studied patient

Table (4) shows the relation between total knowledge level and personal data of studied patients, where there was a highly significant statistical relation (p= <0.001**) with age and education level revealing that 100.0 % of patients aged from 30-<40 years and 90.0% of patients who were illiterate had unsatisfactory level of knowledge. Also, there was a significant statistical relation (p= 0.020*) with education. Where 100.0 % of widowed patients had un satisfactory level while 57.1% of single patients had satisfactory level of knowledge.

Table (5) reveals that there was no significant statistical relation between clinical data and aggravating factors of unhealed wound among studied patients, while there was a statistically significant relation (p=0.042*) with times of hospital admission due to diabetes. Where 66.7% of patients who admitted twice to hospital were of a moderate level of aggravating factors.

Table (6) shows that there was a positive correlation between total knowledge and practice for the studied patients with p-value 0.011*, which indicates the higher the level of knowledge, the higher the level of practice.

Table (7) Multivariate linear regression model in this table presents that degree of unhealed wound among studied patients with diabetic foot ulcer was best predicted by sex, duration time from ulcer onset till referral, the followed lifestyle, total practice and degree of aggravating factors (p= <0.001**, <0.001**, 0.011*, <0.001** and <0.001**, respectively), accounting for 47.9% of the variance of unhealed wound degree.

Results

Table (1): Distribution of the studied patients according to their personal data (n = 92).

Patients' personal data		No.	%
Age (in year)	20-<30	12	13.0
	30-<40	10	10.9
	40-<50	28	30.4
	50- 60	42	**45.7**
	Mean ± SD	**49.08± 1.04**	
Sex	Male	62	**67.4**
	Female	30	32.6
Marital status	Married	68	**73.9**

	Single	14	15.2
	Divorced	4	4.3
	Widowed	6	6.5
Residence	Urban	40	43.5
	Rural	52	**56.5**
Education level	Illiterate	42	**45.7**
	Read and write	17	18.5
	Secondary education	18	19.6
	High education	15	16.3
Occupation	Employee	22	23.9
	Housewife	29	31.5
	Free work	41	**44.6**
Living status	Living alone	19	20.7
	Living with the family	**73**	**79.3**

Table (2): Distribution of the studied patients according to their clinical health status (n = 92).

Patients' clinical health status	No.	%
BMI (kg/cm^2)		
Normal weight (18.5–24.9)	10	10.9
Overweight (25–29.9)	**35**	**38.1**
Obese class I (30 -34.9)	20	21.7
Obese class II (35 -39.9)	12	13.0
Obese class III (≥ 40)	15	16.3
Mean ± SD	29.34 ± 4.05	
Presence of family history of diabetes		
Yes	**24**	**26.1**
No	68	73.9
Degree of kind ship related family history of diabetes **(n= 24)**		
First degree	**22**	**91.7**
Second degree	2	8.3
Type of diabetes mellitus		
Type I	76	**82.6**
Type II	16	17.4
Time since diagnosis		
< one year	8	8.7
1-< 5 years	14	15.2
5- <10 years	20	21.7
≥ 10 years	50	**54.3**
Mean ± SD	**9.21± 1.00**	
Factors caused diabetes #		
Genetic factors	16	17.4
Bad habits as smoking and no exercise	62	**67.4**

Psychological factors	56	60.9
Don’t know	2	2.2
Complications experienced due to diabetes #		
Diabetic foot	80	**86.9**
Damage to kidney	14	15.2
Numbness of hands and feet	22	23.9
numbers of hospital admission due to diabetes		
Once	11	12.0
Twice	12	13.0
Three times	16	17.4
More than 3 times	53	**57.6**

Table (3) Distribution of total aggravating factors of unhealed wound among studied patients with diabetes (n = 92).

Aggravating factors of unhealed wound	Total level			Mean ± SD	Mean %	Ranking
	Low <50%	Moderate 50-70%	High >70%			
Physical factors	**27 (29.3)**	**54 (58.7)**	**11 (12.0)**	**8.70 ± 2.16**	**58.0%**	2
Social factors	**61(66.3)**	**27(29.3)**	**4(4.3)**	**1.32 ± 1.07**	**33.0%**	3
Psychological factors	**12(13.0)**	**66(71.7)**	**14(15.2)**	**2.00 ± 0.59**	**66.7%**	1

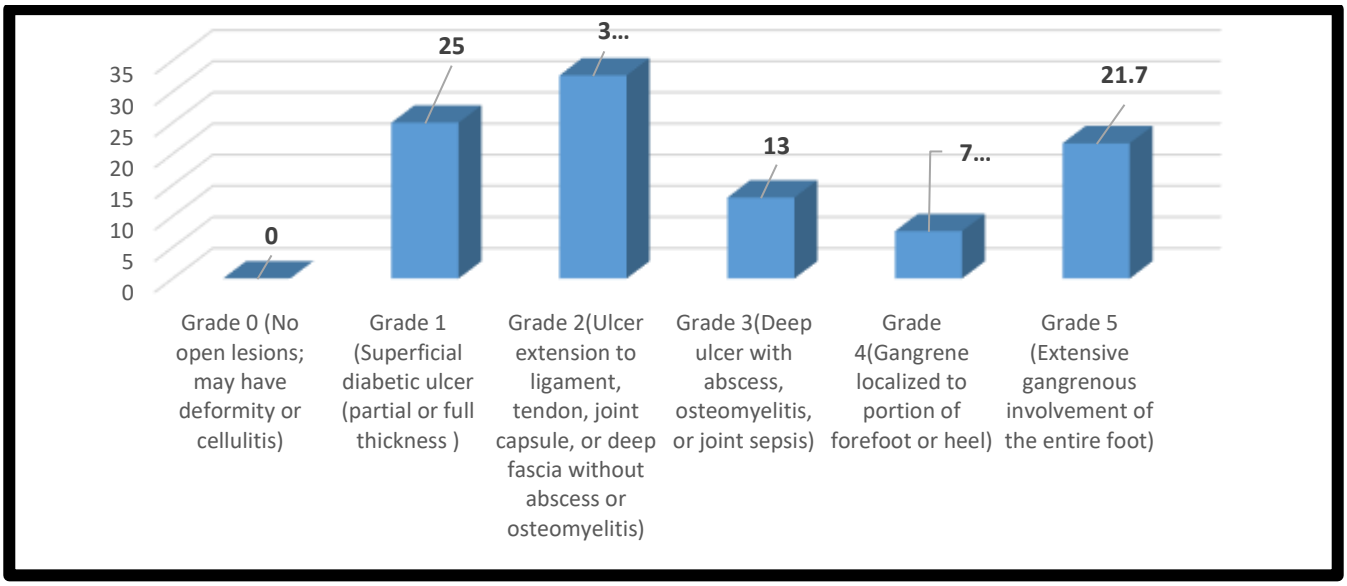

Figure (1): Distribution of studied patients according to grade of diabetic foot ulcer (n = 92).

Table (4): Relation between total knowledge and personal data of the studied patients (n = 92).

Personal data	Total knowledge level				Chi-square	
	≥ 75 %		<75%		X^2	P value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Age						
20-<30	10	83.3	2	16.7	23.651	**<0.001****
30-<40	0	0.0	10	100.0		
40-<50	8	28.6	20	71.4		
50-60	8	19.0	34	81.0		
Sex						
Male	16	25.8	46	74.2	0.565	0.452 n.s
Female	10	33.3	20	66.7		
Marital status						
Married	16	23.5	52	76.5		
Single	8	57.1	6	42.9		
Divorced	2	50.0	2	50.0	9.807	**0.020** *
Widowed	0	0.0	6	100.0		
Residence					0.627	0.428 n.s
Urban	13	32.5	27	67.5		

Rural	13	25.0	39	75.0		
Education					36.521	**<0.001****
Illiterate	4	9.5	38	90.5		
Read & write	7	41.2	10	58.8		
Secondary	2	11.1	16	88.9		
University	13	86.7	2	13.3		

(n.s) Not significant (*) Statistically significant (**) Highly statistically significant

Table (5): Relation between total aggravating factors and clinical data of the studied patients (n = 92).

Clinical data	Total aggravating factors						Chi-square	
	< 50%		50 - 70%		>70%		X^2	P value
	Low		Moderate		High			
	No.	%	No.	%	No.	%		
Presence of family history of diabetes							1.471	0.479 n.s
Yes	6	25.0	13	54.2	5	20.8		
No	23	33.8	37	54.4	8	11.8		
Time since diagnosis							9.165	0.165 n.s
< one year	2	25.0	6	75.0	0	0.0		
1-< 5 years	8	57.1	6	42.9	0	0.0		
5- <10 years	4	20.0	12	60.0	4	20.0		
≥ 10 years	15	30.0	26	52.0	9	18.0		
numbers of hospital admission due to diabetes							13.037	**0.042***
Once	5	45.5	6	54.5	0	0.0		
Twice	2	16.7	8	66.7	2	16.7		
Three times	2	12.5	8	50.0	6	37.5		
More than 3 times	20	37.7	28	52.8	5	9.4		

(n.s) Not significant (*) Statistically significant

Table (6): Correlation coefficient between studied patients' total knowledge and practice of foot care (n=92).

Variables	Total knowledge	
	r	P value
Total practice	.265	**0.011***

****A Highly Statistical significant p ≤ 0.001**

Table (7): Multiple Linear Regression Analyses for Predictor Variables for degree of unhealed wound among studied patients with diabetic foot ulcer (N=92)

Predictor Variable For degree of unhealed wound	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.853	1.514		-.564	.575

Age	.200	.163	.141	1.230	.222
Sex	-1.158	.279	-.368	-4.146	<0.001
Marital status	-.164	.145	-.094	-1.132	.261
BMI	-.260	.172	-.201	-1.515	.134
Type of diabetes	-.045	1.166	-.011	-.038	.970
Site of wound	-.085	.262	-.028	-.324	.747
Duration time from ulcer onset till referral	1.186	.204	.560	5.822	<0.001
Type of pharmacological Diabetes treatment	1.439	1.196	.361	1.203	.233
Followed lifestyle	.073	.028	.255	2.617	.011
Knowledge level	.003	.022	.014	.157	.876
Practice level	.388	.104	.665	3.709	<0.001
Degree of aggravating factors	-.496	.136	-.663	-3.650	<0.001
Adjusted R^2= 0.479			**P = <0.001****		

*: Statistically significant at $p \leq 0.05$ (**B**) Beta Co-Efficient (SEB) Standard Error

Discussion

In relation to demographic characteristics, the results of the present study showed that less than half of the studied patients between 50 and 60 years

This finding agrees with **Galal, et al (2021),** who studied" Predictors of Foot Ulcers Among Diabetic Patients at a Tertiary Care Center ", and showed that less than half of the studied patients age were 50–60 years this may be due to to older age affects wound healing in diabetic patients

This finding disagrees with **Abd El ghani , eta l (2022) ,** who studied "afoot ulcer prevention guideline program for elderly diabetic patients " and showed that three quarters of patients aged were 60-65 years

Regarding gender the present study showed that two thirds of the studied patients were male. From the investigator point of view this may be due to male having jobs and exposed to work hazards more than female in addition to occupations that need prolonged standing this lead to develop diabetic foot.

This finding agrees with **Sachin, Manasa, & Subhashree (2021),** Who studied "Study of socio-demographic, behavioural and clinical risk factors of diabetic foot in a tertiary care center ". and showed that male was more commonly affected with diabetic foot than female.

Regarding marital status, the present study showed that three quarters of the studied patients were married. This finding agrees with **Aboelezz, Bahaa El Din & Refaat(2021),** who showed that the majority of studied patient were married.

Regarding Residence, the present study showed that more than half of the studied patients were residing in rural area.

This finding agrees with **Isa& Pace (2021), Who** studied" is ethnicity an appropriate measure of health care marginalization? A systematic review and meta-analysis of the outcomes of diabetic foot ulceration in Aboriginal populations". and reported that a large proportion of the studied patients were live in rural areas.

This finding disagrees with **Abukanna, et al (2021),** Who studied "Socio-economic impact on families with diabetic foot ulcer and amputation patients".and showed majority of patients lived in urban area.

Regarding educational level, the present study showed that less than half of the studied patients were illiterate.This finding agrees with **Fekadu, et al (2019).**who studied "Challenges and factors associated with poor glycemic control among type

2 diabetes mellitus patients"**.** and showed that about two third of the studied patients were illiterate .

Regarding occupation, the present study showed that approximately two fifth of studied patients had free works.

This finding disagrees with **Hamzway, et al (2022),** Who studied "Awareness of Elderly Patients Regarding Diabetic Foot Ulcer Prevention at EL Fayoum General Hospital". and showed that three quarters of patients not have work.

This finding disagrees with **Saini & Sharma (2021),** Who studied "the knowledge regarding foot care among the diabetes patients".and showed that approximately two fifth of studied patients were work at Government Services.

Regarding body mass index, the present study showed that more than one third of studied patients had overweight. This finding agrees with **Shabir & Muthanna (2022),** who studied "Level of Awareness About Risk Factors Associated with Diabetic Foot in Type 2 Diabetic Patients", and found that more than two fifth of studied patients were overweight.

Regarding family history, the present study showed that three quarters of studied patients no had family history of diabetes mellitus, this finding agrees with **Verma, et al (2021),** who studied" Diabetic Foot Care Knowledge and Practices in Rural North India "and showed that less than three fifth of studied patients had no family history of diabetes mellitus.

Also, this finding disagrees with **Al Amri, et al (2021),** who studied "Knowledge, Attitude and Practice Regarding Risk of Diabetic Foot Among Diabetic Patients "**.**and showed that more than two third of studied patients had family history of diabetes.

Regarding diabetes type, the present study showed that majority of the studied patients were have Type 1 diabetes mellitus, This finding disagree with **Mohamed, et al (2021),** who studied "Knowledge, Attitude and Practice on Common Diabetic Patients among Diabetic Complications "and showed that less than half of the studied patients were have Type 2 diabetes mellitus

Regarding duration of being diabetic, the present study showed that more than half of studied patients had been diagnosed since ≥ 10 years. This finding agrees with **Mohamed, et al (2021),** who showed that about two third of the studied patients had diabetes for duration more than 10 years.

This finding agrees with **Mathew& Rajeev (2021),** who studied "Distribution of the initial site of infection in diabetic foot and associated initiating etiologies". and showed that about two third of patients had diabetes for more than 10 years

This finding disagrees with **Zhu, et al (2022),** who studied" Factors Associated with Healing Outcomes in Primary Care Patients with Diabetic Foot Ulcers" and found that the majority of studied patients had diabetes mellitus from less than 5 years.

Regarding risk factors, the present study showed that more than two thirds of studied patients reported that bad habits as smoking and no exercise was the causative factor of diabetes. This finding agrees with **Yun, et al (2022).** Who studied "Adherence to Healthy Lifestyle Behaviors as a Preventable Risk Factor for Severe Hypoglycemia in People with Type 2 Diabetes "who found that unhealthy lifestyle factors, as smoking, and lack of regular exercise, were significantly associated with diabetes mellitus.

Regarding complication experienced due to diabetes, the present study showed that majority of studied patients had higher incidence of diabetic foot.

This finding agrees with **Jwad & AL-Fatlawi (2022)** Who studied "Types of Diabetes and their Effect on the Immune System"**.,** and showed that the majority of studied patients had diabetic foot as a complications of diabetes mellitus .

This finding disagrees with **Tuha, et al (2021),** Who studied "Knowledge and practice on diabetic foot self-care and associated factors among diabetic patients at Dessie referral hospital". and showed that quarter of studied patients had diabetic foot as a complication of diabetes mellitus.

Regarding number of Hospital admission due to diabetes ,the present study showed that more than half of studied patients were admitted to hospital more than 3 times due to diabetes .

This finding agrees with **Røikjer, et al (2022),** Who studied" Incidence, hospitalization and mortality and their changes over time in people with a first ever diabetic foot ulcer" and reported that approximately two third of studied patients with diabetic foot ulcer were admitted to hospital more than 3 times due to diabetes.

Regarding level of practice ,the present study showed that more than half of the studied patients had satisfactory level of practice. This finding agrees with **Al Amri, et al (2021),** who showed that the majority of the studied patients wash their feet daily, but about half of them wear cotton socks, about half of the patients may walk barefoot which is unsafe due to the higher risk of trauma.

This finding disagrees with **Ghani & Ramadan (2022),** Who studied "Awareness of Elderly Patients Regarding Diabetic Foot Ulcer Prevention at EL Fayoum General Hospital " and showed that more than half of studied patients were not adequate reported practices about foot care

Regarding physical factors, the present study showed that about two third of aggravating factors was physical factors as smoking, varicose veins, obesity.

This finding agrees with **Jalilian, Sarbarzeh & Oubari (2020),** Who studied" Factors related to severity of diabetic foot ulcer: a systematic review. Diabetes, metabolic syndrome and obesity" and showed that factors such as smoking and obesity, micro vascular complications, high cholesterol levels, which affect the severity of a foot ulcer.

Regarding social factors, the present study showed that the social factors constitute third of the aggravating factors of diabetic foot ulcer**.**

This finding disagrees with **Anderson, et al (2018).** Who studied "Social deprivation modifies the association between incident foot ulceration and mortality in type 1 and type 2 diabetes "and showed that social factors were significantly associated with diabetic foot ulcer.

Regarding psychological factors, the present study showed that psychological factors were constituted two third of aggravating factors of unhealed wounds of diabetic foot patients.

This finding agrees with **Polikandrioti, et al (2020),** Who studied "Depression in diabetic foot ulcer: Associated factors and the impact of perceived social support and anxiety on depression" and showed that slightly two fifth of studied patients had anxiety and depression.

Regarding wound grade, the present study showed that grade of incidence of diabetic foot ulcer among patients with diabetes where grade 2 (Ulcer extension to ligament, tendon, joint capsule, or deep fascia without abscess or osteomyelitis) was of highest incidence among more than third of studied patients.

This finding agrees with **Sharma, et al (2022),** Who studied" the efficacy of inflammatory markers in diagnosing infected diabetic foot ulcers and diabetic foot osteomyelitis": and reported that the majority of studied patient had for grade 2 of diabetic foot ulcer.

Regarding the Relation between total knowledge and personal data (age) of the studied patients, there was a highly significant statistical relation between the age of studied patients and their knowledge.

This finding agrees with **Hassan, et al (2021),** who studied" Impact of Health Intervention about Foot Self-Care Behavior among Adult and Elderly Diabetic Patients ". and showed that there was a statistically significant relationship between the age of the studied sample and their knowledge.

Regarding the Relation between total knowledge and personal data (education) of the studied patients, there was a significant statistical relation between knowledge and education. This finding agrees with

Al Amri, et al(2021), who showed that high knowledge was associated with high education.

Regarding the Relation between total knowledge and personal data (marital status) of the studied patients, there was a significant statistical relation between knowledge and marital status. Where widowed patients had unsatisfactory level while single patients had satisfactory level of knowledge.

This finding disagrees with **Olowo, Iramiot& Ssenyonga (2022),** Who studied" Knowledge of diabetic foot complication, self-care beliefs and practices among patients attending a tertiary hospital in Eastern Uganda". and reported that widowed patients had satisfactory level while single patients had unsatisfactory level of knowledge.

Considering Relation between total aggravating factors and clinical data of the studied patients, there was a statistically significant relation with times of hospital admission due to diabetes. Where two thirds of patients who admitted twice to hospital were of a moderate level of aggravating factors.

Regarding Correlation coefficient between studied patients' total knowledge and practice of foot care, there was a positive correlation between total knowledge and practice for the studied patients which indicates the higher the level of knowledge, the higher the level of practice.

This finding agrees with **Gurmu, Gela & Aga(2018).** Who studied "Factors associated with self-care practice among adult diabetes patients "and showed that statistical significance between the Studied patient's total knowledge score and their total self-care practice.

Regarding Multiple Linear Regression Analyses for Predictor Variables for degree of unhealed wound among studied patients with diabetic foot ulcer ,the present study showed that that degree of unhealed wound among studied patients with diabetic foot ulcer was best predicted by sex, duration time from ulcer onset till referral, the followed lifestyle, total practice and degree of aggravating factors

This finding agrees with **Margolis, et al (2022),** who studied "Further evidence that wound size and duration are strong prognostic markers of diabetic foot ulcer healing", and showed that wound duration are strong predictors of healing.

Conclusion

Based on findings of the current study, it can be concluded that majority of the studied patients had unsatisfactory level of knowledge regarding diabetes and diabetic foot ulcer, more than half of the studied patients had satisfactory level of practice regarding diabetic foot ulcer, about two third of studied patients were utilizing unhealthy life style pattern regarding diet and exercise, there was a positive correlation between total knowledge and practice for the studied patients, there was a statistically significant relation between aggravating factors of unhealed wound and age of studied patients .

Based on the findings of the present study, the following recommendation are made:

-continuous patient education about diabetic foot .

-Providing booklet to the patients including basic information about diabetic foot care

-Customized patient education strategies are necessary to enhance the overall knowledge to decrease diabetic foot complications.

-Implement health education programs related to diabetic foot should be accessible for diabetic foot patients to improve health and to lower the risk of the physical, social, and emotional impacts

- Increase health awareness program to identify diabetic risk factors and adopting a healthy lifestyle and compliance to therapeutic regimen.

-Further studied about care of diabetic foot ulcer at different setting in Egypt and on large probably sample to generalize the results.

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