CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.3370450

Available online at: http://www.iajps.com *Research Article*

AMPUTATIONS IN DIABETIC FOOT PATIENTS

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Article Received: June 2019 **Accepted:** July 2019 **Published:** August 2019

Abstract:

Background: *Diabetes complications include nerve damage and poor blood circulation. These problems make the feet vulnerable to skin sores (ulcers) that can worsen quickly and are difficult to treat. The frequency of minor and major amputation increases with the higher grades of diabetic foot. Poor glycemic control is a significant risk factor for amputation in diabetic foot patients.*

Objective: *Objective of this study is to access the various factors and there frequencies which lead to amputations in diabetic foot patients*

Material and Methods:

Study Design: *Longitudinal study*

Study Setting: *The study was conducted at Diabetic Clinic, Medical, Surgical and Orthopedic Wards Allama Iqbal Medical College, Jinnah Hospital, Lahore.*

Duration: *One month*

Inclusion criteria: *It includes diagnosed cases of type 1 and type 2 diabetes who had developed foot ulcers and undergone amputations.*

Data Collection and analysis: *The patient agreed to participate will be asked to sign informed consent. A self-designed performa consisting of closed and open ended questions will be provided to each patient. Performa contains demographic related item such as age, gender, ethnicity, address, religion, and economical history of mother and father. A patient will be guided how to fill the performa and be assured that their response will be treated with utmost confidentiality.Data will be entered and analyzed in SPSS Version: 17.0.*

Results: *Total of 70 patients were taken as subjects for the study. Mean age of the subjects was 50.16 years with standard deviation of 6.28 years. 62.86% were males and 37.14% were females. 34.29% were diagnosed of Type 1 and 65.71% as Type 2 DM. 77.14% had DM for 1-15 years and 22.86% had DM for 16-35 years*

Conclusions: *This study has identified that most common and significant predictors were gender, type of DM, duration and onset, PVDs and DFUs.*

Key words: *Diabetes Mellitus, Amputation, LEAs.*

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Please cite this article in press Umar Farooque et al., ***Amputations In Diabetic Foot Patients.,*** *Indo Am. J. P. Sci, 2019; 06(08).*

INTRODUCTION:

Diabetes complications include nerve damage and poor blood circulation. These problems make the feet vulnerable to skin sores (ulcers) that can worsen quickly and are difficult to treat. The frequency of minor and major amputation increases with the higher grades of diabetic foot. Poor glycemic control is a significant risk factor for amputation in diabetic foot patients [1].

A retrospective study was carried out from September 2008 to February 2009 in the Department of Endocrinology, Diabetic lower limb and Podiatric surgery at Amrita Institute of Medical Sciences, Kerala, which is a tertiary care super speciality hospital. A total of 114 patients had undergone amputation (minor and major) during this period. The minor amputations included toe amputations, ray and partial foot amputation. The study group consists of 48 (42.12%) of the patients who had undergone a single toe amputation [2].

A population-based cohort study was conducted in a representative Swedish region. All vascular LLAs (at or proximal to the transmetatarsal level) performed from 1997 through 2006 were consecutively registered and classified into initial unilateral amputation, contralateral amputation, or reamputation. The incidence rates were estimated in the diabetic and non diabetic general population aged ≥45 years. In the general population aged ≥45 years, the incidence of vascular LLA at or proximal to the transmetatarsal level is eight times higher in diabetic than in non diabetic individuals [3].

Outpatients Department of the Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences, Karachi, from January 2007 to December 2010 conducted a research. A total of 1091 subjects participated in this study. Mean age in diabetic was 49.6± 15.2.Amputations among diabetics were 21.4%. (233 people) [4].

Another study was conducted in Netherland. The purpose of this study was to identify the incidence of diabetes-related lower-extremity amputations in the Netherlands. Age- and gender-adjusted lower-extremity amputation rates per 10,000 persons with diabetes by level were the following: toe 12.39, foot 2.42, leg 7.82, thigh 2.54, and total 25.17. People with diabetes were 20.3 times more likely to experience a lower-extremity amputation than people without diabetes [5].

A study was conducted to measure the 12-year incidence (1982–1994) of non traumatic lower extremity amputations (LEAs) in Nauruans, a population at high risk for NIDDM, and to determine the risk factors for amputation in Nauruans with diabetes. The incidence of LEAs in diabetic Nauruans was higher than in other populations after adjusting for age and duration [6].

A study was conducted to examine the 25-year cumulative incidence of lower-extremity amputation (LEA) in people with type 1 diabetes. The overall 25-year incidence of LEA was 10.1%. In multivariate analyses (results reported as odds ratio; 95% CI), being male (3.90; 2.29–6.65), heavy smoking (2.07; 1.11–3.85), having hypertension (3.36; 1.91–5.93), diabetic retinopathy (2.62; 1.13–6.09), neuropathy (1.68; 1.02–2.76), and higher HbA1c (per 1% 1.40; 1.24–1.58) were independently associated with the incidence of LEA. Results show a high 25-year incidence of LEA and suggest that glycemic control may result in reduction in its incidence [7].

Data on the incidence rates of amputations and their relative risk in diabetic suhjects compared with the non diabetic population in a study done in Germany. Non traumatic lower limb amputations were performed on 106 residents of Leverkusen in 1990 and 1991. Mean age was 72.0 years (SD10.4, median73.5,range 46-90). Mean diabetes duration obtained for 77 subjects was15.9 years (SD 10.1, median 15.0, range0-55). Amputation levels were as follows: toe, 36; forefoot, 23; lower leg, 14; thigh, 33.8

OBJECTIVES:

Objective of this study is to access the various factors and there frequencies which lead to amputations in diabetic foot patients.

OPERATIONAL DEFINITION:

Diabetes mellitus is a syndrome of chronic hyperglycemia due to relative insulin deficiency, insulin resistance or both.

- A diabetic foot is a foot that exhibits any pathology that results directly from diabetes mellitus or any long-term (or "chronic") complication of diabetes mellitus.
- Amputation is the removal of a limb by trauma, medical illness, or surgery. As a surgical measure, it is used to control pain or a disease process in the affected limb, such as malignancy or gangrene

MATERIAL AND METHODS:

STUDY DESIGN:

- Longitudinal study

STUDY SETTING:

The study was conducted at Diabetic Clinic, Medical, Surgical and Orthopedic Wards Allama Iqbal Medical College, Jinnah Hospital, Lahore.

DURATION OF STUDY:

- One month

SAMPLE SIZE: 70 patients**.**

SAMPLING TECHNIQUE:

- Non probability / purposive sampling

SAMPLE SELECTION:

Inclusion criteria:

It included diagnosed cases of type 1 and type 2 diabetes who had developed foot ulcers and undergone amputations.

Exclusion criteria:

Undiagnosed cases of diabetes

DATA COLLECTION PROCEDURE:

The patient agreed to participate was asked to sign informed consent. A self-designed performa consisting of closed and open ended questions was provided to each patient. Performa contained demographic related item such as age, gender, ethnicity, address, religion, and economical history of mother and father. A patient was guided how to fill the performa and was assured that their response will be treated with utmost confidentiality.

DATA ANALYSIS PROCEDURE:

Data was analyzed by SPSS version 17.0. Mean and standard deviation will be calculated for numerical variables like age, duration of diabetes Mellitus. Frequency tabulation and percentages was generated for nominal variables.

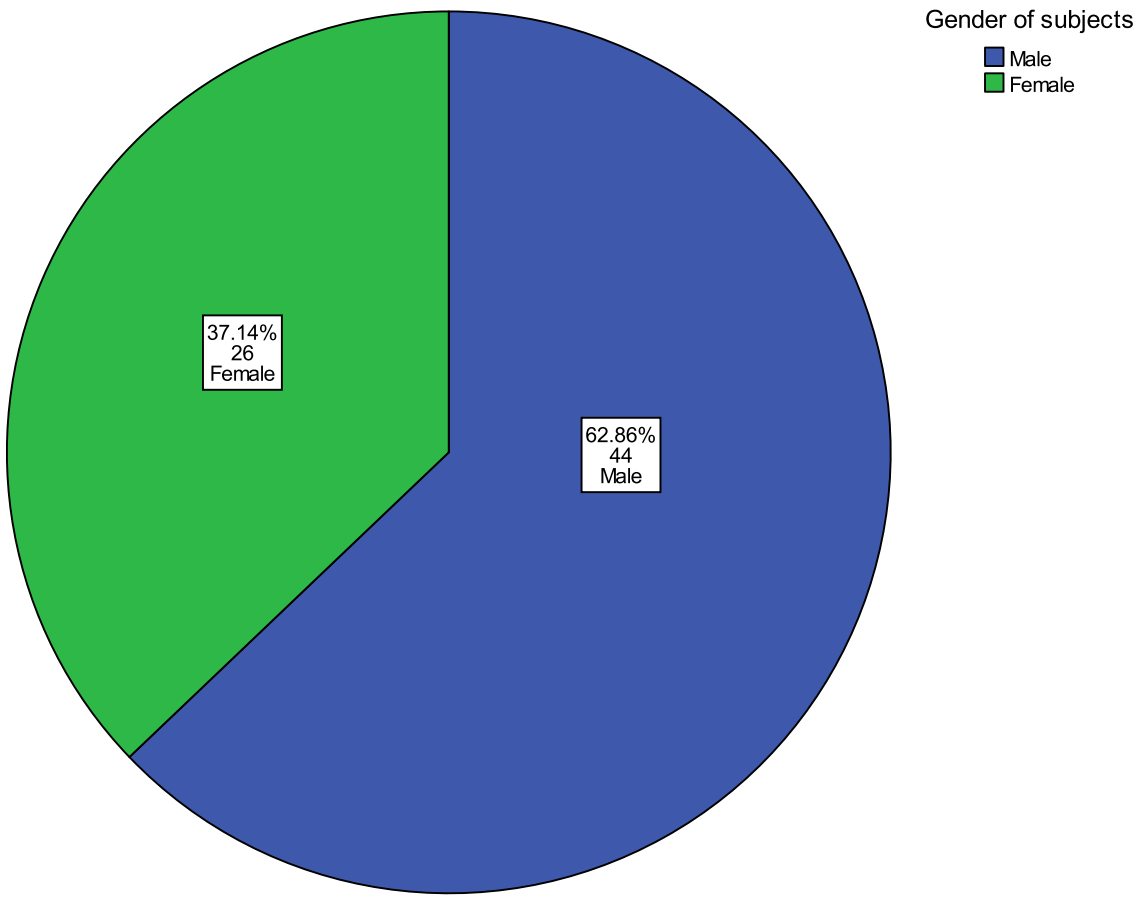
RESULTS AND MAIN FINDINGS:

Statistics

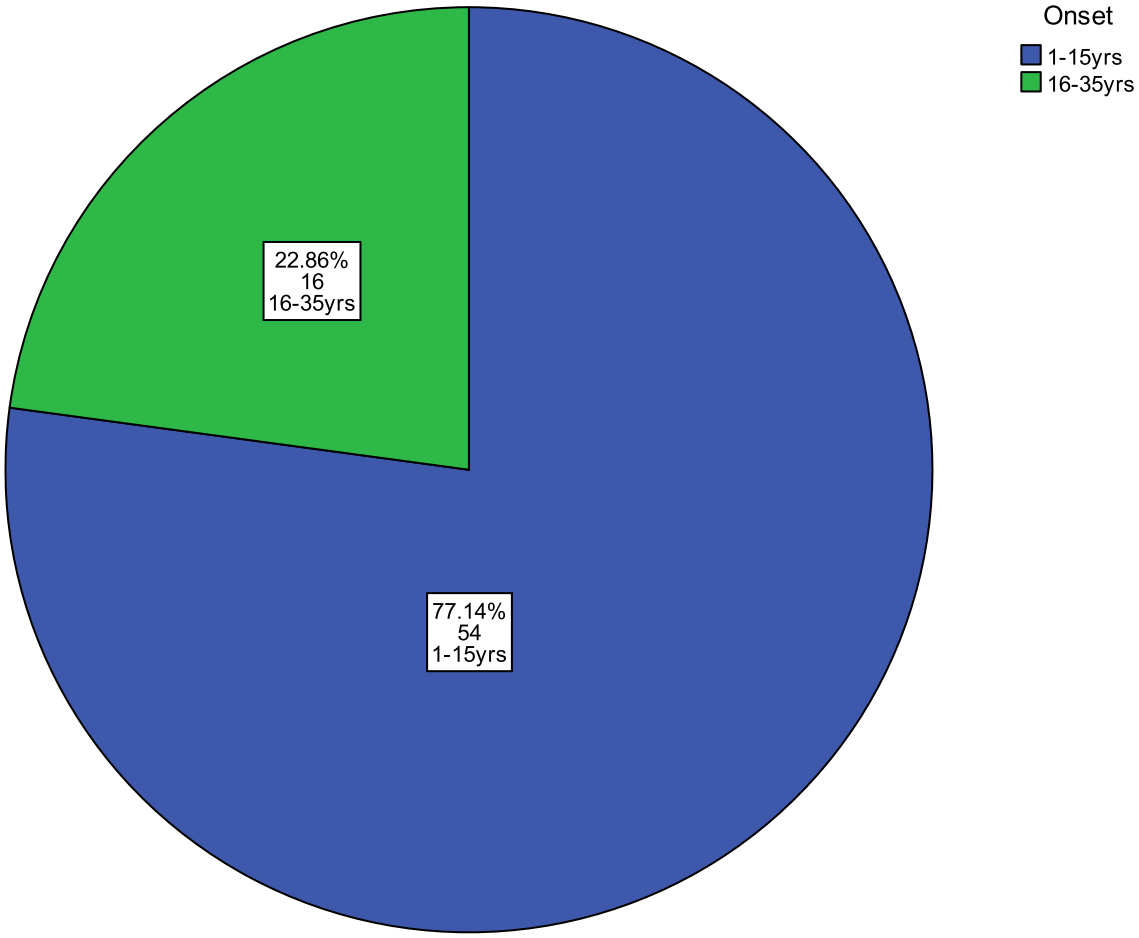
Table 1

Age of subjects

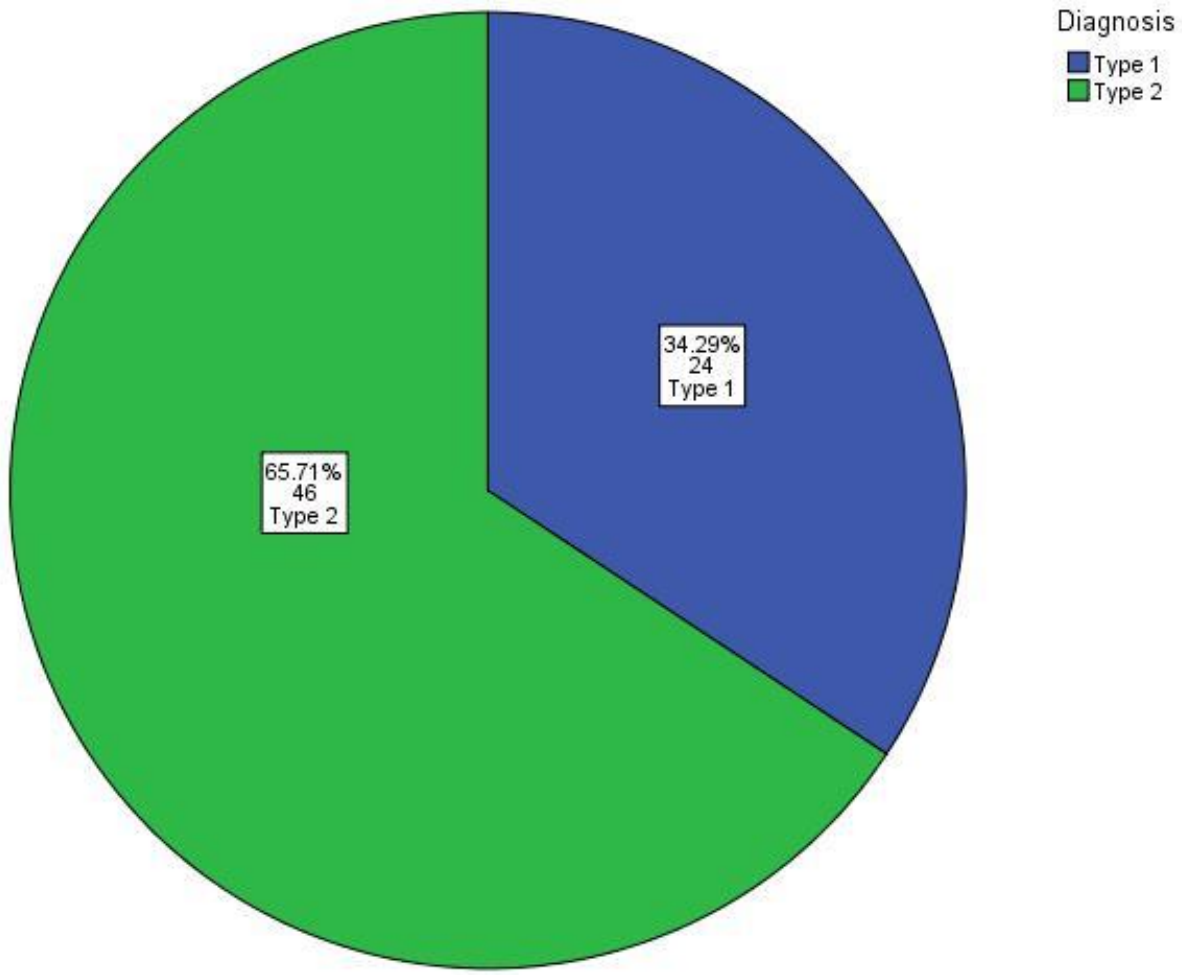
N	Valid	70
	Missing	0
	Mean	50.16
	Median	49.00
	Mode	45
	Std. Deviation	6.824
	Minimum	40
	Maximum	69



Pie Chart 1



Pie Chart 2



Pie Chart 3

Table 2

$Factors Frequencies

		Responses		
		N	Percent	Percent of Cases
$Factors[a]	InsTherapy	54	13.6%	77.1%
	AntiDiabetics	36	9.1%	51.4%
	FamilyHist	44	11.1%	62.9%
	HistDFU	47	11.9%	67.1%
	HistAMP	9	2.3%	12.9%
	HistTrauma	17	4.3%	24.3%
	HistINF	50	12.6%	71.4%
	HistPVD	34	8.6%	48.6%
	HTN	16	4.0%	22.9%
	FootHygn	38	9.6%	54.3%
	QuacksHomeo	8	2.0%	11.4%
	Compliance	43	10.9%	61.4%
Total		396	100.0%	565.7%

a. Dichotomy group tabulated at value 1.

$Factors*Age2 Crosstabulation

			Age		
			40 – 55 years	55 – 70 years	Total
$Factors[a]	InsTherapy	Count	41	13	54
		% within Age2	71.9%	100.0%	
	AntiDiabetics	Count	27	9	36
		% within Age2	47.4%	69.2%	
	FamilyHist	Count	40	4	44
		% within Age2	70.2%	30.8%	
	HistDFU	Count	38	9	47
		% within Age2	66.7%	69.2%	
	HistAMP	Count	9	0	9
		% within Age2	15.8%	.0%	
	HistTrauma	Count	17	0	17
		% within Age2	29.8%	.0%	
	HistINF	Count	46	4	50
		% within Age2	80.7%	30.8%	
	HistPVD	Count	25	9	34
		% within Age2	43.9%	69.2%	
	HTN	Count	12	4	16
		% within Age2	21.1%	30.8%	
	FootHygn	Count	25	13	38
		% within Age2	43.9%	100.0%	
	QuacksHomeo	Count	8	0	8
		% within Age2	14.0%	.0%	
	Compliance	Count	30	13	43
		% within Age2	52.6%	100.0%	
Total		Count	57	13	70

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

$Factors*gender Crosstabulation

			Gender of subjects		Total
			Male	Female	
$Factors[a]	InsTherapy	Count	39	15	54
		% within gender	88.6%	57.7%	
	AntiDiabetics	Count	25	11	36
		% within gender	56.8%	42.3%	
	FamilyHist	Count	29	15	44
		% within gender	65.9%	57.7%	
	HistDFU	Count	25	22	47
		% within gender	56.8%	84.6%	
	HistAMP	Count	5	4	9
		% within gender	11.4%	15.4%	
	HistTrauma	Count	6	11	17
		% within gender	13.6%	42.3%	
	HistINF	Count	28	22	50
		% within gender	63.6%	84.6%	
	HistPVD	Count	30	4	34
		% within gender	68.2%	15.4%	
	HTN	Count	9	7	16
		% within gender	20.5%	26.9%	
	FootHygn	Count	25	13	38
		% within gender	56.8%	50.0%	
	QuacksHomeo	Count	6	2	8
		% within gender	13.6%	7.7%	
	Compliance	Count	26	17	43
		% within gender	59.1%	65.4%	
Total		Count	44	26	70

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

$Factors*q1 Crosstabulation

			Diagnosis		
			Type 1	Type 2	Total
$Factors[a]	InsTherapy	Count	19	35	54
		% within q1	79.2%	76.1%	
	AntiDiabetics	Count	7	29	36
		% within q1	29.2%	63.0%	
	FamilyHist	Count	24	20	44
		% within q1	100.0%	43.5%	
	HistDFU	Count	11	36	47
		% within q1	45.8%	78.3%	
	HistAMP	Count	9	0	9
		% within q1	37.5%	.0%	
	HistTrauma	Count	5	12	17
		% within q1	20.8%	26.1%	
	HistINF	Count	13	37	50
		% within q1	54.2%	80.4%	
	HistPVD	Count	12	22	34
		% within q1	50.0%	47.8%	
	HTN	Count	8	8	16
		% within q1	33.3%	17.4%	
	FootHygn	Count	8	30	38
		% within q1	33.3%	65.2%	
	QuacksHomeo	Count	5	3	8
		% within q1	20.8%	6.5%	
	Compliance	Count	12	31	43
		% within q1	50.0%	67.4%	
Total		Count	24	46	70

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

RESULTS:

The study was conducted to access the factors and incidence of amputations in diabetic foot patients at Allama Iqbal Medical college and Jinnah Hospital, Lahore. Performas were filled after taking permission from the patients admitted and records were accessed for last two months. After that, entry was made on SPSS version 17 and was sent to be analyzed. Total of 70 patients were taken as subjects for the study. Mean age of the subjects was 50.16 years with standard deviation of 6.28 years. 62.86% were males and 37.14% were females. 34.29% were diagnosed of Type 1 and 65.71% as Type 2 DM. 77.14% had DM for 1-15 years and 22.86% had DM for 16-35 years. 77.1% were receiving insulin. 51.4% were on oral hypoglycemics. 62.9% had family history of DM. 67.1% had history of foot ulcers. 12.9% had history of previous amputations. 24.3% had previous history of trauma.71.4% had history of infection. 48.6% had history of peripheral vascular disease.22.9% had hypertension. 54.3% took foot hygiene serious. 11.4% accessed quacks/homeopathy.61.4% had good compliance to their physician directions.

DISCUSSION:

.The main objective of this research was to study different factors which led to the amputations in diabetic foot ulcer patients. In our study 62.86% were male as seen in study carried in Jinnah Postgraduate Medical Center, Karachi[1] . Similarly, mean age of subjects is 50.16 years in our study and is consistent with mean age of 50.88 years in study conducted in Karachi[1]. In our study 65.71% had DM type 2 in contrast to 93.3% of subjects having type 2 in study conducted in Karachi[1].

According to our study, 77.14% of subjects who had undergone amputations had DM for 1-15 years which is consistent with the study conducted at Kaiser Permanente Medical Care Program[6] which gave duration of 14 years.

In our study, 48.6% subjects had history of Peripheral vascular complications which was also shown to be a predictable factor of amputation in study conducted in 1995[18].

Similarly, our study showed peripheral vascular complications and duration of DM to be statistically significant regarding amputations be consistent with study conducted in 1998 by Arch Med Res[19.]

Patients with history of diabetic foot ulcers are more likely to have undergone amputations as shown by our study which showed 67.1% subjects had previous DFUs consistent with study among Medicare beneficiaries[20]

CONCLUSION:

- This study has identified that most common and significant predictors were gender, type of DM, duration and onset, PVDs and DFUs.
- Amputations were more common in males, with duration of disease for 1-15 years and having type 2 DM. Patients with PVDs and previous history of foot ulcers.

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