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A STUDY ON ASSESSMENT OF SKIN MANIFESTATIONS IN FOOT AMONG DIABETIC PATIENTS IN A RURAL AREA.

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ABSTRACT

Background: Diabetes mellitus is a metabolic disorder which has affected more than 347 million people, worldwide. The cutaneous foot manifestations in diabetes are a common finding which pose a significant morbidity among these patients. Skin manifestations may present as the first clinical sign and thereby helps in early diagnosis and prompt management.

Objective: To assess the skin manifestations in foot among diabetic patients in a rural area.

Methodology: 150 diabetic patients attending the Rural Health and Training Centre, Vayalanallur of Sri Ramachandra Medical College and Research Institute were included in the study. After obtaining the consent, the participants details were collected using structured questionnaire. Clinical examinations were done to identify skin manifestations in the foot like dryness, fissures, callosities, foot ulcers, tinea pedis and nail changes.

Results: Among the study participants 48.7% (73) were males and 51.3% (77)were females. Skin manifestations in foot were reported in 84% (126) of the patients. The predominant cutaneous foot manifestation of diabetes were seen in nails changes which accounted to 60.7% (91) of the patients followed by fissures in the foot which were seen among 46.7% (70)of the study participants. Callosities were reported in 15.3% (23) patients. 53.3% patients who were overweight/obese, were 0.3 times at risk of developing skin manifestations which was

statistically significant with the p value.($p<0.03$) Diabetic patients with poor glycemic control were 2.3 times at higher risk of developing foot ulcer which was statistically significant with the p value.($p<0.05$)

Conclusion: The skin manifestations being common among the diabetics must be identified and treated early to reduce significant morbidity and complications. These patients must be educated about self-examination of the foot and proper foot care.

Keywords: Diabetes, Skin manifestations, Foot ulcer.

INTRODUCTION

Social and economic instigation have resulted in significant multiplication of Non-communicable diseases including diabetes mellitus. Diabetes mellitus is a group of metabolic disorders characterised by chronic hyperglycaemic condition resulting from defects in insulin secretion, action or both.[1] According to WHO classification, there are two major types, namely type 1 and type 2 DM wherein type 2 is predominant accounting for 90% of all the cases of diabetes. Prevalence of Type 2 diabetes mellitus in the World is about 9% and in India it is 7.3%.[2]

Type 2 diabetes mellitus also knows as non-insulin dependent diabetes mellitus is caused by decreased sensitivity of target tissues to insulin.[3] Most people with T2DM are overweight and obesity. It is of generalized perception that diabetes is due to dysfunction or destruction of beta cells of pancreas.[4] Various aetiologies can lead to dysfunction of endocrine pancreas including genetic predisposition, epigenetic mutations, autoimmunity, concurrent illness and environmental factors.[5]

Insulin resistance leads to a cascade of micro vascular and macro vascular complications. A casual association has been noted between glycemic status and complications. Micro vascular complications include retinopathy, nephropathy and neuropathy and macro vascular manifestations include atherosclerosis, coronary heart disease.

Skin manifestations are present in 30-60% of diabetic population, many a times it might be a sentinel sign. Dermatological manifestations array from lesions specific to diabetes to lesions due to its complications and skin lesions which are found in higher incidence than in general. From various studies, it has been concluded that 30-82% of persons with diabetes have some type of cutaneous involvement through the course of disease.[6]

Dysregulation of glucose, insulin and lipids leads directly to physical signs in skin of patients with diabetes mellitus. Chronically elevated blood glucose leads to non-enzymatic glycosylation (NEG) of cutaneous proteins, which eventually leads to irreversible advanced glycosylation end products (AGEs). It is also noted as diabetic patients are at an increased risk of infections with severe clinical course possibly due to immune alteration.[7]

A variety of foot lesions are seen in people with uncontrolled diabetes mellitus like fissures, abscess, cellulites, ulcers, claw toes and Charcot's joints. There is a risk of developing gangrene and of consequent amputation of the foot especially for people from the lower socioeconomic strata and for those living in rural areas. So the objective of this study was to assess the skin manifestations in foot among diabetic patients in a rural area.

METHODS

Study design

Cross Sectional study

Study area and population

The study was conducted in rural health and training centre of the department of community medicine, Sri Ramachandra Institute of Higher Education and Research. The area is located in Tiruvallur District, about 30 km from Chennai. The area consists of nine panchayats with a total population of 18,879. The study population included diabetic individuals residing in the field practice area and aged above 18 years. The study was done for a period of one week.

Inclusion and exclusion criteria

Diabetic Patients above the age of 18 years including both sexes and those who gave informed consent were included in the study. Patients with other Co-morbidities that may cause cutaneous manifestation were excluded from the study.

Sample size and sampling technique

Sample size was calculated using the formula $4PQ/d^2$, with the allowable error of 5%, the sample size was calculated to be 150. Simple random sampling technique was used to identify the study participants.

Data collection

After taking informed consent, data was collected through a one to one interview schedule during which a semi structured, self-prepared and content validated questionnaire was administered. The questionnaire was available in the local language of Tamil and in English. Socio-demographic information including name, age, gender, occupation and socio-economic status were collected. A detailed dermatological examination was carried out and the cutaneous findings were recorded. For calculation of body mass index the subjects were weighed with a standardized weighing machine and their height was calculated.

Statistical analysis

Data collected was entered in Microsoft excel and analysis was done in SPSS software version 16.0. Data was analysed using Descriptive and Analytical statistics. Chi-square test was used to compare the difference in proportions with the significant level of $p \leq 0.05$. Odds ratio (OR) with 95% confidence intervals was calculated to see the association between the exposure various variables in the foot.

Ethical approval and informed consent

The research protocol, informed consent and draft questionnaire were presented before the Ethical committee of Sri Ramachandra Institute of Higher Education and Research, Chennai and Permission was obtained. Ethical Committee Approval Number-CSP-MED/18/OCT/47/182.

RESULTS

The study participant's age ranged from 30 to 84 years. The mean age of the study participants were 58.6±9.8 years. Out of the total study participants 51.3% were females and 48.7% were males. Majority of the participants were in the age group of 61 to 70 years (37.3%). Out of 150 participants, 116 (77.3%) were literates and 34 (22.7%) were illiterates. Among the study participants the prevalence of smoking was 8.0% with a 95% confidence interval of 4.4% to 13.2% and the prevalence of alcohol was 4.0% with a 95% confidence interval of 1.6% to 8.1%. The prevalence of consuming both the tobacco use and alcohol use was found to be 11.3% with a 95% confidence interval of 6.9% to 17.1%. Table 1 shows the demographic profile of the study participants. (**Table 1**)

Out of 150 study participants, 75 (50.0%) participants had the diabetes duration of one to five years followed by six to ten years of diabetes duration were seen in 40 (26.7%) participants. Among

the study participants 43 (29.3%) had poor glycemic control. The prevalence of overweight/obesity was found to be 53.3% with a confidence interval of 45.3% to 61.2%. Table 2 shows the diabetic profile of the study participants. (**Table 2**)

Nail changes (60.7%) were the most common skin manifestations in foot among diabetic patients followed by fissures which showed the prevalence as 46.7% and the least skin manifestations in foot were foot ulcer (16.0%) and callosities (15.3%) respectively. Table 3 shows the skin manifestations in foot among diabetic patients. (**Table 3**)

Figure 1 shows the prevalence of skin manifestation among the diabetic patients. Among them 84% (126) had some form of skin manifestations and 16% (24) were found to be free of any skin manifestations. (**Figure 1**)

Statistically significant association was found between body mass index and skin manifestation with a odds ratio of 0.3.($p<0.05$). There is 2.4 times higher risk of having foot ulcer in poor glycemic control participants than good glycemic control which was found to be statistically significant. ($p<0.05$) (**Table 4 & 5**)

DISCUSSION

This study shows 84% of the diabetic patients had one or more associated skin manifestations in foot. Similar study conducted by Abhisek Goyal et al., in 2010 showed the prevalence of cutaneous skin manifestations as 80%.[7] A study on skin lesion in diabetes by N T Foss et al, in 2005 showed the prevalence of one or more skin lesion in diabetes as 81%.[8] These findings are in agreement with the study conducted by Demirseren DD et.al, in 2014 found out that among 750 diabetic patients, 79.2% developed some sort of skin manifestation.[9] Higher prevalence of skin manifestations According to American diabetic association an estimated 33% of the diabetics will develop some type of skin disorder that is caused or affected by diabetes.

According to this study skin manifestations were seen commonly in patients with poor glycemic control (29.3%). Similar findings were seen by Demirseren DD et al., who observed that patients with poor glycemic control (HbA1C ≥8mmol/ml) had more skin disorders and the same was statistically significant.[9]

Most commonly seen cutaneous manifestation was nail changes which occurred in 60.7% patients. Dogiparthi SN et,al. concluded from their study that nail changes were seen in 80.5% of the cases.[10]

Dryness was the second most common skin finding which was present in 40.3% of diabetic patients. This is in concordance with study done by Borssen B. et al, who observed that dryness was present in 33% of study participants.[11]

The least appearing foot manifestation in our study was callosities which were observed in mere 15.3% of the patients. Higher prevalence were published by Mehra BR, et,al. who observed callosities in 54.6% of the patients in a study done on diabetic patients in rural India.

Cutaneous foot manifestation remains the commonly occurring yet least prioritized co-morbidity associated with diabetes. Routine screening for Cutaneous foot manifestation and patient education on foot care along with proper glycemic control reduces morbidities associated with this condition.

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TABLES

Table 1: Socio-demographic profile of participants

Characteristics	Number	%
Age (in years)		
Above 60	67	44.7
Below 60	83	55.3
Gender		
Male	73	48.7
Female	77	51.3
Educational status		
Illiterate	34	22.7
Literate	116	77.3

Personal habits		
No smoking and alcohol	115	76.7
Smoking only	12	8.0
Alcohol only	6	4.0
Both	17	11.3

Table 2: Diabetic profile of participants

Characteristics	Number	%
Duration of diabetes		
1-5 years	75	50.0
6-10 years	40	26.7
11-15 years	14	9.3
16-20 years	13	8.7
>20 years	8	5.3
Glycemic control		
Poor	44	29.3
Good	106	70.7
Body mass index		
Overweight/obese	80	53.3
Normal	70	46.7

Table 3: Skin manifestations of diabetes mellitus

Characteristics	Number	%
Dryness		
Present	61	40.7
Absent	89	59.3
Fissures		

Present	70	46.7
Absent	80	53.3
Callosities		
Present	23	15.3
Absent	127	84.7
Foot ulcer		
Present	24	16.0
Absent	126	84.0
Tinea pedis		
Present	35	23.3
Absent	115	76.7
Nail changes		
Present	91	60.7
Absent	59	39.3

Table 4: Association between body mass index and skin manifestation of diabetes mellitus

S.NO	PARTICULARS	SKIN MANIFESTATION		ODDS RATIO	95%CI	p VALUE
		PRESENT	ABSENT			
1.	**AGE**					
	>60 years	58	9	1.42	0.6-3.5	0.44
	<60 years	68	15			
2.	**SEX**					
	Male	62	11	1.14	0.4-2.7	0.76
	Female	64	13			
3.	**EDUCATION**					
	Illiterate	32	2	3.74	0.8-16.8	0.06

	Literate	94	22			
4.	**BMI**					
	>25 kg/m^2	72	8	0.37	0.2-0.94	**0.03**
	<25 kg/m^2	54	16			
5.	**HYPERTENSION**					
	Present	68	10	1.64	0.67-3.9	0.26
	Absent	58	14			

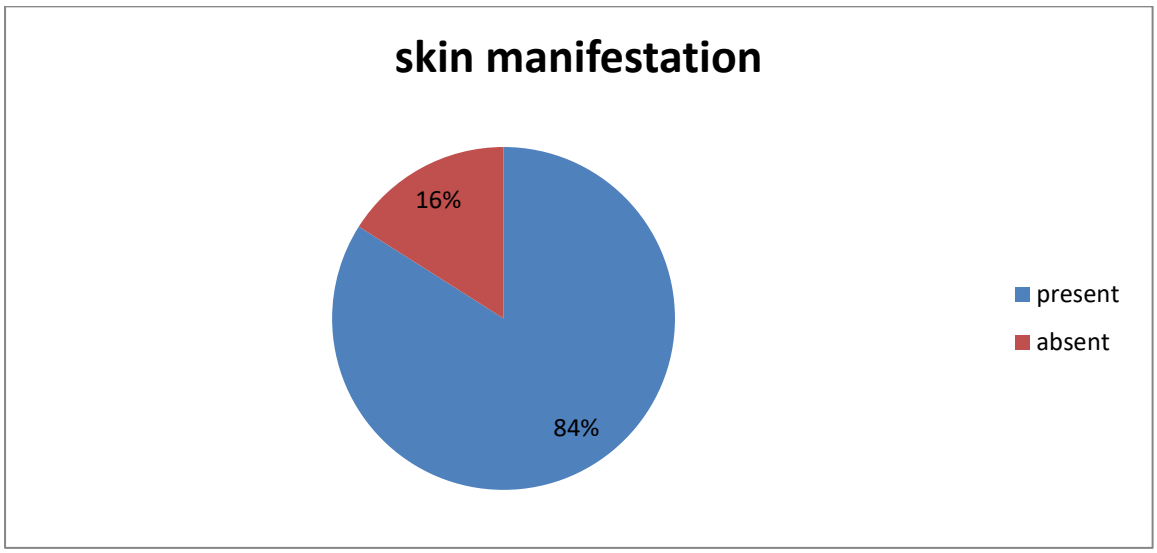
Table 5: Association between various skin manifestations and glycemic control

S.NO	PARTICULARS	GLYCEMIC CONTROL		ODDS RATIO	95%CI	p VALUE
		POOR	GOOD			
1.	**DRYNESS**					
	Present	20	41	1.32	0.6-2.6	0.44
	Absent	24	65			
2.	**FISSURES**					
	Present	21	49	1.1	0.5-2.1	0.86
	Absent	23	57			
3.	**CALLOSITIES**					
	Present	5	18	0.6	0.2-1.8	0.38
	Absent	39	88			
4.	**FOOTULCER**					
	Present	11	13	2.4	0.9-5.8	**0.05**
	Absent	33	93			
6.	**TINEA PEDIS**					

	Present	12	23	1.4	0.6-3.0	0.46
	Absent	32	83			
7.	**NAIL CHANGES**					
	Present	28	63	1.2	0.6-2.5	0.63
	Absent	16	43			

FIGURE

Figure 1: skin manifestation



UNITS OF MEASUREMENT

Height in centimeters

Weight in kilograms

Body mass index in kilogram per meter square

ABBREVATIONS AND SYMBOLS

None

Declarations

Funding: None

Conflict of interest: None

Ethical approval: IEC approval obtained