International Journal of Research in Dermatology
Mohamed ZMR. Int J Res Dermatol. 2024 Nov;10(6):308-313
http://www.ijord.com

DOI: https://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20242652

Original Research Article

Skin disorders in patients with type 2 diabetes mellitus in Khartoum Dermatology and Venereology Teaching Hospital

Zainab M. R. Mohamed*

Department of Dermatology, Medical Services, Doha, Qatar

Received: 15 August 2024
Revised: 28 August 2024
Accepted: 30 August 2024

***Correspondence:**
Dr. Zainab M. R. Mohamed,
E-mail: Zainab.mhd.rahma@gmail.com

ABSTRACT

Background: Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose, which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. About 1 in 11 adults worldwide now have diabetes mellitus (DM), 90% of whom have type 2 DM (T2DM). One of the most common manifestations of diabetes are skin complications, such as dryness of the skin, bacterial and fungal infections. Objectives were to study the frequency and pattern of skin disorders in patients with T2DM at Khartoum dermatology and venereology teaching hospital (KDVTH) in Khartoum, Sudan during August 2016 to December 2016.
Methods: This was prospective, observation descriptive, cross-sectional hospital-based study used a quantities method. A total convenient sample technique enrolled 100 points during the study period.
Results: One hundred diabetic patients (64% male and 36% female) were included in the study. The age group varies between (25 and >70 years), the commonest cutaneous manifestations were xerosis which was found in 45 patients (45%), fungal infection found in 36 patients (36%). Serum HbA1c level was done for each case.
Conclusions: The study concluded that the most prevalent cutaneous diseases among patients were xerosis fungal infection, eczema, bacterial infections, and scabies respectively. A significant relationship between duration of DM and level of HB A1C and the presence of cutaneous manifestations was observed.

Keywords: KDVTH, DM, Diabetic dermopathy, Acanthosis nigricans, Xerosis, Tinea pedis

INTRODUCTION

Type 2 diabetes affects how your body uses sugar (glucose) for energy. It stops the body from using insulin properly, which can lead to high levels of blood sugar if not treated. Over time, T2DM can cause serious damage to the body, especially nerves and blood vessels. T2DM is often preventable. Factors that contribute to developing T2DM include being overweight, not getting enough exercise, and genetics.[1]

Skin disorders, usually neglected and frequently underdiagnosed among diabetic patients, are common complications and encounter a broad spectrum of disorders in both type 1 and T2DM e.g., cutaneous infection, dry skin, pruritus that can lead to major complications and are highly associated with hyperglycemia and advanced glycation end products (AGEs).[2]

Several epidemiological studies evaluating occurrence of skin disorders on type 1 and T2DM were performed worldwide, with pattern of skin disorders varying according to DM type and region where the study was conducted. The high prevalence of dermatological disorder among DM patients described in literature

endorses the clinical importance and high impact of this complication. Although study design and eligibility criteria of the included patients varied slightly among reported studies, most frequent disorder reported in diabetic patients, regardless of DM type, was infection occurring in at least 20.6% of diagnosed patients. Moreover, fungal infections were more prevalent than bacterial or viral infections, and interdigital spaces, genitalia and skin folds were the most frequent site of infection.[3-5]

This study aimed to determine the frequency and pattern of skin disorders in T2DM. Furthermore, it is aimed to determine to the association of these lesions with the glycemic control in diabetic patients.

METHODS

Study design

This was prospective, observational descriptive, cross-sectional hospital-based study.

Study period

The study had been conducted during the period from August 2016 to December 2016.

Study setting

The study was done at KDVTH located in Khartoum; Khartoum state the capital of Sudan.

Study population

The study population consisted of adult diabetic patients of any gender, clinically and laboratory diagnosed as a case of diabetes. presented to dermatology clinic in KDVTH during the study period, with suspecting skin complain

Population size

Total coverage of 100 patients who were fulfilling the inclusion criteria of the study, attended dermatological clinic during the period of the study.

Inclusion and exclusion criteria

Adults already diagnosed with type 2 diabetes presented with cutaneous lesions were included. Patients presented with skin lesions secondary to other systemic disease, pregnancy, or iatrogenic causes were excluded.

Data collection

Data was collected every Wednesday in KDVTH from August 2016 to December 2016.The data was collected by pre-coded questionnaire to obtain the following: Personal data, duration of DM, symptoms of skin disease and full dermatological examination. Diagnosis was mainly clinically; confirmatory investigations were done when needed. Clinical examination was done in the presence of dermatology doctor whose is working at KDVTH. The level of HBA1C was measured for every patient to assess his glycemic control; some photos were captured by researcher.

Data handling and processing

Statistical analysis was conducted by computer using statistical package for social sciences (SPSS version 20), the results were presented in tables and figures.

Ethical consideration

The proposal of the study was presented to the ethics review committee of the Sudan medical specialization board council of dermatology for approval. A permission to conduct the study was requested from the study area. Written consent was taken from all participants.

RESULTS

A total 100 patients of T2DM, presented to KDVTH. during August 2016 to December 2016, were included in this study. The study aimed to identify the prevalence of cutaneous manifestation.

Demographic characteristics of patients showed, out of 100 patients, 8 patients (8%) were in the age of 25-40 years, 61 patients (61%) were in the age of 41-55 years, 28 patients (28%) were in the age of 56-70 year and 3 patients (3%) were in the age exceeding 70 years. Sixty-four of the patients were male (64%), and 36 were female (36%) with male to female ratio of 1.8:1.

Duration of DM was less than 5 years in 22 patients (22%) of participants, 6-10 years in 29 patients (29%), 11-15 years in 30 patients (30%) and exceeded 15 years in 19 patients (19%), (Figure 1). Concerning the treatment of diabetes 58 patients (58%) were treated by insulin injections and the other 42 patients (42%) were on hypoglycemic tablets, (Figure 2).

Skin lesion duration ranged between 1-6 months in 80 patients (80%) of diabetic patients, 7-12 months in 9 patients (9%), less than one-month in 7 patients (7%) and more than one-year in 4 patients (4%), (Figure 3).

In concern symptoms and signs in these patients, dryness was noticed in 66 of these patients (66%), localized purities was found in 51 patients (51%), hyper pigmentation was found in 17 patients (17%), generalized purities was found in 15 patients (15%), hypo pigmentation was found in 12 patients (12%), lumps and swelling were found in 7 patients (7%), and the condition was painful in 7 patients (7%), numbness was observed in

3 patients (3%), and two patients had malaise and one patient was febrile (Figure 4).

Among the studied group of patients, the most frequently observed skin disease was xerosis which was observed in 45 patients (45%), followed by eczema in 21 patients (21%), Tenia pedis in 19 patients (19%), Tenia versicolor in 17 patients (17%), bacterial infections in 15 patients (15%), scabies in 11 patients (11%), leishmania in 6 patients (6%), acanthosis nigricans in 3 patients (3%), and herpes zoster in tow patients (2%). Other diseases observed with a lesser frequency include one case of breast cancer and one of vitiligo (Table 2).

Confirmatory investigation was done for 15 patients (15%), 5 of them subjected to skin scrapping for fungal infection, 3 patients for skin biopsy, and the same number for nail clipping for fungal infection, skin smear for L. donovani, and skin swab for alcoholic acid-fast bacilli (AFB) was taken from one patient, (Table 3).

Glycemic control using HbA1c test was found as value, 8-11 value in 59%, more than 11 in 16% and 6-7 in 25% of diabetic patients (Figure 5).

Skin manifestation showed is significant association with duration of DM and glycaemic control (p=0.352 and 0.176 respectively) (Table 4 and 5).

Table 1: Demographic characteristics of adult diabetic patients at KDVTH during August to December 2016 (n=100).

Demographic characteristics	N	%
Age (in years)		
25-40	8	8.0
41-55	61	61.0
56-70	28	28.0
>70	3	3.0
Gender		
Male	64	64.0
Female	36	36.0

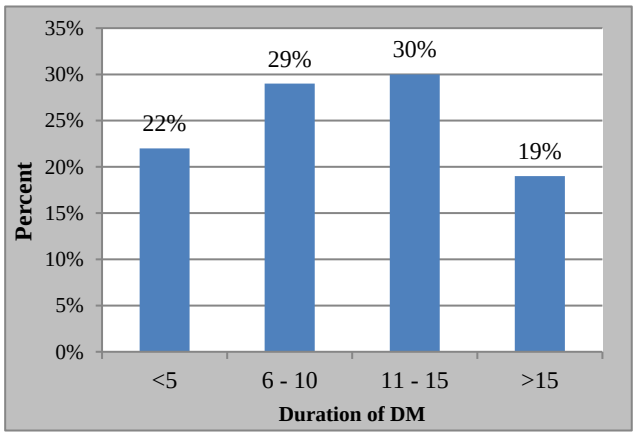

Figure 1: Duration of DM by years among patients at KDVTH during August to December 2016 (n=100).

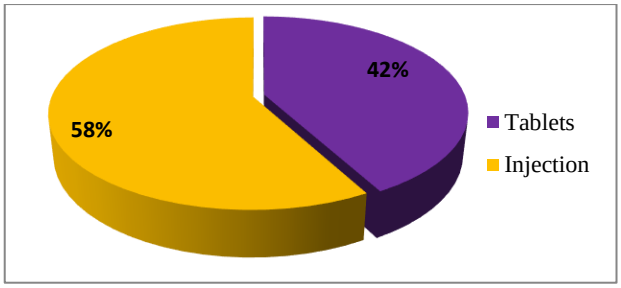

Figure 2: Type of diabetic treatment received by patients at KDVTH during August to December 2016.

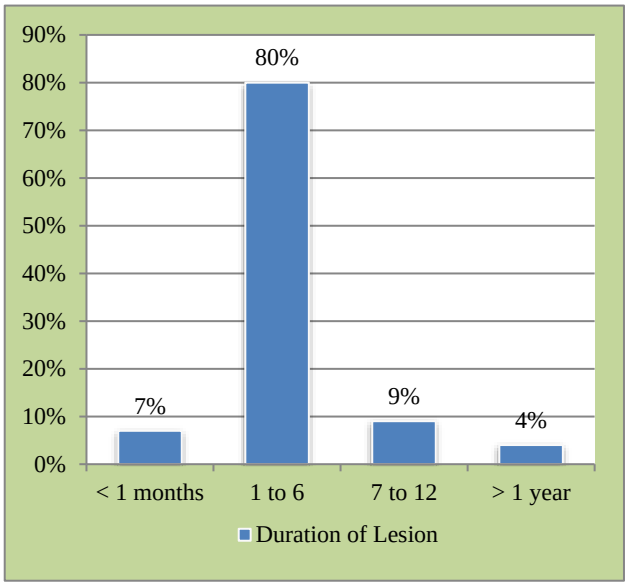

Figure 3: Duration of dermatologic lesion among adult diabetic patients at KDVTH during August to December 2016.

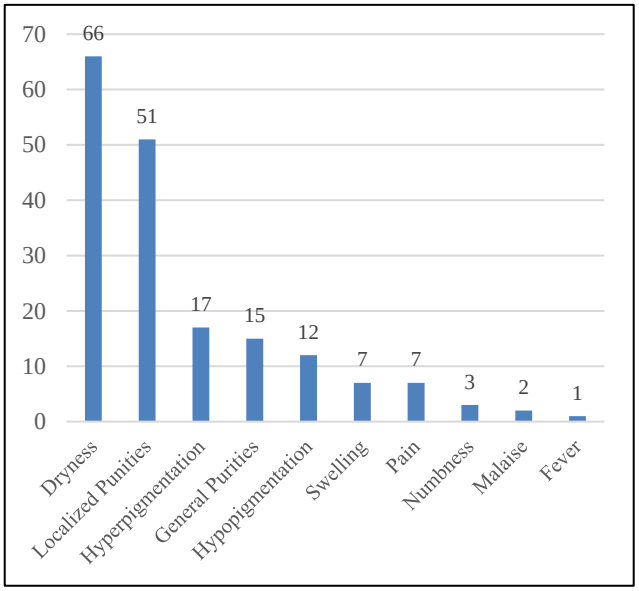

Figure 4: Dermatological symptoms and sings among adult diabetic patients at KDVTH during August-December 2016 (n=100).

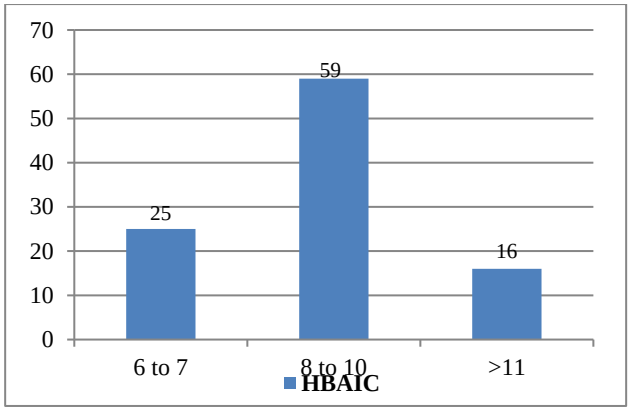

Figure 5: Level of HBAIC among adult diabetic patients at KDVTH during August-December 2016, (n=100).

Table 2: Diagnosis among adult diabetic patients at KDVTH during August to December 2016 (n=100).

Diagnosis	N	%
Xerosis	45	45.0
Tenia versicolor	17	17.0
Tenia pedis	19	19.0
Bacterial infection	15	15.0
Leshaminia	6	6
Scabies	11	11
Eczema	21	21
Acanthosis nigricans	3	3.0
Herpes zoster	2	2.0
Vitiligo	1	1.0
Breast CA	1	1.0

Table 3: Confirmatory investigations for skin lesion among adult diabetic patients at KDVTH during August to December 2016 (n=100).

Confirmatory investigations	N	%
Skin biopsy	3	3.0
Skin scraping for fungal infection	5	5.0
Nail clip for fungal infection	3	3.0
Skin smear for L. D. bodies	3	3.0
Skin swab for alcoholic AFB	1	1.0
No confirmatory investigation	85	85
Total	100	100

Table 4: Correlation between duration of DM and skin manifestation among adult diabetic patients at KDVTH during August to December 2016 (n=100).

Diagnosis	Duration of DM				Total
	<5	6-10	11-15	>15	
Xerosis	5	5	10	25	45
	11.11%	11.11%	22.22%	55.6%	100%
Fungal infection	6	11	11	8	36
	16.7%	30.55%	30.55%	22.22%	100%
Leishmania	0	5	1	0	6
	0.0%	83.3%	16.7%	0.0%	100%
Bullosis diabeticorum	0	1	1	1	3
	0.0%	33.33%	33.3%	33.33%	100%
Herpes zoster	0	0	2	0	2
	0.0%	0.0%	100%	0.0%	100%
Eczema	8	4	5	4	21
	38.09%	19.04%	23.8%	19.04%	100%
Scabies	3	2	1	5	11
	27.3%	18.2%	9.1%	45.5%	100%
Acathosis nigricans	1	1	1	0	3
	33.33%	33.33%	33.33%	0.0%	100%
Vitiligo	0	0	0	1	1
	0.0%	0.0%	0.0%	100%	100%
Bacterial infection	3	3	7	2	15
	20%	20%	46.7%	13.3%	1.5%
Brest CA	0	1	0	0	1
	0.0%	100%	0.0%	0.0%	100%

*P=0.352.

Table 5: Correlation between glycemic control and skin manifestation among adult diabetic patients at KDVTH during August-December 2016.

Diagnosis	HBAIC			Total
	6-7%	8-10%	>11%	
Xerosis	12	25	8	45
	26.7%	55.6%	17.8%	100%
Fungal infection	8	22	6	36
	22.2%	61.1%	16.7%	100%
Leishmania	0	4	2	6
	0.0%	66.7%	33,3%	100%
Bullosis diabeticorum	0	3	0	3
	0.0%	100%	0.0%	100%
Herpes zoster	0	1	1	2
	0.0%	50%	50%	100%
Eczema	8	9	14	31
	25.8%	29,03%	45.2%	100%
Scabies	2	7	2	11
	18.2%	63.6%	18.2%	100%
Acathosis nigricans	1	1	1	3
	33.3%	33.3%	33.3%	100%
Vitiligo	1	0	0	1
	100%	0.0%	0.0%	100%
Bacterial infection	2	10	3	15
	13.3%	66.7%	20%	100%
Breast CA	1	0	0	1
	100%	0.0%	0.0%	100%

*P=0.176

DISCUSSION

Almost all diabetic patients eventually develop skin complications from the long-term effects of DM on the microcirculation and on skin collagen. Cutaneous infections are more common in type 2 diabetes, whereas autoimmune-related lesions are more common in type 1. Patients who have had diabetes for many years tend to develop the most devastating skin problems. However, problems can also develop in the short term, as insulins and oral hypoglycemic drugs can also have dermal side effects. Furthermore, diabetes-related cutaneous lesions may also serve as a port of entry for secondary infections.[6]

Most of the patients (69%) included in the study were in the age range group 41-55. This finding was similar to the result of the study done in Pakistan, where the common age group was found to be 54.[7] However, in a study done in Saudi Arabia most of the participants were young or middle age.[8]

In concern to the gender most of the participants in this study (64%) were male. On the contrary to this finding one study in Pakistan found the predominance of female (59.1%) than male.[9]

Xerosis was the common skin disorder in this study (45%), followed respectively by fungal infection (tinea versicolor, tinea pedis) (36%), eczema (21%) and bacterial infection (15%). However, Bashier and Kordofanian in 2004 found that the most common cutaneous manifestations were Fungal infections represented a higher prevalence (48.8%), followed by bacterial infections (26.4%), and diabetic dermopathy (0.8%). Bullosis diabetecorum was found in 6.4%, Vitiligo in 5.6%, and local insulin reaction appeared in 3.2%.[10] Sanad et al in Egypt, evaluated 100 patients of DM type 1 (n=23) and type 2 (n=77), with at least one skin lesion, in a single center cohort study. The mean time of diagnosis was found to be 10.57±7.63 years. The most+common skin disorders in their study were cutaneous infections (40%), followed by pruritus (11%), local reactions at the site of insulin injection (8%), vitiligo (8%), diabetic dermopathy (7%), periungual telangiectasia (6%), and xanthelasma (5%). Xerosis was the least reported in only 3% of patients. Concerning the cutaneous infections in this study, 22% were fungal, 16% bacterial, and 2% viral infections. Tinea pedis was the most common fungal infection (12%), whereas boils were the most common bacterial infection (5%). Among viral infections, one patient had herpes simplex and another had herpes zoster.[4]

Regarding duration of DM and its effect on symptom of skin manifestation we found that, the longer the duration of DM the more likely we identified skin problems. As long-term effect of DM on microcirculation and the dermal collagen will eventually results in skin disorder in almost all diabetic patients. So, in this study xerosis was

observed in 55.6% on long standing diabetics more than 15 years.

Regarding DM control and its effect on skin manifestations we found that 75% of diabetics were uncontrolled. However, the number of uncontrolled diabetic patients in Lahore study was found to be 90% and this was almost similar to result.[5]

Many researchers have reported diabetic dermopathy to be the most common and specific cutaneous association of DM.[11-14] However, in this study due to the small group of the participants and the short duration of the study, no case of diabetic dermopathy was detected.

CONCLUSION

In this study xerosis was found to be the commonest cutaneous disorder in T2DM, followed respectively by infections, especially fungal infections. Other cutaneous disorders like eczema, scabies, acanthosis nigricans, and vitiligo was less common. Achieving appropriate glycemic control in diabetic will reduce the incidence of these cutaneous complications.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Diabetes. 2023. Available at: https://www.who.int/news-room/fact-sheets/detail/diabetes. Accessed on 15 June 2024.
2. Wang YR, Margolis D. The prevalence of diagnosed cutaneous manifestations during ambulatory diabetes visits in the United States, 1998-2002. Dermatology. 2006;212(3):229-34.
3. Federation ID. IDF diabetes atlas. Brussels: International Diabetes Federation, 6th edi. 2013.
4. Sanad EM, ElFangary MM, Sorour NE, ElNemisy NM. Skin manifestations in Egyptian diabetic patients: a case series study. Egypt J Dermatol Venereol. 2013;33(2):56-62.
5. Goyal A, Raina S, Kaushal SS, Mahajan V, Sharma NL. Pattern of cutaneous manifestations in diabetes mellitus. Indian J Dermatol. 2010;55(1):39-41.
6. Campos GM, Nunes S, Barreto T. Skin disorders in diabetes mellitus: an epidemiology and physiopathology review. Diabetol Metab Syndr. 2016;8(1):63.
7. Demirseren DD, Emre S, Akoglu G, Dilek A, Aysegul A, Ahmet M, et al. Relationship between skin diseases and extracutaneous complications of diabetes mellitus: clinical analysis of 750 patients. Am J Clin Dermatol. 2014;15(1):65-70.
8. Hattem SV, Bootsma AH, Thio HB. Skin manifestations of diabetes. Cleveland Clin J Med. 2008;75(11):772-87.
9. Ahmed K, Muhammad Z, Qayum I. Prevenance of cutaneous manifestations of diabetes mellitus. J Ayub Med Coll Abbottabad. 2009;21(2):77-8.
10. Almansour M, Abanemai N, Alhusayni S, Forat A, Ruba A, Ghaiath H. Perception of Attendees of Primary Healthcare Centers in Al-Majmaah City, Saudi Arabia About Skin Manifestations of Diabetes Mellitus. J Res Med Dental Sci. 2020;8(4):43-50.
11. Niaz F, Bashir F, Nadia S, Zaman S, Ijaz A. Cutaneous manifestations of diabetes mellitus type 2: prevalence and association with glycemic control. J Pak Assoc Dermatolog. 2016;26(1):4-11.
12. Bashier AH, Kordofani YM. Clinico-epidemiological study of cutaneous manifestations of diabetes mellitus in Sudanese patients. Sud J Dermatol. 2004;2(2):54-60.
13. Kalus AA, Chien AJ, Olerud JE. Diabetes mellitus and other endocrinal disorder. In: Fitzpatrick's Dermatology in general medicine. 7th ed. New York: Mc Graw-Hill. 2008;1461-84.
14. Crook MA. Skin tags and atherogenic lipid profile. J Clin Pathol. 2000;53(11):873-4.

Cite this article as: Mohamed ZMR. Skin disorders in patients with type 2 diabetes mellitus in Khartoum Dermatology and Venereology Teaching Hospital. Int J Res Dermatol 2024;10:308-13.