

## Demographic Study of Dermatological Manifestations of DM Patients Attending in a Medical College Hospital

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### Abstract

**Introduction:** Diabetes mellitus (DM) is a common metabolic disorder and is significant for its ability to adverse effect of various organs. Skin manifestations in this condition are due to metabolic derangements, chronic complications and infections, which are commonly observed after developing clinical diabetes mellitus, but may also precede the disease.

**Aim:** The aim of this study was to understand dermatological manifestations in diabetes mellitus relation with demographic parameters. **Materials and Methods:** It was a hospital based cross sectional study carried out among 80 randomly selected diabetic patients with/without skin lesions. Patients were then asked for their willingness to participate in the study. Skin examination was carried out and skin lesions were identified. All data was recorded in the pre-designed, pre-tested, and semi-structured questionnaire developed for the study. Data was analyzed using SPSS version 26. Frequencies and percentages were calculated for the necessary data. **Result:** : Mean age of the subjects was 51.0±13.2 years, minimum age 25 and maximum 80 years. It was observed that, out of 80 patients, 52 (65.0%) were aged between 41–60 years. 52 (65%) were female and 28(35%) were male patients. 46(57.5%) were housewives and 16(20.0%) were service holders, 10(12.5%) were farmers and other 8(10%). 41(51.2%) from middle class, 38(47.5%) from lower class and 1(1.3%) were from upper class. 61.2% patients came from rural area and 38.8% patients from urban area. The mean duration of diabetes mellitus was 6.6±5.1 years, 42.5% patients duration had 5-10 years followed by 36.3% below 5 years and 21.3% patients had DM more than 10 years. Out of 80 patients, a total of 39(48.8%) DM patients had skin manifestations and 41(51.2%) had no skin manifestations. Among 39 DM patients with skin disease, 19(48.7%) having a single, while 8(25.5%) had two and 13(30.8%) patients had three or more skin lesions. 22(56.4%) patients found diabetic dermopathy, diabetic foot ulcer 12(30.8%), fungal infections 9(23.1%), bullous lesions 7(17.9%), diabetic foot gangrene 5(12.8%), lymphodystrophy 5(12.8%), pruritus 5(12.8%), xerosis 5(12.8%) cases, scleredema 3(7.7%), ichthyosis 2(5.1%) and bacterial infections 2(5.1%). Age, sex, educational level, socioeconomic status, residence found no significant association ( $p>0.05$ ), but duration of diabetes mellitus was significantly associated with the presence of dermatological manifestations ( $p=0.001$ ). **Conclusion:** The spectrum of skin manifestations due to DM in this study population is similar to that in other parts of the world. Diabetic dermopathy, Pruritus and fungal infections are the most common cutaneous manifestations in DM patients. The presence of skin manifestations can highlighten the suspicion for DM enabling early diagnosis and management and thereby can be helpful for preventing complications.

**Key words:** : Cutaneous manifestations, Type II diabetes, Skin, DM.

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### Introduction:

Skin is the largest organ in the body. It determines appearance and plays a major role in protection, support of the interior. More than one third of diabetic patients have some type of dermatologic manifestations during the course of their chronic disease<sup>1</sup>. The association of certain skin diseases with diabetes mellitus has been fairly well recognized with an incidence rate ranging from 11.4% to 66%<sup>2,3</sup>. At least 30% of patients with diabetes mellitus have some type of cutaneous involvement during the course of their chronic disease<sup>4</sup>. Skin sugar levels run parallel to the blood sugar levels<sup>5</sup>. Skin changes generally appear subsequent to the development of DM but may be the first presenting sign or even precede the diagnosis by many years. Among the many skin manifestations in DM, none is pathognomonic of this disease<sup>6</sup>. Diabetes affects all age groups and all social classes. Hyperglycemia is the hallmark of

diabetes. Insulin deficiency may be absolute type I diabetes or partial in type II diabetes<sup>7</sup>. One of the complications of longstanding diabetes is lesions of the skin. Around 30% of the patients suffering from diabetes are estimated to have skin lesions in some form<sup>8</sup>. Dermatological manifestations in DM are mainly due to four causes. First is directly due to diabetes. Second are lesions of skin due to infections of the skin. Third due to other complications of diabetes and fourth due to reaction of the body of the patient to insulin or oral hypoglycemic drugs. The list of skin lesions due to diabetes is long but mainly comprises of diabetic dermopathy, necrobiosis lipoidica, diabetic bullae diabetic thick skin, and yellow nails<sup>9</sup>. Diabetics are prone to develop viral diseases of the skin like warts or herpes zoster. Other skin disorders seen among these diabetic patients are gangrene of foot, and waxy skin<sup>10</sup>. The baseline derangements in metabolic processes damage the skin among patients with diabetes. The longstanding degenerative nature of diabetic complications also affect the skin. Suggested pathogenetic mechanism is disturbed metabolism of carbohydrates and other reasons like impairment in the mechanisms of the host etc<sup>11</sup>. The data on lesions of the skin due to diabetes are scarce. The present study was planned with the objective to evaluate diabetic dermatological manifestations relation with sociodemographic characteristics of the study subjects.

#### Materials and Methods:

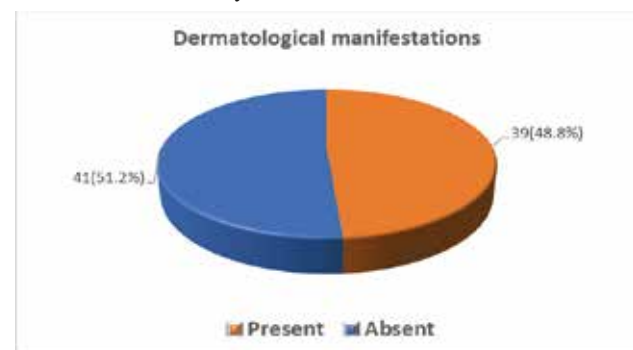
This cross sectional study carried at Khulna Medical College Hospital, Khulna from May 2020 to April 2021. Sample size: 80 randomly selected confirmed diabetic patients with/without skin lesions were selected for the study. Informed consent was obtained from enrolled patients. All patients were given appropriate treatment for their skin lesions and diabetes. **Inclusion criteria:** Confirmed cases of diabetes with/without skin lesions of patients admitted into medicine department of KMCH and both sexes were included in the study. **Exclusion criteria:** Patients unwilling to participate in the study. Patients presented with DM with acute illness. **Procedure:** Patients confirmed to have diabetes according to their treatment records and blood sugar levels were screened. Those found to have skin lesions were then asked for their willingness to participate in the study. Cutaneous infections were classified as bacterial, viral and fungal. Detailed history was taken to trace the source of infection. Thorough skin examination was carried out and skin lesions were identified and recorded. All data was recorded in the pre-designed, pre-tested, and semi-structured questionnaire developed for the study. The samples were sent for histopathology and culture to confirm the clinical diagnosis in required cases. Treatment was initiated based on the final diagnosis. **Statistical analysis:** Data was analyzed using proportions. Simple statistical methods were used to quantify and analyses data. Frequencies and percentages were calculated for the necessary data and 95% confidential intervals of the percentages were also given.

#### Results:

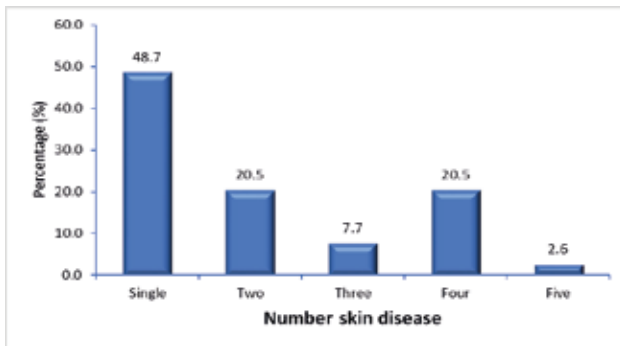
**Table-I: Sociodemographic characteristics of the study patients (n=80).**

Variables	Number of patients	Percentage (%)
<b>Age group (years)</b>		
<40	13	16.2
41-60	52	65.0
60-80	15	18.8
<b>Mean±SD (range)</b>	<b>51.0±13.2 (25 – 80) years</b>	
<b>Sex</b>		
Male	28	35.0
Female	52	65.0
<b>Education level</b>		
Illiterate	19	23.8
Primary	20	25.0
Secondary	10	12.5
Higher secondary	18	22.5
Graduate	13	16.2
<b>Occupation</b>		
Housewife	46	57.5
Service	16	20.0
Farmer	10	12.5
Others	8	10.0
<b>Socioeconomic status</b>		
Low	38	47.5
Medium	41	51.2
High	1	1.3
<b>Residence</b>		
Rural	49	61.2
Urban	31	38.8
<b>Duration of DM</b>		
<5 yrs	29	36.3
5-10 yrs	34	42.5
>10 yrs	17	21.2
<b>Mean±SD (range)</b>	<b>6.6±5.2 (1-20) years</b>	

Table I shows distribution of respondents according to socio-demographic characteristics. Mean age of the subjects was 51.0±13.2 years, minimum age 25 and maximum 80 years. It was observed that, out of 80 patients, 52 (65.0%) were aged between 41–60 years, 15 (18.8%) were aged between 60–80 years, 13 (16.2%) were aged below 40 years. Majority of the patients 52 (65%) were female and 28(35%) were male. Among them patients 23.8% were illiterate, 25.0% completed primary, 12.5% patients secondary, 22.5% patients higher secondary and 16.2% patients were completed graduation. In the present study, 45(57.5%) were housewives and 16(20.0%) were service holders. It was seen that majority of the respondents 41(51.2%) were from middle class, 38(47.5%) were from lower class and 1(1.3%) were from upper class. Maximum (61.2%) patients came from rural area and 38.8% patients from urban area. The mean duration of diabetes mellitus was 6.6±5.1 years, maximum (42.5%) patients duration 5-10 years followed by 36.3% patients had below 5 years and 21.2% patients had duration of DM more than 10 years.



**Figure-1: Pie diagram showing the frequency of dermatological manifestations within DM patients.**



**Figure-2: Distribution of the patients by number of dermatological manifestations (n=39).**

Out of 80 patients, a total of 39(48.8%) DM patients had skin manifestations and 41(51.2%) had no skin manifestation. Among 39 DM patients with skin disease, 19(48.7%) having a single skin condition while 8(25.5%) had two and 3(7.7%) patients had three, 8(20.5%) have 4 skin diseases and 1(2.6%) patients had five skin disease (Figure 1 and Figure 2).

**Table-II: Distribution of the patients by dermatological manifestations (n=39).**

Dermatological manifestations	Number of patients	Percentage (%)
Diabetic foot ulcer	12	30.8
Diabetic foot gangrene	5	12.8
Bullous Lesions	7	17.9
Lipodystrophy	5	12.8
Bacterial infections	2	5.1
Fungal infections	9	23.1
Diabetic dermopathy	22	56.4
Necrobiosis Lipoidica diabetorum	1	2.6
Scleredema	3	7.7
Vitiligo	1	2.6
Ichthyosis	2	5.1
Pruritus	5	12.8
Xerosis	4	12.8
Granuloma anulare	1	2.6
Acquired perforating dermatosis	1	2.6

Table-II showed that among the 39 DM patients skin disease, the main complaint in 22 (56.4%) patients diabetic dermopathy, diabetic foot ulcer 12(30.8%), fungal infections 9(23.1%), bullous lesions 7(17.9%), diabetic foot gangrene 5(12.8%), Lipodystrophy 5(12.8%), pruritus 5(12.8%), xerosis in 4(10.3%) cases, scleredema 3(7.7%), ichthyosis 2(5.1%), bacterial infections 2(5.1%).

**Table-III: Association of dermatological manifestations with sociodemographic characteristics of diabetic patients (n=80).**

Variables	Dermatological manifestations		p-value
	Absent (n=41)	Present (n=39)	
<b>Age group (years)</b>			
<40	8(19.5%)	5(12.8%)	
41-60	26(63.4%)	26(66.7%)	
60-80	7(17.1%)	8(20.5%)	
<b>Mean±SD (range)</b>	<b>49.3±14.2</b>	<b>52.8±11.9</b>	<b>0.234</b>
<b>Sex</b>			
Male	12(29.3%)	16(41.0%)	0.270
Female	29(70.7%)	23(59.0%)	
<b>Education level</b>			
Illiterate	10(24.4%)	9(23.1%)	0.203
Primary	11(26.8%)	9(23.1%)	
Secondary	8(19.5%)	2(5.1%)	
Higher secondary	8(19.5%)	10(25.6%)	
Graduate	4(9.8%)	9(23.1%)	
<b>Socioeconomic status</b>			
Low	18(43.9%)	20(51.3%)	0.435
Medium	23(56.1%)	18(46.2%)	
High	0(0.0%)	1(2.6%)	

Variables	Dermatological manifestations		p-value
	Absent (n=41)	Present (n=39)	
<b>Residence</b>			
Rural	22(53.7%)	27(69.2%)	0.153
Urban	19(46.3%)	12(30.8%)	
<b>Duration of DM</b>			
<5 yrs	19(46.3%)	10(25.6%)	0.001*
5-10 yrs	16(39.0%)	18(46.2%)	
>10 yrs	6(14.6%)	11(28.2%)	
<b>Mean±SD (range)</b>	<b>4.68±4.43</b>	<b>8.58±5.26</b>	

Table-III showed that no significant association was observed between presence of dermatological manifestations with age, sex, educational level, socioeconomic status, residence ( $p>0.05$ ). Duration of diabetes mellitus was significant associated with the presence of dermatological manifestations ( $p=0.001$ ).

#### Discussion:

Diabetes mellitus is the most common metabolic disorder which involves the skin. Many skin disorders are associated with DM. Dermatological signs of DM mostly appear once the primary disease has already developed but may also appear coincidentally with its onset or even precede DM. In the present study, the mean age of the subjects was  $51.0\pm 13.2$  years, minimum age 25 and maximum 80 years. It was observed that, out of 80 patients, 52 (65.0%) were aged between 41–60 years, 15 (18.8%) were aged between 60–80 years, 13 (16.2%) were aged below 40 years. This is in agreement with the study by Gupta et al.<sup>12</sup> reported the majority of patients were in the age group of 40–60 years (32%), Mahajan et al.,<sup>13</sup> Nigam and Pande,<sup>14</sup> and Nawaf et al.<sup>15</sup> The skin manifestations increase with age, duration, as well as the level of blood sugar control and severity of DM. Majority of the patients 52 (65%) were female and 28(35%) were male in our study. Gupta et al.<sup>12</sup> reported males (55%) outnumbered females (45%). Al Mutairi,<sup>16</sup> Mahajan et al.,<sup>13</sup> and Bhat et al.<sup>17</sup> reported a higher incidence of dermatological manifestations in female diabetic patients, which supports this study.

It was seen that majority of the respondents 41(51.2%) were from middle class, 38(47.5%) were from lower class and 1(1.3%) were from upper class. Maximum (61.3%) patients came from rural area and 38.8% patients from urban area. Gupta et al.<sup>12</sup> reported out of 200 patients, 73% of the patients belonged to a rural background while 27% were from an urban background which coincides this study. The maximum no. of patients (48%) were from lower socioeconomic status, followed by 38% from middle socioeconomic and 14% were from upper socioeconomic status. The maximum no. of patients were housewives (51%), followed by retired persons (19%) and others (16%). In the present study, 46(57.5%) were housewives and 16(20.0%) were service holders. Study of Gupta et al.<sup>12</sup> and our study results almost same. The mean duration of diabetes mellitus was  $6.6\pm 5.1$  years, maximum (42.5%) patients duration 5-10 years followed by 36.3% below 5 years and 21.3% patients had duration of DM more than 10 years. In this study showed out of 80 DM patients, 39(48.8%) had skin manifestations and 41(51.2%) had no skin manifestation.



Among 39 DM patients with skin disease, 19(48.7%) having a single skin condition while 8(25.5%) had two and 3(7.7%) patients had three, 8(20.5%) have 4 skin diseases and 1(2.6%) patients had five skin diseases. Kiprono et al.<sup>18</sup> reported 239 (43.9%) DM patients had skin manifestations. Among the 239 patients with skin manifestations, 297 skin diseases were diagnosed, with 188 (78.7%) DM patients having a single skin condition while 44 (18.4%) had two and seven (2.9%) patients had three or more skin diseases. Among 39 DM patients, 22 (56.4%) patients had diabetic dermopathy, diabetic foot ulcer 12(30.8%), fungal infections 9(23.1%), bullous lesions 7(17.9%), diabetic foot gangrene 5(12.8%), Lipodystrophy 5(12.8%), pruritus 5(12.8%), xerosis in 4(10.3%) cases, scleredema 3(7.7%), ichthyosis 2(5.1%), bacterial infections 2(5.1%). Kiprono et al.<sup>18</sup> reported among the 150 primary non-infectious skin diseases associated with DM, pruritus was the main complaint in 90 (60.0%) patients while perforating dermatosis was the least common Table II. A total of 113 cutaneous infections were encountered and the majority 108(95.6%) was fungal infection, mainly candida, while the remaining five infections were viral three and bacterial two. All 16 patients with cutaneous disorders due to a diabetic complication had a diabetic foot ulcer. The prevalence of skin manifestations in DM patients is estimated to range from 20 to 50%<sup>19,20</sup>. The rate of dermatological manifestations (48.8%, 39/80) in this study is similar to that reported in other studies. Previous reports showed that about 5-10% of patients had bacterial infections<sup>17,20</sup>. In this study 2(5.1%) patients had bacterial infections. In present study showed that no significant association was observed between presence of dermatological manifestations with age, sex, educational level, socioeconomic status, residence ( $p>0.05$ ). Duration of diabetes mellitus was significant associated with the presence of dermatological manifestations ( $p=0.001$ ). Similarly Kiprono et al.<sup>18</sup> observed no significant association between the development of cutaneous disorders and disease factors such as the gender, the age, the duration of DM and the type of DM. The association of cutaneous manifestation with these factors have been inconsistently reported<sup>16,20</sup>. Although this study did not show association, cutaneous manifestations of DM generally appear after development of the disease and the duration of DM determines the risk of development of diabetic complications<sup>16,20</sup>.

#### Conclusion:

The spectrum of skin manifestations due to DM in this study population is similar to that in other parts of the world. Primary non-infectious skin conditions associated with DM are common. Diabetic dermopathy, Pruritus and fungal infections are the most common cutaneous manifestations in DM patients. The presence of skin manifestations (which are easily visible) can heighten the suspicion for DM enabling early diagnosis of DM and thus be very well taken as a clinical marker for DM.

**Conflict of Interest:** None.

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#### References :

1. Azizian Z, Behrangi E, Roshanak H, Kazemlo H, Esmaceli R, Hassani P. Prevalence study of dermatologic manifestations among diabetic patients. *Advances in preventive medicine*. 2019 Jul 1. <https://doi.org/10.1155/2019/5293193> PMID:31355008 PMCID:PMC6634127
2. American Diabetes Association: Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. Jan 2012; 35: S11-S63.
3. Chhabra SAN. Cutaneous manifestations in diabetes mellitus. Thesis submitted to Delhi University in 1978.
4. Giligor RS, Lazarus G S. Skin manifestations of diabetes mellitus. In: Rifkin H, Raskin P, Brady co, Louana, editors. *Diabetes Mellitus*. 1981: 313-321.
5. Urbach E. Skin diabetes (hyperglycidermia) without hyperglycemia. *JAMA*. 1945; 129:433. <https://doi.org/10.1001/jama.1945.02860400022007>
6. Levy L., Zeichner JA. Dermatologic manifestation of diabetes. *J Diabetes*. 2012 Mar; 4(1):68-76. <https://doi.org/10.1111/j.1753-0407.2011.00151.x> PMID:21848812
7. Ahmed K, Muhammad Z, Qayum I. Prevalence of cutaneous manifestations of diabetes mellitus. *J Ayub Med Coll Abbottabad*. 2009;21:76-8.
8. Romano G, Moretti G, Di Benedetto A, Giofrè C, Diagnosis Cesare E, Russo G, et al. Skin lesions in diabetes mellitus: prevalence and clinical correlations. *Diabetes Res Clin Pract*. 1998;39(2):101-6. [https://doi.org/10.1016/S0168-8227\(97\)00119-8](https://doi.org/10.1016/S0168-8227(97)00119-8)
9. Bashier AH, Kordofani YM. Clinicoepidemiological study of cutaneous manifestations of diabetes mellitus in Sudanese patients. *Sud J Dermatol*. 2004;2:54-60. <https://doi.org/10.4314/sjd.v2i2.32842>
10. Baloch GH, Memon NM, Ram B, Iqbal P, Thebo NK. Cutaneous manifestation of type II diabetes mellitus. *J Liaquat Uni Med Health Sci*. 2008;7:67-70. <https://doi.org/10.22442/jlumhs.08720146>
11. Bhat YJ, Gupta V, Kudyar RP. Cutaneous manifestations of diabetes mellitus. *Int J Diab Dev Ctries*. 2006;26:152-5. <https://doi.org/10.4103/0973-3930.33180>
12. Gupta PL, Singh K, Devpura G. A Tertiary Care Hospital-based Study of Various Skin Manifestations in Diabetes Mellitus Patients: Skin as a Clinical Marker of Diabetes Mellitus. *Journal of Mahatma Gandhi University of Medical Sciences & Technology*. 2021 Jan;6(1):11. <https://doi.org/10.5005/jp-journals-10057-0142>
13. Mahajan S, Koranne RV, Sharma SK. Cutaneous

manifestations of diabetes mellitus. *Indian J Dermatol Venereol Leprol.* 2003;69(2):J05-J08.

14. Nigam PK, Pande S. Pattern of dermatoses in diabetics. *Indian J Dermatol Venereol Leprol.* 2003;69(2):83-85.

15. Nawaf A, Amr Z, Ashok KS. Cutaneous manifestations of diabetes mellitus. *Med Princ Pract.* 2006;15(6):427-430.

<https://doi.org/10.1159/000095488>

PMid:17047349

16. Al Mutairi N, Zaki A, Sharma AK. Cutaneous manifestations of diabetes mellitus. *Med Princ Pract.* 2006;15(6):427-430.

<https://doi.org/10.1159/000095488>

PMid:17047349

17. Bhat YJ, Gupta V, Kudyar RP. Cutaneous manifestation of diabetes mellitus. *Int J Diab Dev Ctries.* 2006;26(4):152-155.

<https://doi.org/10.4103/0973-3930.33180>

18. Kiprono S, Minde E, Mavura DR, Masenga JE. Prevalence of cutaneous manifestations of diabetes mellitus: a hospital-based cross-sectional study in northern Tanzania.

*East African Medical Journal.* 2015 Oct 1;92(5):221-5.

19. Behm B, Schreml S, Landthaler M, Babilas P. Skin signs in diabetes mellitus. *J Eur Acad Dermatol Venereol.* 2012;26:1203-1211.

<https://doi.org/10.1111/j.1468-3083.2012.04475.x>

PMid:22348239

20. Raganatha S, Anitha B, Inamadar AC, Palit A, Devarmani SS. Cutaneous Disorders in 500 Diabetic Patients Attending Diabetic Clinic. *Indian J Dermatol.* 2011; 56: 160-164

<https://doi.org/10.4103/0019-5154.80409>

PMid:21716540 PMCID:PMC3108514

21. Chatterjee N, Chattopadhyay C, Sengupta N, Das C, Sarma N, Pal SK. An observational study of cutaneous manifestations in diabetes mellitus in a tertiary care Hospital of Eastern India. *Indian journal of endocrinology and metabolism.* 2014 Mar;18(2):217.

<https://doi.org/10.4103/2230-8210.129115>

PMid:24741520 PMCID:PMC3987274