

Dermatoses in geriatric diabetic patients and its association with socioeconomic condition – A cross-sectional observational study in a tertiary care hospital in Eastern India



Shayeri Banerjee¹, Animesh Ghosh², Olympia Rudra³, Pranjal Praveen⁴, Biswanath Naskar⁵, Jinia Saha⁶

^{1,4}Post Graduate Trainee, ³Assistant Professor, ⁵Professor, Department of Dermatology, Venereology and Leprosy, ²Assistant Professor, Department of ENT, Institute of Post Graduate Medical Education and Research, ⁶RMO, Department of Pediatrics, Calcutta National Medical College, Kolkata, West Bengal, India

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ABSTRACT

Background: Diabetes mellitus can have varied cutaneous manifestations. **Aims and Objectives:** This study aims to explore the plethora of dermatoses among the geriatric diabetic population and evaluate their association with the socioeconomic conditions of the patients. **Materials and Methods:** This is a cross-sectional observational study carried out on 300 diabetic patients aged 60 and above in department of dermatology of a tertiary care hospital in Eastern India. Data were collected in a pre-designed proforma, and all findings were recorded. **Results:** Three hundred diabetic patients aged 60 and above were evaluated; 42% were male, 58% were female. About 61.33% belonged to lower socioeconomic status (SES), 24% to middle, and 14.67% to upper SES. Xerosis (66%) and generalized pruritus (44%) were the most common skin manifestations. Among the infective dermatoses, fungal infections (49.3%) were the most common followed by bacterial (29.3%). There was statistically significant correlation of diabetic dermatoses with SES, female gender, obesity, increased intake of junk food, active smokers for more than 10 years, living singly, sedentary lifestyle, and hypertension. **Conclusion:** An in-depth knowledge of diabetic dermatoses in the elderly and the role of SES and demographic parameters accounting for their increased prevalence has not been sufficiently studied among the Indian population. This study will shed some light on the same and bring in awareness among the doctors and policymakers alike to enhance the health-care needs of the elderly.

Key words: Geriatric diabetic patients; Diabetic dermatoses; Socioeconomic condition; Diabetes mellitus

INTRODUCTION

The geriatric population of the world has been estimated to be around 8.5% which continues to grow and is expected to double by 2050.¹ As per Indian population data census of 2011, almost 8.6% of the population belongs to the geriatric age group.²

Diabetes mellitus is one of the most common metabolic disorders affecting the elderly population that affects the skin and eventually every organ system, if not controlled.³ Cutaneous lesions are frequently noted in type 2 diabetes,

while autoimmune-related lesions are mostly associated with type 1 diabetes.³ Various factors such as abnormal metabolism of carbohydrates, alteration of metabolic pathways, vascular atherosclerosis, microangiopathy, sensory, motor, and autonomic neuropathies, impaired host immunity, genetic predisposition, obesity, and alcohol consumption together play a role in the pathogenesis.⁴

Dermatological manifestations in elderly patients with diabetes mellitus often led to severe morbidity which can even precipitate long-term organ damage. Hence, recognition and management at the earliest are important

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Address for Correspondence:

Dr. Jinia Saha, Department of Pediatrics, Calcutta National Medical College, Kolkata - 700 014, West Bengal, India.

Mobile: +91-7001683530. E-mail: jiniasaha007@gmail.com

to prevent complications and improve the quality of life. As socioeconomic factors play a major role in nutrition and healthcare, differences in socioeconomic status (SES) often cause disparity in their dermatological well-being. Sir Michael Hurst, President of International Diabetes Federation, had pointed out a common misconception about diabetes mellitus in many countries of the world that diabetes mellitus is “a disease of the wealthy.”⁵ A meta-analysis on socioeconomic factors and its correlation with diabetes had showed that poor socioeconomic conditions have increased the risk of developing diabetes by 40% after statistically controlling the clinical factors and risk behaviors.⁶ Hence, we have conducted this study to evaluate different dermatoses in geriatric diabetic patients and its association with socioeconomic condition. Few studies have been done around the world to assess so but none in this part of the country.

Aims and objectives

1. To assess the dermatological manifestations in geriatric diabetic patients
2. To explore their association with their socio-economic profile.

MATERIALS AND METHODS

Study setting

An observational cross-sectional study was conducted for 1 year, in a tertiary care hospital in eastern India to explore the dermatological manifestations in geriatric diabetic patients and to observe their association with the socioeconomic profile of the patients. The study was pre-approved by the Institutional Ethics Committee for the final permission. Diabetic patients aged 60 years and above attending the dermatology outpatient department (OPD) with skin manifestations or those attending the diabetic clinic of medicine OPD and subsequently referred to dermatology OPD with skin manifestations were included in the study. A total of 300 patients were included in the study. The study samples were chosen by random sampling and consecutive alternate patients had further been chosen for the allocation purpose.

After a written informed consent from each participant, detailed history including their SES, addiction, other associated metabolic syndromes, duration and progression of the disease, and treatment modalities was obtained. Critically ill, moribund or unwilling patients and those having other types of geriatric dermatoses were excluded from the study. Clinical examination included general physical examination along with cutaneous examination of the lesion including 10% KOH smear, Tzanck smear, pus stain, and culture and biopsy of lesion wherever required.

Parameters of diabetes were assessed by recent HbA1c levels, FBS, and PPBS levels.

Sociodemographic parameters such as age, gender, marital status, caste, SES (determined by Modified Kuppuswamy Scale; MKS), behavioral features (such as physical inactivity, smoking, alcohol consumption, consumption of junk food, consumption of fresh fruits, and vegetables), and associated risk conditions (overweight or obesity, hypertension, chronic kidney disease, heart disease, mental health, etc) were considered for analysis. Hypertension and other chronic diseases were self-reported.

- Lower class (LC) was considered as lower and upper-LC of MKS (score 3-10)
- Middle class (MC) was considered as middle and upper-MC of MKS (score 11-25)
- Upper class (UC) was considered as UC of MKS (score 26-29).

BMI was calculated by measuring height and weight and values were expressed as normal for those having BMI <22.9 kg/m², overweight between 23.0 and 24.9 kg/m², and obesity as ≥25.0 kg/m² in accordance with WHO Asian-BMI classification.⁷

Sedentary habit is defined as any waking behavior such as sitting or leaning with an energy expenditure of 1.5 metabolic equivalent task or less.⁸

Statistical analysis

Statistical analysis performed using IBM SPSS Statistics 22 for Windows. Numerical data were analyzed by descriptive statistics. Independent-samples t-test was performed for continuous variables, and they were expressed as means ± standard deviation. Chi-square test (Or Fischer's exact test) was performed for categorical data. Statistical significance was defined as P<0.05. Logistic regression was used to assess socioeconomic gradients and different associated health conditions in outcomes and accounted for survey design characteristics and sampling weights.

RESULTS

A total of 300 diabetic patients along with skin problem were included in the study. Out of them, male: female ratio was 1:1.38 (M=126; F=174) and as per modified Kuppuswamy scale, LC comprised of 61.33% (n=184) patients; MC 24% (n=72); and UC 14.67% (n=14). Majority of the study participants, that is, 70% (n=210) patients belonged to the age group 60–69 years, followed by 26% (n=78) patients belonging to the age group 70–79 years and 4% (n=12) patients above 80 years. Table 1

Table 1: Association of diabetic dermatosis with different demographic parameters and diseases

Variables	Number	Percentage
Demographics		
Gender		
Male	126	42
Female	174	58
Marital status		
Married	184	61.33
Widowed/separated/divorced	94	31.33
Single/never married	22	7.33
Cultural status		
Hindu	230	76.67
Muslim	70	23.33
Socioeconomic		
Lower	184	61.33
Middle	72	24
Upper	44	14.67
Education level		
Illiterate	56	18.67
Primary	128	42.67
Secondary	72	24
Graduate and above	44	14.67
Daily smoker for more than 10 years	158	52.67
Hypertension	112	37.33
Obesity	164	54.67
Other chronic diseases	136	45.33

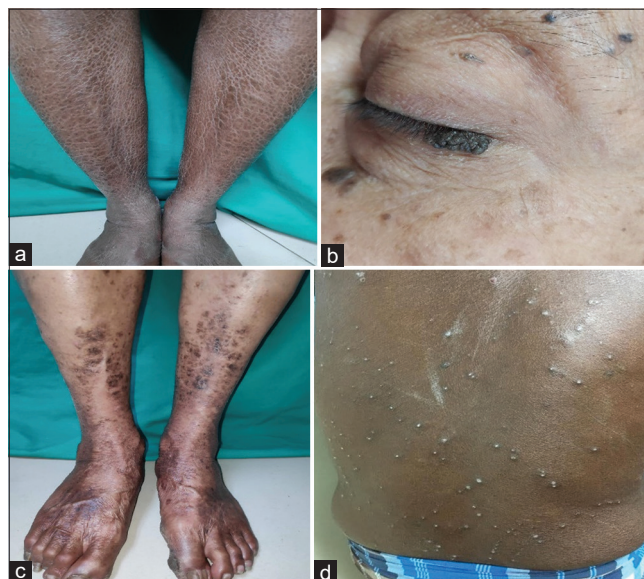


Figure 1: (a) Xerosis, (b) acrochordon, (c) diabetic dermopathy/shin spots, and (d) acquired perforating disorder

shows association of diabetic dermatosis with different demographic parameters and diseases.

Xerosis (Figure 1a) was seen in 66% (n=198) patients and was the most common skin manifestation. Generalized pruritus was the second, seen in 44% (n=132) of all the non-infective cases followed by acrochordons (Figure 1b) and acanthosis nigricans. Table 2 shows pattern of non-infective dermatoses among the patients based on SES. Pruritus, diabetic dermopathy or shin spots (Figure 1c), diabetic foot syndrome, perforating dermatoses (Figure 1d), necrobiosis lipoidica diabetorum (Figure 2a), and lipodermatosclerosis (Figure 2b) majorly involved the lower SES, while acanthosis nigricans, eruptive xanthoma (Figure 2c), and insulin-site lipodystrophy (Figure 2d) majorly affected the higher SES.

Fungal infections (49.3%, n=148) were the most common skin infection among the study participants. Dermatophytosis (29%, n=87) such as tinea corporis (Figure 3a), cruris, and pedis in the order of frequency was the most common fungal infection followed by candidiasis (Figure 3b). Bacterial infections (29.3%, n=88) such as folliculitis (Figure 3c), furuncles, and cellulitis were the second most common infection followed by parasitic infections (12.7%, n=38) like scabies (Figure 3d), pediculosis capitis, and viral infections (13.3%, n=20) like wart (Figure 4a), herpes simplex, and herpes zoster (Figure 4b). Table 3 shows pattern of infective dermatoses among the patients



Figure 2: (a) Necrobiosis lipoidica diabetorum, (b) Lipodermatosclerosis with secondary bacterial infection, (c) Eruptive xanthoma, (d) Insulin injection site lipodystrophy

based on SES. Infections, in general, were more common among those belonging to the lower SES.

Table 2: Pattern of non-infective dermatoses among the patients based on SES

Type of dermatosesa	Lower class (%)	Middle class (%)	Upper class (%)
Xerosis	72 (36.3)	66 (33.3)	60 (30.3)
Generalized pruritus	62 (47)	34 (25.7)	36 (27.3)
Pigmented purpura	17 (36.9)	16 (34.8)	13 (28.3)
Acrochordons	22 (33.3)	24 (36.3)	20 (30.3)
Acanthosis nigricans	10 (20)	16 (32)	24 (48)
Seborrhoeic keratosis	4 (40)	4 (40)	2 (20)
Eruptive xanthoma	2 (25)	2 (25)	4 (50)
Perforating dermatosis	4 (66.7)	1 (16.7)	1 (16.7)
Diabetic foot syndrome	16 (51.6)	9 (29)	6 (19.3)
Shin spots	20 (50)	12 (30)	8 (20)
Insulin injection site lipodystrophy	1 (16.7)	1 (16.7)	4 (66.7)
Others (Lipodermatosclerosis, drug reactions, necrobiosis lipidica diabetorum, scleredema adutorum)	10 (55.5)	4 (22.2)	4 (22.2)

Table 3: Pattern of infective dermatoses amongst the patients based on SES

Type of infection	Lower class (%)	Middle class (%)	Upper class (%)
Fungal	90 (60.8)	34 (22.9)	24 (16.2)
Bacterial	50 (56.8)	24 (27.3)	14 (15.9)
Parasitic	19 (50)	13 (34.2)	6 (15.7)
Viral	10 (41.7)	8 (33.3)	6 (25)

Diabetic dermatoses were seen to be positively correlated with SES, obesity, female gender, increased intake of junk food, active smokers for more than 10 years, single living, sedentary lifestyle, and hypertension. Table 4 shows adjusted and mutually adjusted odds ratios and 95% confidence intervals from logistic regression analyses with diabetic dermatoses as the dependent variable.

DISCUSSION

This study depicts a picture of the diversification of diabetic dermatoses and its distribution along the socioeconomic gradients in Eastern India. The most common age group of geriatric diabetic patients with skin manifestation was between the 6th and 7th decades in our study, whereas Timshina et al.,⁹ had found so to be in the 5th decade.

In our study, non-infective dermatoses were more common than infective dermatoses, and among them, xerosis and generalized pruritus were the most common which was similar to study done by Duff et al., and his colleagues in Ohio,¹⁰ whereas a study conducted by Sani et al., in Nigeria, had found idiopathic guttate hypomelanosis to be most common.¹¹ Patients from higher socioeconomic strata were found to have more incidence of non-infective diabetic dermatoses compared to infective. Whereas in lower socioeconomic strata, infective dermatosis was more common. These findings are in accordance with the studies done by Haire-Joshu and Hill-Briggs; Braveman et al., and Bachmann et al.,



Figure 3: (a) Tinea corporis, (b) Vulval candidiasis, (c) Folliculitis, (d) Crusted scabies

where they have also inferred that poverty, lack of quality education, and lack of health care significantly impair disparities in diabetes risk, diagnosis, and outcomes.¹²⁻¹⁴ Household wealth was also found to be positively correlated with diabetes, hypertension, and obesity as was shown by Corsi and Subramanian.¹⁵ However, this finding is in sharp contrast to a national Canadian study conducted over 11 years, where the prevalence of diabetes increased by 56% among lowest incomer group, 93% in the lower-middle, 59% in the upper middle, and 0% in the highest income group.¹⁶

Female predominance was seen in our study similar to the findings of Mashkoo et al.,¹⁷ and Romano et al.,¹⁸ Lack of awareness, illiteracy, and negligence among the female patients lead to long-term complications of diabetes and this might explain the positive correlation between female

Table 4: Adjusted and mutually adjusted odds ratios and 95% confidence intervals from logistic regression analyses with diabetic dermatoses as the dependent variable

Diabetic dermatoses	Coefficients	P-value	95.0% Confidence interval	
			Lower bound	Upper bound
SES	0.849	0.049*	-0.098	1.795
Age	0.802	<0.001*	0.528	1.076
Obesity	1.171	<0.001*	0.888	1.455
Female gender	7.435	0.019*	1.245	13.625
Sedentary life	6.321	0.021*	1.211	12.524
Single living	6.151	0.038*	0.331	11.970
Living in village	0.548	0.798	-3.658	4.754
Other chronic diseases	0.292	0.885	-3.662	4.245
Regular intake of Junk food	8.034	0.041*	0.328	15.741
Smoking for more than 10 years/daily smoker	3.311	0.017*	0.601	6.021
Hypertension	3.123	0.011*	0.502	5.012
Religion	0.607	0.729	-2.838	4.051

SES: Socioeconomic status

**Figure 4:** (a) Multiple warts, (b) Herpes zoster

gender and diabetic dermatosis.¹⁹

There is increased risk of obesity, hypertension, and hyperlipidemia in persons with diabetes and the association has been labeled as the “Deadly Quartet.”²⁰ It is also well established that poor glycemic control leads to increased prevalence of diabetic dermatoses and this is in correlation as per our study findings. Good glycemic control helps in reduction of the incidence and severity of cutaneous disorders associated with diabetes.²¹

Interestingly, patients living alone or are depressed were seen to suffer from xerosis more often in our study. Sridhar has explained about increasing evidence of existence of bidirectional relationship between the diabetes and depression in his paper.²² Hence, it should be kept in mind that self-neglect, lack of proper care, and depression in persons living single might play a role in exacerbation of diabetic dermatoses. Smoking was also found to be independently associated with poor glycemic control in our study, similar to the findings by Sia et al., and Georges et al.^{23,24} Hence, patients should be counselled about the importance of socializing with family, friends, and abstinence from smoking to avoid exacerbation of complications of diabetes.

It was seen that sedentary lifestyle had statistically significant association with diabetic dermatoses in our study. Refraining from an active life might lead to increased incidence of complications in diabetes. Hence, patients must be made aware about the importance of physical exercise, including yoga and running which help in control of depression and other negative psychological conditions.

It is a known fact that sugary foods, junk foods, and fatty diets with high glycemic index lead to uncontrolled diabetes or worsening of diabetic dermatoses. In our study, regular intake of junk food had significant impact on diabetic dermatoses, as was also inferred by Sarmiento et al., in their study that eating patterns influence control of diabetes. Hence, patients must be made aware of the importance of prioritized eating pattern constituting high consumption of fruits, vegetables, low-fat dairy products, whole grains, fish, poultry, and low in sweets and desserts or dietary approaches to stop hypertension diet, which can help in control of glycemic index.²⁵

The relationship between religion and diabetes might be attributed to habits promoted by religious practices. Intermittent fasting has proven health benefits, but long-term fasting may predispose persons on glucose-lowering medication to hypoglycemia. Persons who abstain from intake of liquids during the hot and humid Indian summer run the risk of dehydration and hypotension. Over-indulgence in unhealthy foods, after completion of the fasting episodes, may worsen glycaemia variability and lead to uncontrolled diabetes and its complications. Fasting during Ramadan by Muslims and Navaratri by Hindus has been dissuaded by doctors for patients of diabetes.^{26,27} However in our study, we could not find any significant association of religion with diabetic dermatoses.

Limitations of the study

The study had included small number of study subjects and was not longitudinal in nature, hence the disease course could not be followed. It needs more multicentric studies to know the clinic-epidemiography of the disease amongst Indian patients.

CONCLUSION

In India, adequate health service is still not accessible to all. The lower economic strata seem to suffer from the adverse complications more often, due to their economical constraints, poor hygiene, poor wound care, irregular attendance at diabetic clinics, and loss to follow-up. Hence, there is need of more regular screening at mass levels for diabetes and their regular follow-up for strict control of diabetes and avoidance of cutaneous and systemic complications.

This study should help to bring in awareness about the recognition of early and late skin changes in diabetic patients, understand the importance of lifestyle modifications on their health, and stress on the utmost need to look after such patients by the doctors, caregivers, as well as the policymakers to enhance their quality of life. Our study opens up scientific windows regarding future researches in larger population.

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SB, OR, PP- Concept and design of the study, prepared first draft of manuscript; **OR, AG-** Interpreted the results; reviewed the literature and manuscript preparation; **JS-** Concept, coordination, statistical analysis and interpretation, preparation of manuscript and revision of the manuscript..

Work attributed to:

Department of Dermatology, Venereology and Leprosy, S.S.K.M, Kolkata - 700 020, West Bengal, India.

Orcid ID:

Shayeri Banerjee - <https://orcid.org/0000-0002-4160-2126>

Animesh Ghosh - <https://orcid.org/0000-0002-1151-8599>

Olympia Rudra - <https://orcid.org/0000-0001-6181-2940>

Jinia Saha - <https://orcid.org/0000-0003-2710-1082>

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