

Assessment of the Dermatological Lesions in Diabetic Retinopathy Patients: Cross Sectional Study

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Abstract

Aim: The purpose of this study was to determine the prevalence of dermatological lesions in patients with diabetic retinopathy. **Methods:** This cross-sectional study was done at the Department of Ophthalmology, Anugrah Narayan Magadh Medical College Hospital (ANMMCH), Gaya, Bihar, India for 10 months. 90 patients with diabetic retinopathy having diabetes mellitus for at least 5 years duration, aged between 28-62 years, were included in this study. The dermatological examination was done by a dermatologist under proper day light and if needed, using handheld magnifying lens. Examination of the retina was done by an Ophthalmologist using indirect ophthalmoscopy of dilated fundus, fundus photo, fundus fluorescein angiography and optical coherence tomography of the macula. **Results:** Of the 90 diabetic patients included in this study, 8(8.89%) had Very Mild Non-Proliferative Diabetic Retinopathy (NPDR), 29(32.22%) had Mild NPDR, 35(38.89%) had Moderate NPDR, 11(12.22%) had Severe NPDR, 7(7.78%) had Proliferative Diabetic Retinopathy (PDR) and 39(43.33%) had Clinically Significant Macular Edema (CSME). 71 among 90 DR patients had different types of dermatological lesions, the prevalence being 78.89%. Dermatological lesions among poor glycemic control DM patients had a prevalence of 56.67% which was higher as compared to 33.33% among good glycemic control DM patients. 39(43.33%) patients had diabetic dermopathy, 28(31.11%) had Xerosis, 24(26.67%) had IGH, 22(24.44%) patients had Ichthyosis, 6(6.67%) patients had Intertrigo, 5(5.56%) patients had Tinea Versicolor, 4(4.44%) patients had Chronic Paronychia and 4(4.44%) patients had Tinea Unguium, 4(4.44%) patients had Eczema, 3(3.33%) had Melasma, 3(3.33%) had Lichen Amyloidosis, 3(3.33%) had Varicose vein, 2(2.22%) had Fissure feet, 2(2.22%) had Pigmented Purpuric Dermatitis (PPD), 2(2.22%) had Dermatitis Papulosa Nigra (DPN), 2(2.22%) had Sclerodactyly, 1(1.11%) had Plain warts, 1(1.11%) had Macular Amyloidosis, 1(1.11%) had Cherry Aneurysm, 1(1.11%) had Xanthelasma Palpebrarum, 1(1.11%) had Photodermatitis, 1(1.11%) had Skin tags, 1(1.11%) had Onychomycosis, 1(1.11%) had Onychogryphosis and 1(1.11%) had Prurigo. **Conclusion:** Prevalence of Dermatological lesions in Diabetic Retinopathy patients was 78.89%, the most common being Diabetic Dermopathy (shin spots) which was 43.33%.

Keywords: Dermatological Lesions, Diabetic, Diabetic Retinopathy, etc.

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Introduction

Cutaneous manifestations of diabetes mellitus appear at disease onset, after the disease is established or precede diabetes by many years. A cutaneous condition is defined as any medical condition that affects the system enclosing the body, including the skin, hair, nails, and related muscle and glands. Cutaneous disorders due to T2DM are attributed to hyperglycemia which affects skin homeostasis resulting in altered keratinocytes metabolism and collagen properties[1,2]. DM can affect almost all organ systems in the body and can cause microvascular complications like neuropathy (nervous system damage), nephropathy (renal system damage) and retinopathy (eye damage) as well as macrovascular complications like cardiovascular disease, stroke, and peripheral vascular disease leading to non-healing ulcers and gangrene which end up in amputation[3]. Some cutaneous manifestations related to DM such as acanthosis nigricans and pigmented purpuric dermatosis are the signs of macrovascular complications[4]. At least 30% of patients with DM are affected by different types of cutaneous disorders during the chronic course of their disease[5]. In the classification of cutaneous manifestations in DM, they are divided into four categories: (1) cutaneous diseases with weak to strong association with DM; (2) cutaneous infections; (3) cutaneous manifestations of DM complications; and (4) cutaneous reactions to DM treatments[6,7]. Long-term DM duration causes permanent and irreversible functional changes and damage to body cells, and therefore, it leads to problems arising from biochemical, structural, and functional anomalies[8,9]. Cutaneous complications of DM provide a clue to the

current and past metabolic status of the patient[5]. Cutaneous infections occur in 20- 50% of patients and are often along with moderate blood glucose control. Microvascular circulatory disorders, peripheral vascular diseases, peripheral neuropathy, and immune responses reduction are all contributing factors to an increased susceptibility of infection[10]. Common cutaneous infections, staphylococcal infections, are more perilous and severe in patients with uncontrolled DM. Other types of infection include styes that cause tuberculosis of eyelid and also bacterial infection of the nails[11]. A fungus called *Candida albicans* is responsible for numerous fungal infections affecting diabetic patients; these infections are common in vaginal area and lips corners (angular cheilitis)[11]. Candidiasis infection (moniliasis) can be considered as an early symptom of undiagnosed DM and localized candidiasis infection in the genital area of women has a strong relationship with DM[12]. Increasing the knowledge about cutaneous manifestations of DM can be associated with overall prognosis improvement of disease through the early diagnosis and treatment[13]. According to various studies, 30-82% of DM patients experience different types of cutaneous disorder during the chronic course of their disease[6,14]. Controlling the metabolism of the body may prevent some of these manifestations and also support the treatment[15]. On the other hand, many glycemic control medications also have skin side effects[16]. People who have cutaneous manifestation related to DM, even without a history of DM, should be investigated for the possibility of the disease[17]. Diabetes mellitus (DM) is a highly prevalent interdisciplinary disorder that needs many

different specialties' attention; however, the importance of dermatologists' knowledge has not been highlighted regarding this issue. As a result, we aim to assess the prevalence and variety of DM skin and nail manifestations in an effort to further acquaint dermatologists and other clinicians with diabetic dermatologic manifestations.

Material and methods

This cross sectional study was done at the Department of Ophthalmology, Anugrah Narayan Magadh Medical College Hospital (ANMMCH), Gaya, Bihar, India for 10 months after taking the approval of the protocol review committee and institutional ethics committee.

90 patients with diabetic retinopathy having diabetes mellitus of at least 5 years duration, aged between 28-62 years, were included in this study. Patients suffering from ophthalmological conditions like hypertensive retinopathy, vascular occlusion and advanced cataract that may affect the findings were excluded from the study. A questionnaire, which was semi structured was used to collect the data. The

dermatological examination was done by a dermatologist under proper day light and if needed, using handheld magnifying lens. Examination of the retina was done by an Ophthalmologist using indirect ophthalmoscopy of dilated fundus, fundus photo, fundus fluorescein angiography and optical coherence tomography of the macula. Socio-demographic details of patients including name, age, sex, educational status and occupation, questions on diabetes mellitus like duration of diabetes, medications and associated conditions were included. The collected data was entered in MS Excel software and was analysed using SPSS 21.

Results

90 patients who had DR were included in the study. The range of age was from 28 years to 62 years. The mean age was 18.59(SD 4.69) years. The duration of diabetes mellitus in this group was 5 to 25 years with a mean duration of 11.26 years (SD 5.08). There was a slight female preponderance with 41 males (45.56%) and 49 females (54.44%) among the 90 patients. (Table 1).

Table 1: Gender distribution diabetic retinopathy

| Gender | Number of patients=90 | Percentage |
|--------|-----------------------|------------|
| Male | 41 | 45.56 |
| Female | 49 | 54.44 |

Of the 90 diabetic patients included in this study, 8(8.89%) had Very Mild Non-Proliferative Diabetic Retinopathy (NPDR), 29(32.22%) had Mild NPDR, 35(38.89%) had Moderate NPDR,

11(12.22%) had Severe NPDR, 7(7.78%) had Proliferative Diabetic Retinopathy (PDR) and 39(43.33%) had Clinically Significant Macular Edema (CSME).

Table 2: Distribution of diabetic retinopathy

| | Number of patients | Percentage |
|----------------|--------------------|------------|
| Very mild NPDR | 8 | 8.89 |
| Mild NPDR | 29 | 32.22 |
| Moderate | 35 | 38.89 |
| Severe | 11 | 12.22 |
| PDR | 7 | 7.78 |
| CSME | 39 | 43.33 |

29 patients (32.22%) were on Oral hypoglycemic agents (OHA), 16(17.78%) were on Insulin and 45(50%) were on both OHA & Insulin.

71 among 90 DR patients had different types of dermatological lesions, the prevalence being 78.89%. Dermatological lesions among poor glycemic control DM patients had a prevalence of 56.67% which was higher as compared to 33.33% among good glycemic control DM patients.

Out of 71 patients, the most prevalent dermatological lesions noted were diabetic dermopathy, Xerosis, Idiopathic Guttate Hypomelanosis (IGH), Ichthyosis, Intertrigo, Tinea Versicolor and Chronic Paronychia, while the less prevalent ones were Eczema, Melasma, Lichen Amyloidosis, Varicose vein, Fissure feet, Pigmented Purpuric Dermatitis (PPD), Dermatitis Papulosa Nigra (DPN), Sclerodactyly, Plain warts, Macular Amyloidosis, Cherry Aneurysm, Xanthelasma Palpebrarum, Photodermatitis, Skin tags, Onychomycosis, Onychogryphosis and Prurigo.

39(43.33%) patients had diabetic dermopathy, 28(31.11%) had Xerosis, 24(26.67%) had IGH, 22(24.44%) patients had Ichthyosis, 6(6.67%) patients had Intertrigo, 5(5.56%) patients had Tinea Versicolor, 4(4.44%) patients had Chronic Paronychia and 4(4.44%) patients had Tinea Unguim.

4(4.44%) patients had Eczema, 3(3.33%) had Melasma, 3(3.33%) had Lichen Amyloidosis, 3(3.33%) had Varicose vein, 2(2.22%) had Fissure feet, 2(2.22%) had Pigmented Purpuric Dermatitis (PPD), 2(2.22%) had Dermatitis Papulosa Nigra (DPN), 2(2.22%) had Sclerodactyly, 1(1.11%) had Plain warts, 1(1.11%) had Macular Amyloidosis, 1(1.11%) had Cherry Aneurysm, 1(1.11%) had Xanthelasma Palpebrarum, 1(1.11%) had Photodermatitis, 1(1.11%) had Skin tags, 1(1.11%) had Onychomycosis, 1(1.11%) had Onychogryphosis and 1(1.11%) had Prurigo. Table 3 and 4 shows the gender distribution of Dermatological lesions among Diabetic Retinopathy patients.

Table 3: distribution of most prevalent Dermatological lesions among DR patients

| Dermatological Lesions | Number of patients | Percentage |
|----------------------------------|--------------------|------------|
| Diabetic dermopathy (shin spots) | 39 | 43.33 |
| Xerosis | 28 | 31.11 |
| IGH | 24 | 26.67 |
| Ichthyosis | 22 | 24.44 |
| Intertrigo | 6 | 6.67 |
| Tinea Versicolor | 5 | 5.56 |
| Chronic Paronychia | 4 | 4.44 |
| Tinea Unguim | 4 | 4.44 |

Table 4: Distribution of less prevalent Dermatological lesions among DR patients

| Dermatological Lesions | Number of patients | Percentage |
|-------------------------|--------------------|------------|
| Eczema | 4 | 4.44 |
| Melasma | 3 | 3.33 |
| Lichen Amyloidosis | 3 | 3.33 |
| Varicose veins | 3 | 3.33 |
| Fissure feet | 2 | 2.22 |
| PPD | 2 | 2.22 |
| DPN | 2 | 2.22 |
| Sclerodactyly | 2 | 2.22 |
| Plain warts | 1 | 1.11 |
| Macular Amyloidosis | 1 | 1.11 |
| Cherry Aneurysm | 1 | 1.11 |
| Xanthelasma Palpebrarum | 1 | 1.11 |
| Photodermatitis | 1 | 1.11 |
| Skin tags | 1 | 1.11 |
| Onychomycosis | 1 | 1.11 |
| Onychogryphosis | 1 | 1.11 |
| Prurigo | 1 | 1.11 |

Discussion

Diabetes mellitus (DM) is a common endocrinopathy and assumes significance for its ability to adversely affect the various internal organs. It can also derail the immune system of the affected. Hence, it is not surprising for diabetes to affect skin (the largest organ) producing different lesions. At times, evaluation for skin lesions leads to diagnosis of underlying diabetes. In a known diabetic, skin changes may provide warning signals regarding systemic involvement. Poor glycemic control might lead on to prolonged hyperglycemia. Prolonged hyperglycemia causes microcirculation and glycosylation of proteins which in turn results in complications in various organ systems of the body. Kidney, retina, nerves, and skin are the most commonly affected which manifests as renal failure, retinopathy, neuropathy and Diabetic dermopathy.^{18,19} In our study, Dermatological lesions among DR patients who had poor glycemic control had a prevalence of 56.67% which was higher as compared to 33.33% among good glycemic control DM patients.

Skin (Dermatological) disorders in DM can occur due to diabetic vascular abnormalities, cutaneous infections, treatment complications especially with Insulin, associated hyperlipidemia and other miscellaneous causes. Lesions like Diabetic dermopathy, erysipelas-like erythema, Diabetic rubeosis, leg ulcers and wet gangrene of the foot are due to vascular abnormalities. Non clostridial gas gangrene, candida albicans etc. are due to cutaneous infections. Insulin reactions can lead on to insulin lipodystrophy and associated hyperlipidemia can cause acanthosis nigricans, eruptive xanthomas and skin tags. Other manifestations like diabetic bullae, pruritis, waxy skin, scleroderma diabeticum, vitiligo, lichen planus etc. are also noticed in DM[20].

In our cross sectional study, 90 patients with DR were included, who all had suffered from type 2 DM for at least 5 years. 71 among 90 DR patients had different types of dermatological lesions, the prevalence being 78.89%, and the most Prevalent Dermatological lesion was 39(43.33%) patients had diabetic dermopathy, 28(31.11%) had Xerosis,

24(26.67%) had IGH, 22(24.44%) patients had Ichthyosis, 6(6.67%) patients had Intertrigo, 5(5.56%) patients had Tinea Versicolor, 4(4.44%) patients had Chronic Paronychia and 4(4.44%) patients had Tinea Unguim.

George and Walton also reported that Diabetic dermopathy (diabetic shin spots) is the commonest skin condition that occurs in patients with DM[21]. A study conducted among 125 DM patients by Kalsy et al found that the most frequent skin lesions was diabetic dermopathy[22]. In another study done by Chatterjee et al among 490 Type 2 diabetics, infections, Xerosis, hair loss beneath the knees and diabetic dermopathy were the most frequent[23]. A thorough search of literature could not give any studies which investigated on the prevalence of diabetic dermatological lesions in DR patients. Though both DR and Dermatological lesions are considered to be the complications of DM, we could not demonstrate the exact nature of association between these two in our study and further studies are required to do so.

Conclusion

Prevalence of Dermatological lesions in Diabetic Retinopathy patients was 78.89%, the most common being Diabetic Dermopathy (shin spots) which was 43.33%.

Reference

- Behm B, Schreml S, Landthaler M, et al. Skin signs in diabetes mellitus. *J Eur Acad Dermatol Venereol.* 2012; 26(10): 1203–1211.
- de Macedo GM, Nunes S, Barreto T. Skin disorders in diabetes mellitus: an epidemiology and physiopathology review. *Diabetol Metab Syndr.* 2016; 8(1): 63
- Deshpande AD, Harris-Hayes M, Schootman M. Epidemiology of Diabetes and Diabetes-related complications. *Phys Ther* 2008; 88 (11): 1254-64.
- Pierard G, Seite S, Hermanns-Le T, Delvenne A, Scheen A, and C. Pierard-Franchimont C, “The skin landscape in diabetes mellitus. Focus on dermocosmetic management,” *Clinical, Cosmetic and Investigational Dermatology.*2013; 6:127–135.
- Karadag A S, Ozlu E, and Lavery M J, “Cutaneous manifestations of diabetes mellitus and the metabolic syndrome,” *Clinics in Dermatology.* 2018;36(1):89–93.
- Perez M I and Kohn S R, “Cutaneous manifestations of diabetes mellitus,” *Journal of the American Academy of Dermatology.*1994;30(4): 519–531.
- Paron N G and Lambert P W, “Cutaneous manifestations of diabetes mellitus,” *Primary Care-Clinics in Office Practice.*2000; 27(2):371–383.
- Wahid Z and Kanjee A, “Cutaneous manifestations of diabetes mellitus,” *Journal of Pakistan Medical Association.*1998;48(10): 304-305.
- Oumeish O Y, “Skin disorders in patients with diabetes,” *Clinics in Dermatology.*2008;26(3):235–242.
- Al-Mutairi N, Zaki A, Sharma A K, and Al-Sheltawi M, “Cutaneous manifestations of diabetes mellitus: Study from Farwaniya Hospital, Kuwait,” *Medical Principles and Practice.* 2006;15(6):427–430.
- Mahajan S., Koranne R V, and Sharma S K, “Cutaneous manifestation of diabetes mellitus,” *Indian Journal of Dermatology, Venereology and Leprology.* 2003;69(2):105–108.
- Ahmed K, Muhammad Z, and Qayum I, “Prevalence of cutaneous manifestations of diabetes

- mellitus,” *Journal of Ayub Medical College Abbottabad*.2009;21(2):76–79.
13. Murphy-Chutorian B, Han G, and Cohen S R, “Dermatologic manifestations of diabetes mellitus. a review,” *Endocrinology and Metabolism Clinics of North America*.2013;42(4): 869– 898.
 14. Ahmed I and B. Goldstein B, “Diabetes mellitus,” *Clinics in Dermatology*.2006; 24(4): 237–246.
 15. Schons K R R, “Cutaneous manifestations in diabetes mellitus,” in *Dermatology in Public Health Environments: A Comprehensive Textbook*, R. R. Bonamigo and S. I. T. Dornelles, Eds., pp. 719–738, Springer International Publishing, Cham, 2018.
 16. Van Hattem S, Bootsma A H, and Tio H B, “Skin manifestations of diabetes,” *Cleveland Clinic Journal of Medicine*.2008;75(11):772–787.
 17. Levy L and Zeichner J A, “Dermatologic manifestation of diabetes,” *Journal of Diabetes*.2012;4(1): 68–76.
 18. Chakrabarty A, Norman AR, Phillips TJ. Feature:cutaneous manifestations of diabetes. *Wounds*.2002;14(8):267-74.
 19. Masharani U. Diabetes mellitus and hypoglycaemia. In: McPhee SJ, Papadakis MA, editors. *Current medical diagnosis & treatment*. 46th ed. New York: McGraw-Hill,2007;1219-1265.
 20. Bourke J. Skin disorders in Diabetes Mellitus. In: Griffiths EM C, Barker J, Bleiker T, Chalmers R, Creamer D, editors. *Rook’s textbook of Dermatology*. Vol 2, 9th ed. Hoboken (NJ): Wiley-Blackwell; 2016. p64.1-64.7.
 21. George S MC, Walton S. Diabetic Dermopathy. *Br J Diabetes Vasc Dis*. 2014; 14(3):95-97.
 22. Kalsy J, Malhotra S K, Malhotra S. Incidence of diabetic dermopathy. *J Pak Assoc Dermatologists*. 2012; 22(4):331-5.
 23. 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 J Endocrinol Metabol*. 2014; 18(2): 217-20.