Skin Diseases In Diabetes Mellitus Patients

ABSTRACT

Aims: This research activity aims to determine the manifestation of skin disease in diabetes mellitus patients at Sentra MedikaCisalak Hospital, Depok in 2019-2020
Study design:research with a cross-sectional approach
Place and Duration of Study: Sentra MedikaCisalak Hospital, Depok with research time including the time for processing, collecting and carrying out research carried out in December 2019 – January 2020.
Methodology: The design of this research is a cross-sectional approach with a population of all patients suffering from diabetes mellitus with skin manifestations. The sample in this study was taken using a total sampling technique, namely taking samples entirely from medical record data of patients who had been diagnosed with diabetes mellitus and who experienced skin manifestations in Sentra MedikaCisalak Hospital, Depok in 2019-2020 which meets the inclusion and exclusion criteria. The research instrument used is secondary data which is the medical records of patients who have been diagnosed with diabetes mellitus and who have skin manifestations at Sentra MedikaCisalak Hospital, Depok for the 2019 - 2020 period.
Results: The research results showed that of the 50 research samples, based on gender, it was dominated by men, namely 30 people (60%), and from the age range it was dominated by patients suffering from diabetes mellitus aged >60 years, namely 26 people (52%), as well as levels of The highest HbA1c level was 10.1 – 12 mg/dL, namely 15 people (30%). Of the total sample, there were manifestations of skin disease experienced by patients, namely, acanthosis nigricans (66%), necrobiosis lipoidicadiabetesrum (58%), diabetic candidiasis (20%), and eruptive xanthomatosis (80%
Conclusion:manifestations of skin disease in diabetes mellitus sufferers are dominated by eruptive xanthomatosis and acanthosis nigricans with the highest age percentage being 60 years

Keywords: Diabetes mellitus, skin disease, manifestations

1. INTRODUCTION

Diabetes mellitus is a metabolic group characterized by hyperglycemia due to abnormalities in insulin secretion, insulin action, or both. Symptoms of hyperglycemia can include polydipsia, polyuria, weight loss, sometimes polyphagia, and unclear vision [1]. Diabetes mellitus occurs when the pancreas produces very little insulin or the body cannot use the insulin produced by the body properly. Insulin is a hormone that has a function in regulating blood sugar. According to the World Health Organization, the epidemiology of diabetes mellitus sufferers will greatly improve in the coming years. For Indonesia, it is predicted that it could increase from 8.4 million in 2000 to 21.3 million by 2030 [2]. Diabetes mellitus can also be called the silent killer because this disease can attack various body organs and cause various types of complaints. The majority of diabetes mellitus patients show little or almost no self-care at all and also the length of time diabetes mellitus is diagnosed. Complications of diabetes mellitus arise from an early age, even before the diagnosis is detected. Meanwhile, if early treatment efforts have been implemented, it can assist in improving the quality of life of the patient [3]

A total of 30%-70% of patients who have diabetes mellitus are diagnosed with skin involvement during this chronic disease which is influenced by the skin microvasculature in diabetes mellitus. Almost all diabetes mellitus patients have complaints or lesions on their skin related to their

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International Diabetes Federation. IDF Diabetes Atlas, 10th edn. Brussels, Belgium: 2021. Available at: https://www.diabetesatlas.org

condition. at HJ Hospital. Adam Malik Medan found 31 types of skin diseases that arise as a result of diabetes mellitus [4].

Some skin conditions in diabetes mellitus patients are a direct result of metabolic changes, for example, hyperglycemia and hyperlipidemia. Progressive damage to the body's vascular, neurological, or immune system also contributes significantly to skin manifestations. 5 Skin manifestations in diabetes mellitus can generally appear in sufferers or patients who have been suffering from poorly controlled DM for a long time, but can also be an early sign of manifestation. primary disease [5]

Various factors have a role in skin manifestations in diabetes mellitus (DM) sufferers, namely disorders of carbohydrate metabolism which can increase metabolic pathways, vascular involvement in atherosclerosis, microangiopathy, and nerve involvement including sensory neuropathy and immune disorders [5] in addition to fungi , the skin of diabetes mellitus sufferers can also be infected by viruses or bacteria. The age of patients who suffer from DM exceeds 50 years, and may be susceptible to skin disease due to manifestations of diabetes mellitus. Most skin disease manifestations are found in patients with DM. Meanwhile, for DMT I, because it was discovered during childhood, patients are more careful in paying attention to lifestyle patterns. Patients who experience diabetes mellitus often suffer from skin infections such as dermatophytosis and candidiasis [5].

Referring to the background, the author has an interest in carrying out research activities related to the manifestation of skin disease in diabetes mellitus sufferers at Sentra MedikaCisalak Hospital, Depok in 2019-2020.

Based on the description in the background of the problem above, a question can be formulated, namely, how does skin disease manifest in diabetes mellitus sufferers at Sentra MedikaCisalak Hospital, Depok in 2019-2020?

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2. MATERIAL AND METHODS

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Manifestations of Skin Diseases Associated with Diabetes Mellitus:

1. Eruptive Xanthomatosis
   The clinical manifestation of xanthomatosis is yellowish-red papules measuring 1 to 4 mm located on the buttocks or extensor surfaces of the extremities. These lesions often group and form plaques. In uncontrolled diabetes mellitus and hypertriglyceridemia, there is an increase in triglyceride levels which results in reduced lipoprotein lipase activity as well as chylomicrons and VLDL (very low-density lipoprotein) which are associated with xanthoma eruptions. Histopathological examination showed macrophage infiltration containing lipids in the dermis. Unlike other forms of xanthoma, foam cells appear, namely macrophages which are dominated by triglycerides rather than cholesterol esters. Treatment is to control triglyceride levels in the blood, a low-fat diet, and control blood sugar levels [9]
2. Nigrican Acanthosis
   Acanthosis nigricans (AN) is the most easily recognized dermatological manifestation of diabetes mellitus and most cases are associated with obesity and type A insulin resistance and in some cases are associated with increased androgen production. The prevalence of Acanthosis nigricans varies between different races, being higher in African Americans, namely 13%, and Hispanics, 5% [10]. Acanthosis nigricans in women with hyperandrogenism and insulin resistance can be found due to damage to insulin receptor function or the presence of anti-insulin receptor antibodies. Excessive stimulation of growth factors in the skin causing abnormal proliferation of keratinocytes and fibroblasts is the basis of the AN phenotype [10].
3. Necrobiosis LipoidicaDiabeticorum
   The name Necrobiosis lipoidica (NL) was given after the characteristic histology results were found and was first discovered in diabetes mellitus patients, however, not all Necrobiosis lipoidica is associated with diabetes mellitus. 10 This disease is one of the markers of diabetes

which manifests in the skin, its occurrence is very rare. only occurs in 1% of people with diabetes mellitus and is more common in women [5].

4. Diabetic bullae
   Diabetic bullae or bulosisdiabeticorum are rare skin manifestations of diabetes mellitus, occurring only in around 0.2%-0.5% of patients. Bullae that appear spontaneously in the lower extremities and there is no history of previous trauma or infection. Diabetic bullae have tense walls measuring 0.5-3 cm without inflammation in the surrounding skin which occurs acutely and is painless. Diabetic bullae have recurrent characteristics which mainly occur in patients with advanced diabetes mellitus [5].. Histopathological examination shows that there are subepidermal gaps, with intraepidermal nonacantholytic cells [4]. Diabetic bullae are a condition that can improve or heal without treatment, usually within 2-4 weeks. Topical antibiotics can be given to large bullous lesions and drained [12].
5. Fungal Infections
   Candida infection can be an early indicator of undiagnosed diabetes mellitus. Mucocutaneous infections due to Candida species such as thrush, angular cheilitis, candidal balanoposthitis, vulvovaginitis, and paronychia as well as intertriginous candidiasis are fungal infections that often occur in diabetes mellitus patients [11] Dermatophyte infections, namely tinea pedis and onychomycosis, are one of the significant infections that occur in diabetes. mellitus. Diabetic neuropathy of the lower extremities provides an ideal environment for dermatophyte infections, allowing mild tinea pedis to become widespread. Interdigital tinea pedis is most often accompanied by secondary infection due to fissures and cracks [13] Treatment for candidiasis and dermatophytosis in diabetes mellitus patients is no different from the principles of therapy in non-diabetes mellitus patients, but attention is needed to care for dry skin and nails regularly and most importantly. Blood sugar levels must be controlled. If necessary, treatment is immediate and aggressive to prevent secondary infections [5,10]

2.1. METHODS

2.1.1. Research Design

This type of research uses descriptive research methods with a cross sectional design.

2.1.2. Place and Time of Research

2.1.2.1. Research Place

The location for data collection for this research was at Sentra MedikaCisalak Hospital, Depok.

2.1.2.2. Research Time

The time for processing, collecting and carrying out research was carried out in December 2019 – January 2020.

2.1.3. Research Population

The population of this study were all patients diagnosed with diabetes mellitus who had been hospitalized and outpatient for skin diseases at Sentra MedikaCisalak Hospital, Depok for the period 2019 – 2020.

2.1.4 Research Sample

The sample in this study was taken using a total sampling technique, namely taking samples entirely from medical record data of patients who had been diagnosed with diabetes mellitus and who experienced skin manifestations at Sentra MedikaCisalak Hospital, Depok in 2019-2020 which became the research sample in accordance with the inclusion criteria and exclusion.

2.1.5. Research Criteria

2.1.5.1. Inclusion Criteria

1. Patients who have received outpatient or inpatient treatment at Sentra MedikaCisalak, Depok in 2019-2020.
2. All patients diagnosed with diabetes mellitus with skin disease.

2.1.5.2. Exclusion Criteria

1. The patient is not recorded in the medical record archives at Sentra MedikaCisalak Hospital, Depok for the 2019-2020 period.
2. Diabetes mellitus patients with incomplete medical record data according to the variables studied.

2.1.6. Research Instruments

The research instrument used is secondary data which is the medical records of patients who have been diagnosed with diabetes mellitus and who have skin manifestations at Sentra MedikaCisalak Hospital, Depok for the 2019 - 2020 period.

2.1.7. Research Variables

• Independent variables: gender, age, HbA1c levels, and skin disease manifestations
• Dependent variable: diabetes mellitus

2.1.8. Research Instruments

The material used in this research activity is secondary data in the form of medical records of all patients diagnosed with TDM II who have been inpatients and outpatients for skin diseases at Sentra MedikaCisalak Hospital, Depok for the period 2019-2020.

2.1.9. Data Processing and Analysis

1. Edit Data
   Enter and examine the data that has been obtained into the SPSS program where the data will later be edited and from the results of the editing, complete data will be obtained.
2. Tabulation
   In this stage, the data will be grouped into tables so that analysis can be carried out. All data that has been obtained will be entered into the SPSS (Statistical package for the social science) program. The table used in this research is a frequency distribution table.
3. Data Analysis
   The statistical data analysis used in this research uses descriptive statistical data methods with frequency analysis

3. RESULTS AND DISCUSSION

The number of samples of medical records of patients diagnosed with diabetes mellitus with skin disease at Sentra MedikaCisalak Hospital, Depok. The number of medical records of diabetes mellitus patients at Sentra MedikaCisalak Hospital, Depok in 2019-2020 was 75 medical records and those included in the inclusion criteria for the material studied in this research were 50 samples of medical records, where descriptions of characteristics were based on gender, age, and HbA1c levels are presented in tables 1, 2 and 3 below:

Table 1. Patient characteristics by gender

Gender	Frequency	Percentage
Female	20	40%
Male	30	60%
Total	50	100%

Table 1 describes the characteristics of diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 based on gender. There were 30 people (60%) who were male and 20 people (40%) who were female. From the research results obtained from 50 samples of diabetes mellitus sufferers, the majority were 30 male patients (60%) compared to 20 female patients (40%). According to research conducted by Anna Nordstrom et al, the prevalence of diabetes mellitus for men is relatively higher than for women. This could be because men have

relatively more visceral fat than women, so men have a higher risk of developing diabetes mellitus than women [14].

Table 2. Patient Characteristics by Age

Age	Frequency	Percentage (%)
≤ 30 year	1	2 %
31-40 year	1	2%
41-50 year	3	6%
51-60 year	19	38%
>60 year	26	52%
Total	50	100%

Table 2 describes the characteristics of diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 based on age. There is 1 person (2%) whose age is ≤ 30 years, 1 person (2%) whose age is 31-40 years, 3 people (6%) whose age is 41-50 years, 19 people (38%) whose age is 51-60 years, and 26 people (52%) were >60 years old. Research activities were carried out by Ragunatha et al (2011) who researched 500 patients with type 2 diabetes mellitus, the age group most likely to experience cutaneous complications, namely the age category above 50 years [15]. The age factor is related to the physiology of old age, whereas one gets older, it means that the body's function decreases, including the work of the insulin hormone, so it cannot work optimally, and as a result, blood sugar levels become high [16]

Table 3. HbA1C levels

HbA1c Level (mg/dL)	Frequency	Percentage
≤6.5 mg/dL	13	26 %
6.6 – 8.1 mg/dL	9	18%
8.1 – 10 mg/dL	10	20%
10.1 – 12 mg/dL	15	30%
≥ 12 mg/dL	3	6%
Total	50	100%

Table 3. describes the characteristics of diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 based on the results of the examination of HbA1c levels. There were 13 people (26%) who had HbA1c levels ≤6.5 mg/dL, 9 people (18%) who had HbA1c levels 6.6 – 8.1 mg/dL, 10 people (20%) who had HbA1c levels 8.1 – 10 mg/d, 15 people (30%) had HbA1c levels 10.1 – 12 mg/dL, and 3 people (6%) had HbA1c levels ≥ 12 mg/dL. These results are also by those obtained by Kafaie et al in 2010, namely that there was a relationship between poor glycemic control and an increased prevalence of skin disease manifestations in type 2 diabetes mellitus patients. [17]. Drozdowska et al in 2008 said that several causal factors in diabetes mellitus patients were found to increase the severity and increase the risk of serious complications, namely hyperglycemia can directly cause the decreased function of neutrophils, monocytes, and macrophages (attachment function, chemotaxis, and phagocytosis), decreased function of T cells [9]. There is a relationship between the degree of hyperglycemia and an increase in several complications, namely microvascular complications, macrovascular complications, sensory neuropathy, cardiac ischemia, stroke, and death [18].

Data regarding skin manifestations in patients with diabetes mellitus who are the research samples are presented in tables 4, 5, 6, and 7 below:

Table 4. Diagnosis of Acanthosis Nigrican

Diagnosis of Acanthosis Nigrican	Frequency	Percentage
With a diagnosis of AN	33	66%
No Diagnosis of AN	17	34%
Total	50	100%

Table 4 describes the characteristics of diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 based on the results of the examination of HbA1c levels. There were 13 people (26%) who had HbA1c levels ≤6.5 mg/dL, 9 people (18%) who had HbA1c levels 6.6 – 8.1 mg/dL, 10 people (20%) who had HbA1c levels 8.1 – 10 mg/dL 15 people (30%) had HbA1c levels 10.1 – 12 mg/dL, and 3 people (6%) had HbA1c levels ≥ 12 mg/dL.

These results are also those obtained by Kafaie et al in 2010, namely that there was a relationship between poor glycemic control and an increased prevalence of skin disease manifestations in type 2 diabetes mellitus patients [17]. Drozdowska et al in 2008 said that several causal factors in diabetes mellitus patients were found to increase severity and increase the risk of serious complications, namely hyperglycemia can directly cause decreased function of neutrophils, monocytes, and macrophages (attachment function, chemotaxis, and phagocytosis), decreased function of T cells [9]. There is a relationship between the degree of hyperglycemia and an increase in several complications, namely microvascular complications, macrovascular complications, sensory neuropathy, cardiac ischemia, stroke, and death [18].

Table 5. Diagnosis of Necrobiosis LipoidicaDiabetesrum

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Diagnosis of Necrobiosis LipoidicaDiabetesrum (NLD)	Frequency	Percentage (%)
With the diagnosis of NLD	29	58%
No diagnosis of NLD	21	42%
Total	50	100%

Comment [SS7]: LipoidicaDiabeticorum

Table 5 describes diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 with and without a diagnosis of necrobiosis lipoidicadiabetesrum. There were 29 people (58%) diagnosed with necrobiosis lipoidicadiabetesrum and 21 people (42%) without a diagnosis of necrosis lipoidicadiabetesrum. According to Kenia Lepe et al, necrobiosis lipoidica has an increased prevalence in individuals with diabetes. 62% of cases of necrobiosis lipiodica occur after diabetes is diagnosed. Because there is a strong association between diabetes and necrobiosis lipoidica, several studies have emphasized diabetic microangiopathy as a major etiological factor. This can be further supported by the fact that the effects of diabetes on the eye and kidney vasculature are comparable to the vascular changes observed in necrobiosis lipoidica. The deposition of glycoproteins on the walls of blood vessels in cases of diabetic microangiopathy is also found in necrobiosis lipoidical [20].

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Table 6. Diagnosis of Diabetic Candidiasis

Diagnosis of diabetic candidiasis (DC)	Frequency	Percentage (%)
With the diagnosis of DC	10	20%
No diagnosis of DC	40	80%
Total	50	100%

Table 6 describes diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 with and without a diagnosis of diabetic candidiasis. There were 10 people (20%) who were diagnosed with diabetic candidiasis and 40 people (80%) without a diagnosis of diabetic candidiasis. Candidiasis is a fairly frequent manifestation in diabetes mellitus patients. People with diabetes mellitus have a higher susceptibility to fungal infections compared to people who do not suffer from diabetes mellitus. This is caused by high blood glucose [21].

Table 7. Diagnosis of Eruptive Xanthomatosis

Diagnosis ***Eruptive Xanthomatosis*****(EX)**	Frequency	Percentage (%)
With diagnosis of EX	40	80%
No diagnosis of EX	10	20%
Total	50	100%

Table 7 describes diabetes mellitus patients with skin disease at Sentra MedikaCisalak Hospital, Depok in 2019-2020 with and without a diagnosis of eruptive xanthomatosis. There were 40 people (80%) diagnosed with eruptive xanthomatosis and 10 people (20%) without a diagnosis of eruptive eanthomatosis.Eruptive xanthomas are a clinical presentation of hypertriglyceridemia, generally associated with serum triglycerides above 2,000 mg/dL. However, in patients with diabetes, lower triglyceride levels may be associated with eruptive eanthomatosis. The prevalence of eruptive xanthomatosis is approximately 1% in type 1 diabetes and 2% in type 2 diabetes. Serum lipid abnormalities are present in approximately 75% of patients with diabetes [21].

4. CONCLUSION

Based on the objectives and results of this research, the following conclusions were obtained: 1) Men are the largest population diagnosed with diabetes mellitus with skin disease manifestations at Sentra MedikaCisalak Hospital, Depok in 2019-2020. 2) The largest age group diagnosed with diabetes mellitus with skin manifestations is > 60 years old. 3} Patients with HbA1c levels were most often diagnosed with diabetes mellitus with skin disease manifestations at Sentra MedikaCisalak Hospital, Depok in 2019-2020, namely with HbA1c levels of 10.1-12 mg/dL.4} Manifestations of skin disease in diabetes patients at Sentra MedikaCisalak Hospital, Depok in 2019-2020, namely acanthosis nigrican (66%), necrobiosis lipoidika diabetes (58%), diabetic candidiasis (20%), and eruptive xanthomatosis (80%).

REFERENCES

[1] Simanjuntak, D., Nababan, K., &Sibarani, J. Manifestations of Skin Disease in Type 2 Diabetes Mellitus Patients at Dr. Hospital. Pirngadi Medan. Nommensen Journal of Medicine; 2021; 6(2): 65-67.

[2] PERKENI. Guidelines for the Management and Prevention of Adult Type 2 Diabetes Mellitus in Indonesia. 2021; 10.

[3] Indonesian Ministry of Health Research and Development Agency. Basic Health Research. 2018.

[4] Diabetes Care. Diagnosis and Classification of Diabetes Mellitus [Internet]. 2014 [cited 2021 Nov 1].

[5] Gkogkolou P, Bhom M. Skin Disorders in Diabetes Mellitus. JDDG. 2014;847–64.

[6] Nordström, Anna et al. “Higher Prevalence of Type 2 Diabetes in Men Than in Women Is Associated With Differences in Visceral Fat Mass.” The Journal of Clinical Endocrinology and metabolism vol. 101.10 (2016): 3740-3746.
[7] Rudi, A. and Kwureh, H. N. Risk factors that influence fasting blood sugar levels in laboratory service users. Health Insights: Scientific Journal of Health Sciences. 2017; 3(1).
[8] Fitri N. Characteristics of type 2 diabetes mellitus sufferers with complications who were hospitalized at Santa Elisabeth Hospital Medan in 2016. University of North Sumatra; 2018
[9] Fitri N. Characteristics of type 2 diabetes mellitus sufferers with complications who were hospitalized at Santa Elisabeth Hospital Medan in 2016. University of North Sumatra; 2018
[10] Franck M. Gender differences in glucose homeostasis and diabetes. PhysiolBehav. 2018 April; 187: 20–3.
[11]Tesfamichael G, Abebaw A. Prevalence of diabetic foot ulcers and associated factors among adult diabetic patients who attend the diabetic follow-up clinic at the University of Gondar Referral Hospital, North West Ethiopia. Diabetes Res Clin Pract. 2016;1–18.
[12] Mc Kinster CD, Orozco-Covorrubias L. Skin manifestations of nutritional disorders. In: Hoeger P, Kinsler V, Albert Y, editors. Harper’s textbook of pediatric dermatology. 4th ed. John Wiley & Sons; 2020 .p. 831-40
[13] Golriz F, Donnelly LF, Devaraj S, Krishnamurthy R. Modern American scurvy-experience with vitamin C deficiency at a large children’s hospital. PediatrRadiol. 2017;47:214–20.
[14] Ogawa Y, Kawamura T, Shimada S. Zinc and skin biology. Arch Biochem Biophys. 2016;6(11):113–9.
[15] Glutsch V, Hamm H, Goebeler M. Zinc and skin: An update. J German Soc Dermatol. 2019;17(6):589-94.
[16] Lekwuttikarn R, Teng JMC. Cutaneous manifestations of nutritional deficiency. Dermatology. 2018;20(01):1-9.
[17] GauchanE,KumarA,BkG,ThapaP,Pun J. Relation ofSociodemographics and Personal Hygiene on Different Childhood Dermatoses.Kathmandu Univ Med J (KUMJ).2015;13(49):29-33
[18] Lisha JJ, Sharfaa A, Fiza A, Mohieddin K, Naik M, Haitham D,et al. Prevalence of Allergies among University Students: A Study from Ajman, United Arab Emirates. ISRN Allergy.2014, Article ID 502052
[19] Elsner P,Schliemann S. The notion of occupational skin disease. Medical and legal aspects. 2015;66(3):184-8
[20] Plombom GY. Epidemiological analysis of occupational dermatitis notified in Brazil in the period 2007 to 2012. An. Bras. Dermatol.2016;91(6):732-736