FAMILY MEDICINE APPROACH TO LEPROSY PATIENT WITH DIABETES MELLITUS

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ABSTRAK

Kusta, juga dikenal sebagai penyakit Hansen, masih menjadi tantangan kesehatan global yang signifikan. WHO melaporkan 182.815 kasus kusta baru secara global pada tahun 2023. Penelitian di Kuwait menunjukkan bahwa sekitar 13,3% pasien kusta adalah DM, dengan tambahan 37,7% di negara-negara pra-DM. Lebih lanjut, respons imun seluler terhadap *Mycobacterium leprae* terganggu secara signifikan pada pasien DM, menciptakan lingkaran setan di mana DM mengganggu hasil pengobatan kusta sementara proses inflamasi terkait kusta dapat mempercepat atau memperburuk kontrol glikemik. Kami melakukan lima kunjungan rumah pada bulan Februari-Maret 2025 sebagai tatalaksana komprehensif dengan pendekatan kedokteran keluarga untuk pasien kusta dengan DM di wilayah Puskesmas Legok. Kami menyediakan intervensi yang berfokus pada pasien, intervensi pendekatan keluarga, dan intervensi pendekatan komunitas. Setelah kami menerapkan semua rencana terapi holistik dan komprehensif pada pasien dalam lima kunjungan rumah, kami menemukan adanya penurunan kadar gula darah, meskipun nilainya masih di atas nilai normal. Pasien kini memahami penyakitnya, melanjutkan pengobatan, dan minum obat secara teratur. Pasien juga mulai menjaga pola makan sehat dan mengurangi asupan kopi *sachet* hariannya, serta mulai menerima kondisinya. Kasus kompleks ini menunjukkan peran penting kedokteran keluarga dalam memberikan perawatan komprehensif dan terkoordinasi yang menangani berbagai kondisi kesehatan yang saling terkait dalam konteks kondisi sosial pasien dan dinamika keluarga.

Kata kunci : diabetes melitus, diabetes terkait kusta, kedokteran keluarga, kusta, pendekatan penatalaksanaan holistik dan komprehensif

ABSTRACT

Leprosy, also known as Hansen's disease, remains a significant global health challenge. WHO reported 182,815 new leprosy cases globally in 2023. Research in Kuwait demonstrated that approximately 13.3% of leprosy patients were DM, with an additional 37.7% in pre-DM states. Furthermore, the cellular immune response to Mycobacterium leprae is significantly impaired in patients with DM, creating a vicious cycle where DM compromises leprosy treatment outcomes while leprosy-associated inflammatory processes may precipitate or worsen glycemic control. We conducted five home visits in February-March 2025 as comprehensive management using a family medicine approach for leprosy patients with DM in the Legok Community Health Center area. We provided patient-focused interventions, family-approach interventions, and community-approach interventions. After we implemented all the holistic and comprehensive therapy plans on the patient in five home visits, we found that there was a decrease in blood sugar levels, even though the value is still above the normal value. The patient now understands his illness, continues the treatment, and takes his medication regularly. He has also started maintaining a healthy diet and reducing his daily intake of sachet coffee and begun to accept his condition. This complex case exemplifies the essential role of family medicine in providing comprehensive, coordinated care that addresses multiple interconnected health conditions within the context of patient social circumstances and family dynamics.

Keywords *: leprosy, diabetes mellitus, leprosy related diabetic, family medicine approach, holistic and comprehensive management*

INTRODUCTION

Family medicine is the branch of medicine that treats patients of all genders and reproductive phases and offers first contact as well as ongoing, all-encompassing healthcare for people, families, and communities throughout their lives. This specialization stands out for its comprehensive integration of clinical, behavioral, and biological sciences, which guarantees a patient-centered approach. Family medicine works to improve everyone's health and well-being through advocacy and education (AAFP, 2024). Leprosy, also known as Hansen's disease, remains a significant global health challenge despite remarkable progress in reducing its burden through multidrug therapy (MDT) implementation. The World Health Organization (WHO) reported 182,815 new leprosy cases globally in 2023 (WHO, 2022), with a registered prevalence of 133,802 cases by the end of 2021 (WHO, 2024). This represents a substantial decline from over 5 million cases in the 1980s to fewer than 200,000 cases by 2016, largely attributed to the widespread adoption of MDT since 1982 (Rao PN & Suneetha S, 2018). The intersection between leprosy and diabetes mellitus (DM) has emerged as a critical area of concern, with mounting evidence suggesting a complex bidirectional relationship that significantly impacts patient outcomes and disease management strategies. A comprehensive study from Central India highlighted patients with leprosy demonstrated higher insulin resistance and greater prevalence of pre-DM and DM compared to controls (Ghosh A, 2019).

The distribution of leprosy-DM comorbidity varies significantly across different geographical regions and healthcare systems, reflecting diverse socioeconomic factors, genetic predispositions, and healthcare accessibility patterns. India, which accounts for approximately 60% of global leprosy cases, has been at the forefront of research documenting this association with 107,851 new cases reported in 2023 (WHO, 2024). A study in India showed 14.2% of leprosy patients had DM compared to only 2% in controls (Nigam P et al., 1979). Research conducted in Kuwait demonstrated that approximately 13.3% of leprosy patients were DM, with an additional 37.7% in pre-DM states, indicating a substantial burden of glucose metabolism disorders in this population (Saraya MA et al., 2012). Similarly, hospital-based studies from Spain showed that 18.2% of patients admitted for leprosy had DM as a comorbidity, ranking as the second most common associated condition after hypertension (Figueres-Pesudo B et al., 2024). The implications extend beyond individual patient care to public health policy, as countries with high leprosy burden must develop integrated management strategies addressing both conditions simultaneously.

Indonesia occupies a critical position in the global leprosy landscape, ranking third worldwide after India and Brazil in terms of new case detection, with 17,439 new cases reported in 2019, around 10,976 cases in 2021, and 14,376 cases in 2023 (WHO, 2024). This substantial burden is compounded by concerning demographic patterns, including 1,861 pediatric cases (10% of total) among children under 15 years in 2019, indicating active community transmission and highlighting the urgent need for enhanced case detection and prevention strategies (WHO, 2024). The epidemiological profile of Indonesian leprosy patients shows predominance in adult males (66.8%), with 95.3% of cases occurring in individuals aged over 14 years and 86.2% classified as multibacillary type, representing the more severe and infectious form of the disease (Prakoeswa CRS et al., 2022). A study conducted in Donorojo Village, Central Java revealed a 19.7% prevalence of DM among leprosy patients, with an additional 23.6% in pre-DM condition, totaling 43.3% with glucose metabolism disorders. Furthermore, the cellular immune response to Mycobacterium leprae is significantly impaired in patients with DM, creating a vicious cycle where DM compromises leprosy treatment outcomes while leprosy-associated inflammatory processes may precipitate or worsen glycemic control (Ghosh A, 2019). This study aims to carry out comprehensive management with a family medicine approach in a leprosy patient with DM.

METHODS

We conducted comprehensive management using a family medicine approach for leprosy patients with DM in the Legok Community Health Center area. Our family medicine approach involves creating a genogram to assess the patient's hereditary disease history and social relationships with his family. We also use the mandala of health to consider various interrelated factors, such as biology, personal behavior, psychosocial environment, and physical environment, that can influence the patient's health. We also assess the family's physiological and pathological functions using the APGAR and SCREEM score. We establish a holistic diagnosis through five aspects: personal, clinical, internal, external, and functional. We conducted five home visits in February-March 2025. In addition, we provided patient education and interventions, including monitoring blood sugar levels at each visit. Family-approached interventions, such as education about the patient's condition, management plans, dietary patterns, and family support and assistance, are also necessary to improve treatment success.

CASE REPORT

Mr. E, 54 years old, complained of feeling weak all over his body. The complaint was accompanied by numbness and tingling in both palms of the hands and feet. The patient had been experiencing this complaint for the past 3 years. The patient had a history of uncontrolled DM, which was only diagnosed 3 years ago. However, for the past 5 months, the patient reported having many reddish spots all over his body and face. Initially, the red spots appeared on both hands, then spread to the entire body and face. The complaint was accompanied by weakness in his left hand. The patient admitted that his complaints appeared after taking leprosy medication provided by the community health center, causing him to stop self-treatment for one week. The patient's leprosy diagnosis was first confirmed by a neurologist at Mitra Keluarga Hospital, and the patient was directed to receive leprosy treatment at the community health center in September 2024.

The patient was given MDT (Multi Drug Therapy) treatment for the first time at the community health center at that time. However, after receiving initial treatment, the patient never returned to the community health center for a follow-up. The patient's wife always collects the medication for the patient every month at the community health center. Since being diagnosed with leprosy, the patient has experienced two leprosy reactions. The first reaction occurred approximately one month (October 2024) after starting MDT treatment, and the second reaction occurred in January 2025. The patient was hospitalized at Sitanala Hospital for five days during the first and second leprosy reactions. Before being diagnosed with leprosy, the patient worked as a factory worker and construction worker. In his work environment, the patient never shared items with his coworkers. He also frequently gathered with neighbors during night patrols. However, similar complaints were denied in his work environment, home environment, and family. The patient's family had been given leprosy prophylaxis in the form of a single dose of 600 mg of rifampicin. However, the patient's eldest child refused to take the prophylactic medication because he has kidney stones. The patient's child was concerned that the prophylactic medication might affect his kidney stones. The patient's mother has hypertension, and the patient's younger sibling has DM.

Since being diagnosed with leprosy, the patient has not worked and spends most of his time at home. He maintains good personal hygiene and sleeps approximately 6-7 hours per night. He eats three meals a day, consisting of a ladleful of white rice with various side dishes such as stir-fried vegetables, eggs, fried tofu/tempeh, and home-cooked fish. He rarely eats fruit and has a habit of drinking coffee sachets every morning and evening. He denies consuming alcohol or smoking. The patient lives with his wife and three children in a 10 x 6

meter single-story house. The house has three bedrooms, one bathroom, a living room, a kitchen, a terrace, a back room, and a side yard. The walls of the house are made of brick and cement; the walls are strong and waterproof, the surfaces are smooth and non-slip, the floor is made of cement and not covered with ceramic tiles, and the roof is made of a wooden frame with zinc-based tiles. The entire house is unpainted. Although the environment around the patient's house is clean, cleanliness inside the patient's house is not well maintained. The incidental ventilation area in the patient's house is 19.88%, while the permanent ventilation area is 0.88%. Lighting in the patient's house is quite good. The source of clean water comes from a well that is pumped using a pump. The patient's wife uses boiled well water for food preparation, while daily drinking water consumption uses refilled gallon water. Waste is channeled through a closed pipe to a water channel located underground in the kitchen area. Waste is collected in front of the road every three days and will be collected by a garbage truck. The bathroom is a single unit with a toilet and a squat toilet made of swan-neck ceramic. Waste is collected in a septic tank 2.5 meters deep and 8 meters from a clean water source. Bathroom hygiene is generally poor.

Mr. E's daily needs are met through the income from his wife, who works helping maintain the wood warehouse behind his house. The patient's third child also supports the family's needs by working as a gas station attendant. The patient's relationship with his wife and all his children is good. Family power is patriarchal. The family's physiological function is assessed using the APGAR score, namely adaptation (2), partnership (2), growth (2), affection (2), and resolve (2), obtaining a total score of 10, which means good family function. The pathological function is assessed using SCREEM, namely social, cultural, religious, economic, educational, and medical. Pathology is found in the patient's social elements because since the patient was diagnosed with leprosy, the patient's interaction with neighbors and the surrounding community has been poor. The patient's family genogram was made during the first visit (figure 1).

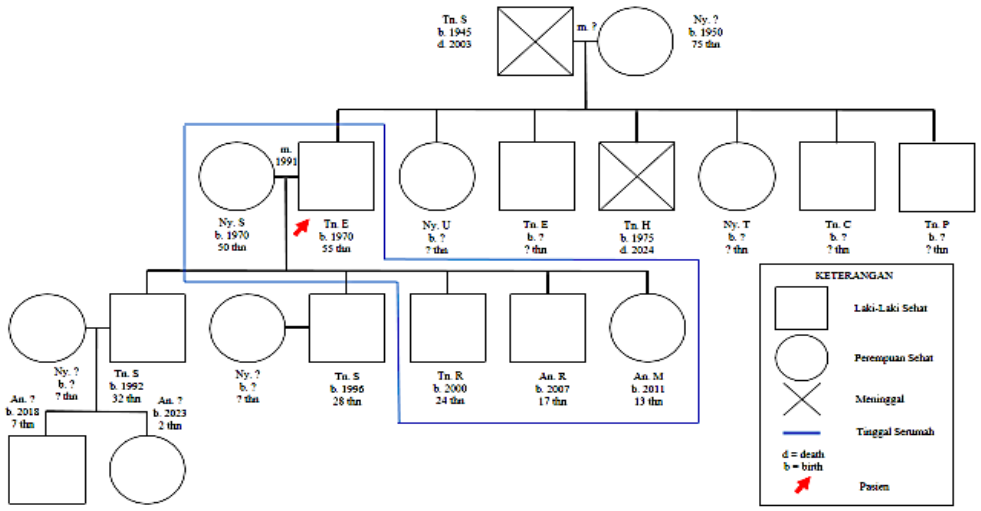

Figure 1. Patient Family Genogram

Physical examination revealed normal vital signs and normal nutritional status based on the Indonesian Ministry of Health's body mass index (BMI) classification. Dermatological examination revealed multiple lesions distributed generally in the facial, cervical, anterior and posterior trunk regions, and bilateral superior and inferior extremities in the form of erythematous macular plaques to hyperpigmentation, ranging in size from nummular to plaques, accompanied by fine white scales (Figure 2). Sensory examination revealed fine tactile hypoesthesia and pain in skin lesions in the bilateral superior and inferior extremities. Motor

examination revealed hypotrophy and monoparesis of the left superior extremity. Cranial nerve examination was within normal limits. Blood sugar at any time was 449 mg/dL.

Figure 2. Dermatological Status and Sensory Examination

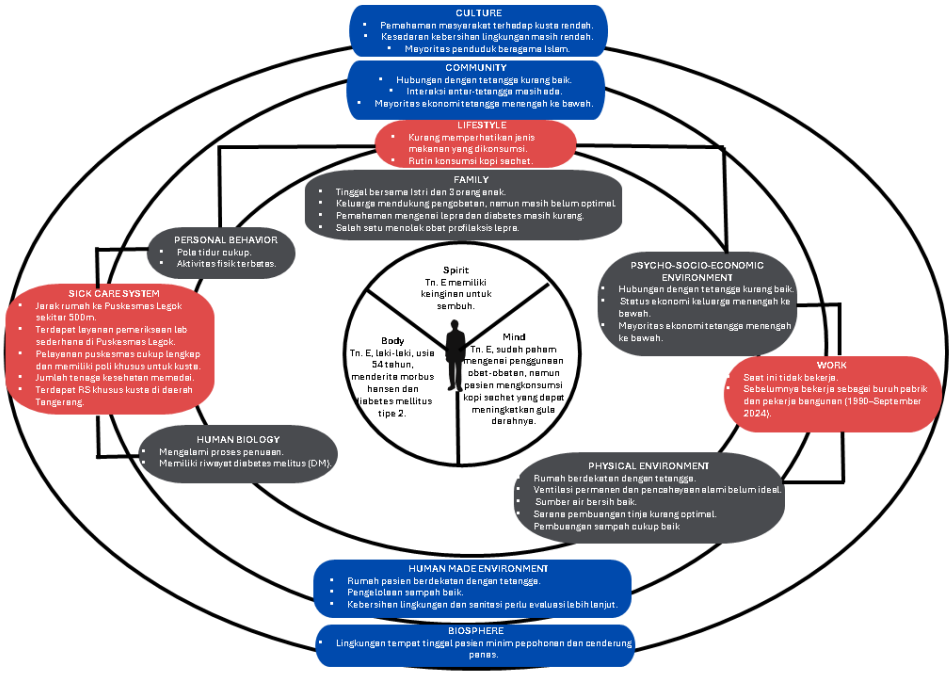

Figure 3. Mandala of Health

From the results of the anamnesis and examination that had been carried out, the initial holistic diagnosis of the patient was obtained as follows (table 1):

Table 1. Patient's Holistic Diagnosis

Aspect I (Personal)	Reason for arrival: The patient complained of feeling weak all over, accompanied by numbness and tingling in the palms of both hands and feet. Patient expectations: Patients want to be able to return to their pre-illness activities. Patient concerns: Complaints of numbness have not improved, making it difficult to carry out daily activities.
Aspect II (Clinical)	Main diagnosis: Morbus Hansen (Leprosy) Borderline Lepromatous Type. Additional diagnosis: Type 2 DM with Peripheral Neuropathy.

Aspect III (Internal)	Mr. E's lack of knowledge regarding the disease (causes and possible prevention measures) and complications that can occur and the importance of regular check-ups and regular medication consumption. Mr. E pays little attention to the types of food and nutrition he consumes and regularly consumes sachet coffee. Mr. E has a history of DM, so his immune system is weakened. Mr. E tends to sit quietly on the side porch of the house and limits socializing with neighbors because he feels embarrassed by his illness. Mr. E does not understand the right time to take medication.
Aspect IV (External)	The patient's children are sometimes unwilling to accompany the patient to the hospital for treatment. The patient's economic condition is lower middle class. The total permanent ventilation of Mr. E's house is not ideal. History of working as a factory laborer and construction worker. Mr. E often hung out outside the house before he got sick.
Aspect V (Functional)	Grade 4 has some difficulty in daily tasks.

The holistic and comprehensive management plan that will be provided to this patient consists of patient-focused interventions, family approach interventions, and community approach interventions (table 2).

Table 2. Holistic and Comprehensive Management Plan

Holistic and Comprehensive Management Plan	
Patient-Focused Interventions	Re-explain and provide understanding about leprosy and type 2 DM so that patients better understand their disease. Explains the condition of DM, which can slow down the healing process of leprosy. Providing an understanding of the importance of taking medication regularly (metformin 2x500 mg PO, glimepiride 1x4 mg PO, vitamin B12 1x1 tab PO, vitamin B6 1x10 mg PO, and MDT MB for adults) as well as education for routine check-ups at health centers and hospitals related to the disease experienced. Education regarding the types of food that are permitted and limited to keep blood sugar under control. Education about the causes, prevention, and complications that can occur if the disease is not controlled. Education about the importance of socializing for the patient's mental health and providing encouragement so that the patient can better accept their condition. Educate patients that if they gather again, they can wear masks, avoid physical contact, and pay attention to the health of their friends.
Family Approach Intervention	Educate the patient's family regarding the patient's illness. Motivate the family that family support is very important for the patient's recovery. Family education and motivation regarding the importance of maintaining a healthy lifestyle and maintaining a healthy diet.
Community Approach Intervention	Discuss and coordinate with cadres and RT heads so that patient receive social assistance because they are in the lower middle class.

DISCUSSION

Family medicine focuses on comprehensive and continuous healthcare delivery that encompasses all ages, addressing common and long-term illnesses while maintaining a holistic care perspective (Hashim, 2018). This approach is distinguished by its patient-centered methodology that considers individuals within their complete life contexts, including family dynamics, community relationships, and environmental factors that influence health outcomes (Jamoulle M et al., 2017). The comprehensive nature of family medicine encompasses

preventive care, acute illness management, chronic disease coordination, and palliative care services delivered through sustained therapeutic relationships (Hashim, 2018). The basis for applying a family medicine approach to the patient in this case report was because the patient never returned to the community health center after the first MDT treatment.

The differential diagnosis of peripheral neuropathy in this patient presents significant clinical complexity due to the overlapping symptomatology between diabetic and leprotic neuropathy, both of which can produce similar sensorimotor deficits, pain patterns, and functional limitations (Azhary H et al., 2010). Diabetic peripheral neuropathy typically manifests as distal, symmetric, sensorimotor polyneuropathy with stocking-glove distribution, while leprotic neuropathy characteristically affects specific nerve trunks with associated skin lesions and varying patterns of sensory loss (Trujillo-Ramirez L et al., 2021). The patient's presentation of bilateral hand and foot numbness with associated weakness could reasonably be attributed to either condition, making accurate differentiation crucial for appropriate treatment planning (Azhary H et al., 2010). Studies demonstrate that peripheral neuropathy caused by leprosy may be misdiagnosed as diabetic complications, potentially leading to delayed leprosy diagnosis and progression to severe deformities (Ghosh A, 2019).

Leprosy-related disabilities result from nerve damage causing sensory loss, motor weakness, and autonomic dysfunction that predispose patients to injuries, infections, and progressive deformities if not properly managed (WHO, 2020). The patient's left hand weakness and bilateral extremity sensory deficits require immediate implementation of self-care education focusing on protective behaviors, regular skin inspection, appropriate footwear use, and wound prevention strategies (De Bruin W et al., 2013). Combined self-care interventions that address both leprosy and diabetic complications may provide synergistic benefits, as both conditions share similar prevention strategies including foot care, wound management, and neuropathy monitoring (De Bruin W et al., 2013).

The patient's history of two distinct Type 2 leprosy reactions (erythema nodosum leprosum) following MDT initiation represents a significant clinical challenge that commonly affects 20-50% of multibacillary leprosy patients during their disease course (Pratama N et al., 2022). Type 2 reactions are severe immune-mediated complications characterized by systemic inflammation involving skin, nerves, and other organ systems that can occur before, during, or after MDT treatment completion (Goulart IMB et al., 2022). The patient's development of widespread erythematous skin lesions, neuritis affecting the left hand, and requirement for hospitalization during both reactional episodes severe manifestations requiring aggressive immunosuppressive management (Nagar et al., 2015). On the other hand, corticosteroid therapy used to manage leprosy reactions can significantly worsen hyperglycemia and may precipitate diabetic ketoacidosis in susceptible patients, necessitating close glucose monitoring and potential intensification of antidiabetic therapy during reactional episodes.

The psychosocial consequences of leprosy diagnosis extend beyond the individual patient to affect entire family systems, creating complex dynamics that influence treatment adherence, social functioning, and overall quality of life (Nasir A et al., 2022). The patient's withdrawal from social interactions, unemployment, and increased dependence on family members represents common psychological responses to leprosy diagnosis that can contribute to depression, anxiety, and social isolation (Nasir A et al., 2022). Despite good family functioning as measured by APGAR scoring, the identified social pathology reflects the broader community stigma associated with leprosy that limits the patient's social participation and community integration (Nasir A et al., 2022). Family medicine approaches must address these psychosocial dimensions through counseling services, support group referrals, and community education initiatives that reduce stigma and promote social reintegration. The concurrent management of MDT for leprosy and antidiabetic medications presents significant pharmacological challenges requiring careful monitoring and potential dose adjustments to

maintain therapeutic efficacy while minimizing adverse effects (Ghosh A, 2019). Rifampicin, a key component of MDT, is a potent inducer of cytochrome P450 enzymes and may significantly interact with various antidiabetic medications, particularly sulfonylureas such as glibenclamide and thiazolidinediones such as pioglitazone, potentially compromising glycemic control (Ghosh A, 2019). Family physicians must maintain comprehensive medication reconciliation processes that account for all prescribed treatments, monitor for drug interactions, and coordinate with specialists to ensure optimal therapeutic outcomes while minimizing polypharmacy risks. The patient's history of self-discontinuing medications due to side effects highlights the importance of patient education regarding medication importance, expected side effects, and the risks of treatment interruption in managing complex chronic conditions.

After we implemented all the holistic and comprehensive therapy plans on the patient in five home visits, we found that there was a decrease in blood sugar levels, even though the value is still above the normal value (Table 3). We also conducted a three-day dietary recall on the patient. The results showed that the patient's energy, protein, fat, and carbohydrate intake was sufficient. The patient now understands his illness, is undergoing treatment, and is taking his medication regularly. He has also started maintaining a healthy diet and reducing his daily intake of sachet coffee. The patient has begun to accept his condition. He also understands the importance of socializing for his mental health but has not yet implemented it.

Table 3. Follow-Up Blood Sugar Checks At Each Home Visit

Home Visit Date	Blood Sugar Level (fasting/at any time)
February 14, 2025	449 mg/dL (A)
February 20, 2025	380 mg/dL (A)
February 27, 2025	333 mg/dL (A)
March 05, 2025	254 mg/dL (F)
March 12, 2025	223 mg/dL (F)

*F = fasting; A = at any time

The patient's complex medical presentation requires comprehensive long-term care planning that addresses both immediate treatment needs and ongoing management of chronic complications associated with leprosy and diabetes mellitus (Trujillo-Ramirez L et al., 2021). Successful MDT completion will eliminate viable *M. leprae* organisms, but the patient remains at risk for late-onset leprosy reactions, progressive nerve damage, and diabetes-related complications requiring lifelong monitoring and intervention (Trujillo-Ramirez L et al., 2021). Regular monitoring protocols should include neurological assessments, blood glucose control evaluation, wound surveillance, and functional capacity assessments to detect early signs of deterioration and implement timely interventions (WHO, 2020). The patient's prognosis depends largely on achieving optimal diabetes control, preventing further leprosy reactions, and maintaining functional capacity through comprehensive rehabilitation and self-care education, requiring sustained engagement with healthcare services and family support systems.

CONCLUSION

This complex case exemplifies the essential role of family medicine in providing comprehensive, coordinated care that addresses multiple interconnected health conditions within the context of patient social circumstances and family dynamics. Family medicine's core principle of treating the whole person rather than isolated diseases becomes particularly relevant when managing patients with multiple chronic conditions requiring coordinated interventions across various healthcare settings and specialties.

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