Risk factors of diabetic foot in older adults: Clinical Case

Verónica Huerta Chimborazo[1,2] Francy Hollminn Salas Contreras[1] María Gabriela Morgado Tapia[1]
[1]University of Cuenca, Ecuador.
[2]Master's Degree in Care Management, Graduate Program of the Catholic University of Cuenca, Ecuador.
*Correspondence: Huerta Chimborazo V. Email: franholsac@yahoo.es / gmorgado@unab.cl
Received: 02/24/2022 Accepted: 05/19/2022 Published: 06/25/2022 DOI: http://doi.org/10.5281/zenodo.7012940

Abstract

Diabetic foot is defined as infection, ulceration, or destruction of the deep tissues of the foot that may be associated with different factors. **Objective:** To carry out a bibliographic analysis and treatment of the disease to determine the risk factors of diabetic foot in elderly women through a clinical case of the FUNPRA geriatric center in the city of Cañar - Ecuador. **Clinical case:** 80-year-old female patient, widowed, from the city of Azogues and resident in Cañar-Ecuador FUNPRA (nursing home), with no education. She is treated for diabetic foot grade I superficial wound in the right foot, does not involve tendon capsule or bone, in the healing process granulation tissue is observed. **Treatment and evolution:** She was administered a general diet, physical activity prior to healing, insulin in the morning 14 IU/dL and in the afternoon 6 IU/dL per day at the end of healing and bandaging. With 3 years of evolution DMT type II, 3 months of evolution of diabetic foot. No pathological, surgical, or family history. Improvement of the patient is observed after the cures performed, control of glycemia and administration of medication appropriately. **Conclusion:** A patient with diabetes mellitus type II was treated, her diabetic foot was associated with obesity, inadequate care, and poor hygiene.

Key words: Risk factors, Diabetic foot, Clinical Case.

Resumen

El pie diabético se define como la infección, la ulceración o la destrucción de los tejidos profundos del pie que puede estar asociada a diferentes factores. Objetivo: Realizar un análisis bibliográfico y de tratamiento de la enfermedad para determinar los factores de riesgo del pie diabético en mujeres de la tercera edad a través de un caso clínico del centro geriátrico FUNPRA de la ciudad de Cañar - Ecuador. Caso clínico: Paciente femenina de 80 años, viuda, procedente de la ciudad de Azogues y residente en Cañar-Ecuador FUNPRA (hogar de ancianos), sin estudios. Es tratada por herida superficial de pie diabético grado I en pie derecho, no compromete cápsula tendinosa ni hueso, en el proceso de cicatrización se observa tejido de granulación. Tratamiento y evolución: Se le administró dieta general, actividad física previa a la curación, insulina por la mañana 14 UI/dL y por la tarde 6 UI/dL al día al finalizar la curación y vendaje. Con 3 años de evolución DMT tipo II, 3 meses de evolución de pie diabético. Sin antecedentes patológicos, quirúrgicos ni familiares. Se observa mejoría del paciente tras las curas realizadas, control de la glucemia y administración de la medicación de forma adecuada. Conclusiones: Se trató a una paciente con diabetes mellitus tipo II, su pie diabético estaba asociado a obesidad, cuidados inadecuados y mala higiene.

Palabras clave: Factores de riesgo, Pie diabético, Caso clínico.

Introduction

Diabetes mellitus is one of the most important health problems, both because of its frequency and its enormous socio-economic repercussions in the world[1]. According to the WHO, this health problem affects 422 million people and causes 1.6 million deaths per year. Due to its ignorance and untimely diagnosis, it can cause different health problems, such as heart attacks, vision problems and many more[2].

Under this context, one of the most frequent complications is the diabetic foot, which is defined as the infection, ulceration or destruction of the deep tissues of the foot associated with neuropathy or peripheral vascular disease of different magnitude in the lower extremities of patients with diabetes mellitus[3,4].

Among the main causes are peripheral neuropathy, mechanical trauma, foot deformities and peripheral arterial disease (PAD)[5]. Other risk factors include poor vision, gait abnormalities, reduced mobility and medical comorbidities. Where the risk of major amputations increases with age, along with the increased prevalence of these factors[6].

With respect to sustainable development, this research focuses on goal number three, which is to ensure healthy living and promote well-being at all ages[7]. At the same time, it is based on studies by different authors that support the theoretical contribution of the case. It constitutes a document that benefits the patient of the case presented and the health personnel in order to provide quality care and warmth to patients[8].

Because diabetes is a chronic disease that requires continuous medical care and education for patient self-management to prevent acute complications and reduce the risk of long-term complications[9]. Such is the case of a study conducted in Iran on diabetic foot care, which mentions that according to the low level of knowledge and practice of 84.8%, a targeted educational program is needed to promote patients' knowledge[10].

Adding to the above, among the risk factors for diabetic foot complications in a study conducted in the United States, peripheral neuropathy, retinopathy, nephropathy, poor glycemic control, insulin use, duration of diabetes, smoking were identified. Followed by advanced age, hypertension, dyslipidemia and body mass index[11].

While in Ecuador, in the city of Cuenca, a study on the risk of diabetic foot and associated factors in patients with diabetes mellitus. It exposes the prevalence of diabetic foot risk was 42.6%, the associated factors were vascular alteration, time of diagnosis, foot at risk, diabetic neuropathy and glycosylated hemoglobin had a highly significant association with the risk of diabetic foot ($p<0.001$)[12].

Therefore, the objective of this work is to determine the risk factors of diabetic foot in older adults through a clinical case of the FUNPRA geriatric center in the city of Cañar - Ecuador.

Description of the clinical case

Clinical case: Patient 80 years old, female, mestizo race, catholic religion, widow, from the city of Azogues and resident in Cañar-Ecuador FUNPRA (nursing home), with no education. Diagnosed with T2DM type II, 3 years of evolution, 3 months of evolution of diabetic foot.

Diagnosis: Older adult with diabetes mellitus type II, insulin dependent is diagnosed with diabetic foot associated with inadequate care and poor hygiene, it is observed in evolution and healing of diabetic foot.

Medical diagnosis: chronic subdural hematoma.

History: No pathological, surgical, or family history.

Reason for consultation: 80-year-old female patient, mestizo race is seen for diabetic foot grade I superficial wound in the right foot, does not involve tendon capsule or bone, in the healing process granulation tissue is observed.

Laboratory tests: Blood biochemistry: urea 37 mg / dl, creatinine 1.14 mg / dl. Glucose 100mg / Dl, HB Glycosylated A 1c (IFI) 6.13%.

Physical examination: Patient conscious, oriented in time, space and person. Vital signs: Blood pressure (BP) 110/70 mmHg, heart rate (HR) 78 beats per minute (bpm), respiratory rate (RR) 20 breaths per minute (rpm), temperature 36.57°C, oxygen saturation 92%. Head: Normo cephalic, with active movements, hair with good implantation. Eyes: eye movements preserved. Pupils: isochoric, reactive to light. Sclerae: with a slight icteric pigmentation. Conjunctivae: no alterations. Mouth: dry oral mucosa, without teeth. Ears: No alterations. Neck: symmetrical, without presence of adenopathies. Chest: Symmetrical, expandable, ventilated lung fields. Abdomen: Soft, depressible, not painful on palpation, hydroaerial sounds present. Upper extremities: Symmetrical, with preserved muscle strength and tone, nails with onychomycosis, capillary filling present. Lower extremities: Symmetrical, with decreased muscle tone and strength, nails with onychomycosis, capillary filling present.

The assessment data in the study patterns, according to Marjory Gordon are:

Health perception: good, with few difficulties in self-care.

Nutritional metabolic: overweight patient (60 kg), weight gain in recent years, currently eating a controlled diet.

Activity and exercise: Relative rest.

Self-perception: patient with a good self-image, self-confidence on a scale of 2, refers to being worried, sad about her illness, during the interview maintains eye contact.

Relationships: Patient manifests that she lives in the nursing home, maintains good relationships with the people around her.

Tolerance to stress: She presents anxiety.

Values and beliefs: She maintains a Catholic, caring attitude towards her illness.

Treatment: General diet, physical activity previous cures, insulin in the morning 14 IU/dL and in the afternoon 6 IU/dL per day and rifampicin is applied after the cure, at the end cure and bandage.

Evolution: 80-year-old patient with diagnosis of T2DM type II, 3 years of evolution, 3 months of evolution of diabetic foot. After the cures performed, control of glycemia and administration of appropriate medication, improvement of the diabetic foot is observed, she is observed in better condition.

Discussion

Type II diabetes mellitus occurs when the human body does not produce enough insulin or is insulin resistant. It is a chronic non-communicable disease. It is predisposed to environmental and genetic factors, obesity, lack of physical activity, among others[13].

According to WHO data, diabetes mellitus is the direct cause of 1.5 million deaths worldwide in 2019, and of all deaths due to diabetes, 48% occurred before the age of 70 years[14]. While 2021 reports indicate that 62 million people are living with diabetes in America. In addition, approximately half of all adults with type 2 diabetes remain undiagnosed and 50% of people with type 2 diabetes do not receive the insulin they need[15].

In Ecuador, based on data reported by the ENSANUT survey, they indicate a prevalence of diabetes of 1.7% in the population aged 10 to 59 years. This proportion rises after the age of 30 years and by the age of 50 years, 1 in 10 Ecuadorians already has diabetes[16].

Among the complications of the disease, diabetic foot has been identified as the most common, which could be disabling and lead to related amputations. Based on these statements Zhao, Zhou and Zeng, mention that foot ulcers affect 15% of patients with diabetes, which is a major health burden. It is worth mentioning that the appearance and development of diabetic foot ulcers is also associated with neuropathy, peripheral arterial disease, and infection[17].

In the same context, the authors Senteio, et al. report in their study that the most prevalent risk factors for the development of diabetic foot are dry skin (78.9%), inadequate daily use of footwear (70.4%), cracked foot (60.6%) and presence of callus (56.3%). The prevalence of foot ulceration risk is 35.2%, with a predominance of grade 2 anomalies (33.8%)[18].

Compared to the data found in Ethiopia, Tolossa, Mengist and Mulisa state that the overall magnitude of foot ulceration in their study is 12.98%. Foot ulcer was significantly associated with rural residence (OR=2.72, 95%, CI:1.84-4.01)), presence of foot corns ((OR=12.67, 95%, CI:6.47-24.79)), an index body mass of >= 24.5 ((OR=2.68, 95% CI:1.58-4.56)), poor self-care practice ((OR=1.47, 95% CI:1.25-1.73)) (19).

At the same time, Martinez presents a clinical case of a 61-year-old male patient diagnosed with type 2 diabetes mellitus (DM2) fourteen years ago. This diagnosis was initially accompanied by sensory and motor peripheral neuropathy, metatarsophalangeal arthropathy without signs of osteomyelitis and diabetic arthropathy. The patient had ulcers on both feet for 10 years, in the metatarsophalangeal area. These had never healed completely during this period[20].

However, Gouri and Suresh present a rare case due to 2 reasons one an unusual site, two development of diabetic foot ulcer within a short duration of 2 years after diagnosis. A young woman in her 30s developed a foot ulcer over the left lower malleolus due to the pressure point due to the professional practice (tailor) of squatting on the floor to work within 2 years after diagnosis of diabetes[21].

In addition, a study in Ecuador showed in a publication that 93% of people had some degree of foot injury. Being conditioned by factors such as physical inactivity, smoking, poor eating habits and lack of sanitary hygiene[8].

While in the exposed case it is presented that the patient of 80 years of age, female, widow, from the city of Azogues and resident in Cañar-Ecuador FUNPRA (Nursing Home), with no education. She is treated for diabetic foot grade I superficial wound in the right foot, does not involve tendon capsule or bone, in the healing process granulation tissue is observed. With 3 years of evolution DMT type II, 3 months of evolution of diabetic foot. No pathological, surgical or family history. She

was given a general diet, physical activity before healing, insulin in the morning 14 IU/dL and in the afternoon 6 IU/dL per day at the end of the healing and bandage.

The treatment is mainly focused on healing the wound daily, using gauze, sterile gloves, distilled water, rifampicin, healing equipment, Vaseline gauze and finally the wound is bandaged. The patient's diabetic foot is associated with obesity, inadequate care, and poor hygiene.

Figure 1. Healing pose 1

Figure 2. Healing pose 2

In this regard, education for patients, caregivers and healthcare providers is an essential aspect of efficient treatment strategies. Therefore, efficient systems and structures are needed to ensure proper assessment and patient compliance in providing appropriate care. Because the involvement of patients and their environment improves outcomes.

Conclusiones

Patient counseling is an important element in the care process. Educating patients regarding diabetic foot ulcer plays an important role in significantly improving knowledge, attitude, practice and can also reduce complications.

Diabetic foot ulcer usually develops due to lack of knowledge and awareness about the consequences of disease progression and poor foot care among diabetics. In this case, improvement of the patient is observed after the cures performed, control of glycemia and administration of medication properly, reducing complications and presumably, avoiding amputation. During the process the patient became aware of the importance of taking care of herself.

Therefore, appropriate interventions for patient self-care practice, lifestyle modification and follow-up are needed to prevent diabetic foot ulcers.

On the other hand, it would be interesting to conduct empirical studies on the fear of COVID-19 in the face of the health emergency due to the COVID-19 pandemic in both the confinement, distancing, and vaccination stage in various populations[22-24] related to emotional[25] and educational aspects[26-35].

References

1. Aalaa M, Sanjari M, Esfahani EN, Atlasi R, Larijani B, Mohajeri-Tehrani MR, et al. Diabetic Foot scientific activities in Endocrinology and Metabolism Research Institute. J Diabetes Metab Disord [Internet]. 2021 [cited 2022 Feb 13];20(2):1767–72. Available from: https://www.webofscience.com/wos/woscc/full-record/WOS:000663052300001

2. Ahuja R, Dixit P, Banga A, Sharma S. Classification Algorithms for Predicting Diabetes Mellitus: A Comparative Analysis. EAI/Springer Innov Commun Comput [Internet]. 2022; [cited 2022 Feb 13]; 233–53. Available from: https://link.springer.com/chapter/10.1007/978-3-030-77746-3_16

3. De Sousa M, Da Silva Q, Duarte J, Melo A, De Resende E, Da Silva S. Risk assessment for diabetic foot in elderly with diabetes mellitus. Cult los Cuid [Internet]. 2019 [cited 2022 Feb 13];23(55):270–82. Available from: https://www.webofscience.com/wos/woscc/full-record/WOS:000504670500023

4. Aziz A, Alsabek M. Diabetic foot and disaster; risk factors for amputation during the Syrian crisis. J Diabetes Complications [Internet]. 2020 [cited 2022 Feb 13];34(2). Available from: https://pubmed.ncbi.nlm.nih.gov/31801697/

5. Lynar S, Robinson C, Boutlis C, Commons R. Risk factors for mortality in patients with diabetic foot infections: a prospective cohort study. Intern Med J [Internet]. 2019 [cited 2022 Feb 13];49(7):867–73. Available from: https://pubmed.ncbi.nlm.nih.gov/30515957/

6. Yazdanpanah L, Shahbazian H, Nazari I, Hesam S, Ahmadi F, Cheraghian B, et al. Risk factors associated with diabetic foot ulcer-free survival in patients with diabetes. Diabetes Metab Syndr [Internet]. 2018 [cited 2022 Feb 13];12(6):1039–43. Available from: https://pubmed.ncbi.nlm.nih.gov/30168426/

7. ONU. Goal 3: Ensure healthy lives and promote well-being for all at all ages. 2030 Agenda for Sustainable Development. 2015. [cited 2022 Feb 13]. Available from: https://www.un.org/sustainabledevelopment/es/health/

8. Minchala R, Estrella M, Suarez P, RamírezA, Guaraca P, Bautista X, et al. Epidemiological factors associated with the evolution of the diabetic foot. Rev Latinoam Hipertens [Internet]. 2021 [cited 2022 Feb 14]; (2):126–31. Available from: https://www.revhipertension.com/rlh_2_2021/3_epidemiological_factors_associated.pdf

9. Association A. Standards of Medical Care in Diabetes—2009. Diabetes Care [Internet]. 2009 [cited 2022 Feb 14]; (Supplement 1):S13–61. Available from: https://diabetesjournals.org/care/article/32/Supplement_1/S13/25055/Standards-of-Medical-Care-in-Diabetes-2009

10. Pourkazemi A, Ghanbari A, Khojamli M, Balo H, Hemmati H, Jafaryparvar Z, et al. Diabetic foot care: knowledge and practice. BMC Endocr Disord [Internet]. 2020 [cited 2022 Feb 13];20(1). Available from: https://pubmed.ncbi.nlm.nih.gov/32192488/

11. Rossboth S, Lechleitner M, Oberaigner W. Risk factors for diabetic foot complications in type 2 diabetes-A systematic review. Endocrinol diabetes Metab [Internet]. 2020 [cited 2022 Feb 13];4(1). Available from: https://pubmed.ncbi.nlm.nih.gov/33532615/

12. Armijos J, Romero R. Risk of diabetic foot and associated factors in patients with type 2 diabetes mellitus. José Carrasco Arteaga Hospital Diabetic Club. Cuenca. Thesis Maest Univ Cuenca [Internet]. 2019 [cited 2022 Feb 13];1–66. Available from: http://dspace.ucuenca.edu.ec/bitstream/123456789/33019/1/Tesis.pdf

13. Brocco E, Ninkovic S, Marin M, Whisstock C, Bruseghin M, Boschetti G, et al. Diabetic foot management: multidisciplinary approach for advanced lesion rescue. J Cardiovasc Surg (Torino) [Internet]. 2018 [cited 2022 Feb 14];59(5):670–84. Available from: https://pubmed.ncbi.nlm.nih.gov/29808982/

14. OMS. Diabetes [Internet]. Reporte. 2019 [cited 2022 Feb 14]. Available from: https://www.who.int/es/news-room/fact-sheets/detail/diabetes

15. OMS. WHO launches new global technical package to accelerate action to tackle diabetes [Internet]. Reporte. 2021 [cited 2022 Feb 14]. Available from: https://www.paho.org/es/noticias/14-4-2021-oms-lanza-nuevo-paquete-tecnico-mundial-para-acelerar-acciones-para-abordar

16. OPS/OMS. Ecuador - Diabetes, a priority public health problem in Ecuador and the Americas region [Internet]. Reporte. [cited 2022 Feb 14]. Available from: https://www3.paho.org/ecu/index.php?option=com_content&view=article&id=1400:la-diabetes-un-problema-prioritario-de-salud-publica-en-el-ecuador-y-la-region-de-las-americas&Itemid=360

17. Qi M, Zhou Q, Zeng W, Wu L, Zhao S, Chen W, et al. Growth factors in the pathogenesis of diabetic foot ulcers. Front Biosci - Landmark [Internet]. 2018 [cited 2022 Feb 14];23(2):310–7. Available from: https://www.webofscience.com/wos/woscc/full-record/WOS:000439039800007

18. Senteio S, Teston E, Costa MA, Soares S, Spigolon D. Prevalence of risk factors for diabetic foot development / Prevalência de fatores de risco para o desenvolvimento de pé diabético. Rev Pesqui Cuid é Fundam Online. 2018 Oct 4;10(4):919–25.

19. Tolossa T, Mengist B, Mulisa D, Fetensa G, Turi E, Abajobir A. Prevalence and associated factors of foot ulcer among diabetic patients in Ethiopia: A systematic review and meta-analysis. BMC Public Health [Internet]. 2020 [cited 2022 Feb 14];20(1). Available from: https://www.webofscience.com/wos/woscc/full-record/WOS:000514592300006

20. Martínez D. Clinical case: complicated diabetic foot ulcer. Rev Española Sanid Penit [Internet]. 2018 [cited 2022 Feb 14];20(3):121. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6463321/

21. Gouri S, Suresh K. Management of Diabetic Foot Ulcer- A case study. Glob J Obesity, Diabetes Metab Syndr [Internet]. 2021 [cited 2022 Feb 14];8(1):001–5. Available from: https://www.peertechzpublications.com/articles/GJODMS-8-149.php

22. Ramírez-Coronel A, Martínez-Suárez P, Pogyo-Morocho G, Estrella-González M, Mesa-Cano I, Minchala-Urgilés R, et al. Evaluación psicométrica e intervención de Enfermería frente al Miedo a COVID-19. Arch Venez Farmacol y Ter. 2020 [citado 2021 Ene 31];39(5):660–6. Disponible en: https://search.proquest.com/docview/2478790383?pq-origsite=gscholar&fromopenview=true

23. Torres-Criollo LM, Ramírez-Coronel AA, Martínez-Suárez PC, Romero-Sacoto LA, Mesa-Cano IC, González-León FM, et al. Clinical and para clinical variables predicting prognosis in patients with covid-19: Systematic review. Arch Venez Farmacol Ter 2020 [citado 2021 Ene 31];39(5):667-671. Disponible en: https://search.proquest.com/docview/2478791926?pq-origsite=gscholar&fromopenview=true

24. Ramírez-Coronel AA., Martínez-Suárez PC, Cabrera-Mejía JB, Buestán-Andrade PA, Torracchi-Carrasco E, Carpio MG. Social skills and aggressiveness in childhood and adolescence. Arch Venez Farmacol Ter 2020 [citado 2021 Ene 31];39(2):209-214. Disponible en: https://search.proquest.com/docview/2422402946?pq-origsite=gscholar&fromopenview=true

25. Ramírez AA. Laterality and reader process: correlational study. Espirales. 2019 [citado 2021 Ene 31];3(27),105-117. Disponible en: https://www.revistaespirales.com/index.php/es/article/view/558

26. Cabrera-Mejía JB, Martínez-Suárez PC, Ramírez-Coronel AA, Montánchez-Torres ML, Torracchi-Carrasco E, Castro-Ochoa FL. Analysis of problem-based learning impact on academic performance according to the forgotten (Fuzzy) effects theory. Arch Venez Farmacol Ter 2020 [citado 2021 Ene 31];39(5):651-659.

27. Andrade MC, Urgilés PT, Estrella MA. Information and communication technologies in the development of stochastic models applied to the health sector. Medicina 2020 [citado 2021 Ene 31];80(1):31-38. Disponible en: https://pubmed.ncbi.nlm.nih.gov/32044739/

28. Ramírez-Coronel A, Martínez-Suárez PC, Mesa-Cano I, Minchala-Urgilés RE, Ramírez-Coronel M, Torres-Criollo L, et al. Reseña histórica de Michel Foucault (1926-1984): concepto de ciencia e incidencia en la Psicología. Archivos Venezolanos de Farmacología y Terapéutica 2020 [citado 2021 Ene 31];39(6):740-743. Disponible en: https://search.proquest.com/docview/2478769623?pq-origsite=gscholar&fromopenview=true DOI: 10.5281/zenodo.4406598

29. Romero-Sacoto LA, Mesa-Cano IC, González MÁE, Ramírez-Coronel AA. Personal protective equipment for COVID-19 patient care: a systematic review. Arch Venez Farmacol Ter 2021;40(7):666-674.

30. Minchala-Urgilés RE, Ramírez-Coronel AA, Estrella-González MÁ, Martínez-Suárez PC. Therapeutic opportunities in adult patients with covid-19. Arch Venez Farmacol Ter 2021;40(7):675-679.

31. González-León FM, Mesa-Cano IC, Ramírez-Coronel AA, Peña-

Cordero SJ. Fear and behavioral self-assessment for care in the face of the covid-19 health emergency in the population of azogues. Arch Venez Farmacol Ter 2021;40(7):656-665.

32. Pogyo-Morocho GL, Ramírez-Coronel AA, Mesa-Cano IC, Pogyo-Morocho MV. Physical functionality in the daily life of the elderly in azogues. Arch Venez Farmacol Ter 2021;40(6):587-595.

33. Sarango DER, Mesa-Cano IC, Ramírez-Coronel AA, Brito EGM. Nursing role in the covid-19 pandemic: Systematic review. Arch Venez Farmacol Ter 2021;40(6):575-580.

34. Uyaguari SPN, Mesa-Cano IC, Ramírez-Coronel AA, Brito EGM. Demographic and clinical characteristics of patients infected with covid-19 at the general hospital of Macas. Arch Venez Farmacol Ter 2021;40(6):563-568.

35. Romero-Sacoto LA, Yambay-Bautista XR, Ramírez-Coronel AA, Andrade-Molina MC, Cordero-Zumba NB, Magdalena-Sarmiento M. Validation of the questionnaire of perception of the importance, usefulness and structure of the syllabus in microcurricular planning. Arch Venez Farmacol Ter 2021;40(6):596-604.