



Diabetic Foot and Self-awareness of This Entity

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To determine the relationship between the diabetic foot stages and the self-awareness about self-care of the feet in patients attending first level medical facility.

Study Design: This is a descriptive, cross sectional study.

Place and Duration of Study: This study was conducted in Unit Number 57 of the Family Medicine in the Mexican Institute of Social Security in Puebla, Mexico between January and June of 2017.

Methodology: We included 360 patients whom we surveyed to correlate between the level of knowledge about self-care of the feet in diabetic patients and its stages. We used a questionnaire in which the variables included gender, age, level of education, occupation, marital status, number of years since they were diagnosed with diabetes mellitus type 2, stage of the diabetic foot and level of knowledge related to this entity. Descriptive statistics and X^2 were used.

Results: We included 360 patients who met the inclusion criteria. Their average age was 55.75 years, the average number of years with the diagnosis of diabetes mellitus was 6.07. There was a significant statistic association between the level of knowledge and the stage of the diabetic foot $P = .049$ a value of $P = .05$ was considered statistically significant.

Conclusion: There is an association between the stage of the diabetic foot and the knowledge about the self-care of the feet among patients.

Keywords: Diabetic complication; diabetic foot; diabetic foot ulcer; diabetes mellitus; foot self-care.

1. INTRODUCTION

Currently, Diabetes mellitus is one of the mayor public health issues worldwide. In 2015, the International Diabetes Federation (IDF) estimated an average of 318 million of pre diabetic patients and 415 million adults had been diagnosed with Diabetes Mellitus type 2 (DM2). According to The International Diabetes Federation, 134.6 million older patients have been diagnosed with Diabetes Mellitus Type 2 worldwide with the numbers expected to increase up to 252.8 million patients with Diabetes Mellitus by 2035. In developing countries, the prevalence is expected to increase by 2030 with at least 82 million older patients with diabetes mellitus [1]. In Mexico, from the economic standpoint, the management of Diabetes Mellitus is associated with other health problems like overweight and obesity which takes up to 85,000 million pesos of the health budget annually. In addition, there are a total of 400 million of labor hours lost due to this entity yearly which counts for up to 184,851 full time jobs [2].

People with DM2 have higher risk to suffer from infectious diseases and other serious illnesses. The high levels of glucose in blood could lead to severe entities that affect the heart, blood vessels, eyes, kidneys, nerves and even cause periodontal issues. In countries with the world's largest economy, Diabetes Mellitus type 2 is the first cause of cardiovascular disease, blindness, kidney disease and amputation of lower extremities. In Mexico this disease is one of the 10 most common causes of hospitalization in adults, and the cause of 30% of the general mortality [3]. In western countries the incidence of diabetic ulcers is approximately 2%; however, in the United States the annual incidence varies from 5 to 6%. In addition, recent data estimates a lifetime risk of foot ulcers of 34% in diabetic patients [4].

The presence of diabetic ulcers is a complication frequently seen in patients who lack basic knowledge about this disease. Carrillo Al. and associates reported that even patients, who are

members of support groups of this entity, couldn't identify the basic signs of alarm [5]. The foot ulcers are the most frequent cause of hospitalization, which could lead to amputation in up to 85% of the cases regardless receiving medical care. Furthermore, the ulceration affects 12 to 25% of people diagnosed with this entity at some point in their lives, which represents an important expense not only for the health system but also for the patients leading to a higher risk of unemployment due to complications related to this entity, damaged social relations, psychological harm, quality of life and general environmental change. Diabetic foot ulcers and its lack of wound healing can lead to severe complications following a skin lesion in people with DM2 and its incidence and high cost of treatment can be reduced with an early education, early diagnosis and proper treatment [6].

Detecting risk factors such as use of inappropriate footwear, walking barefoot and repetitive stress on the foot is important to prevent foot ulcers. The periodic feet assessment in diabetic patients is effective in reducing the risk of amputation of lower extremities and preventing the recurrences of ulcerations, which can also be reduced when using special shoes for diabetics [7]. The risk of complications related to diabetic ulcerations can be reduced with preventive measures, patient education and self-care of the feet. It is recommended that all patients should be examined at least once a year, and for those patients with risk factors at least twice a year [7]. Primary care providers should identify potential patients with risk of diabetic ulcers, neuropathy, macroangiopathy and infections, so early treatment of diabetic foot can be initiated to prevent amputation of the extremities, decrease the expenses of hospitalization and preserve the quality of life of these patients [8]. The Wagner Ulcer Classification System is the most common scale used for prognosis. It considers the presence of neuropathy, ischemia and infection, so proper management can be taken in action [9].

The key is to identify patients with higher risk as well as have qualified health providers taking care of these patients. Moreover, the promotion of general knowledge about this disease should be implemented in diabetic patients, so they can have the knowledge and resources to take care of themselves.

This study was done with the main objective to correlate the knowledge of self-care of the feet and its stages in the primary care level.

2. MATERIALS AND METHODS

A descriptive, transversal study was done in patients with Diabetes Mellitus 2 who received medical attention from January to June in 2017. A non-probabilistic sampling was used with 360 patients who met the inclusion criteria such as: diagnosis of diabetes mellitus 2, willingness to participate and signed consent to participate in this study. The variables were gender, age, level of education, occupation, marital status, years since diabetes mellitus was diagnosed, stage of diabetic ulcers according to the Wagner scale, and level of self-care knowledge.

The survey of knowledge and care of the diabetic foot was used to assess the level of self-awareness among patients. This is a highly approved questionnaire used for the patients with diabetes mellitus type 2 [10]. According to the risk factors, the reliability of the instrument was determined with statistic formulas such as Ku de Richarson. The results were $\alpha=0.7$ which is considered valid for being higher than 0.5. We also assessed the feet of the patients and classified them according to The Wagner Ulcer Classification System. Once all the measurement values were obtained, we codified them and made a data matrix in which the data was processed with SPSS V 23. We used descriptive statistics as well as measures of central tendency, dispersion measures, and χ^2 for the association between variables of interest.

3. RESULTS

From the total number of respondents (360), the sociodemographic data resulted in 55.8 (201) patients of female gender, the average age was 55.75, the minimum age was 29 and the maximum age was 82, ± 10.210 years.

The major number of patients had: an undergraduate degree ($n=108$), the average occupation was housewife ($n=136$) and married marital status ($n=174$) [See Table 1].

The average years of diabetes mellitus type 2 being diagnosed was 6.07, minimum 1, maximum 30, ± 4.517 . These patients had a diabetic ulcer grade 0 in 98.3% ($n=354$) and only 1.7% ($n=6$) had grade 1 according to the Wagner classification. The level of self-awareness of self-care of the feet was below 35.9% ($n=129$), medium 51.9% ($n=187$), high 12.2% ($n=44$).

Table 1. Socio-demographic characteristics

Level of education	n	%
Illiterate	4	1.2
Elementary school	100	27.6
Middle School	77	21.4
High School	71	19.8
Undergraduate	108	30
Occupation	n	%
Housewife	136	37.8
Other	120	33.3
Laborer	42	11.7
Retired	34	9.4
Unemployed	17	4.7
Farmer	11	3.1
Marital Status	n	%
Married	174	48.3
Free union	101	28.1
Widowed	58	16.1
Divorced	14	3.9
Single	13	3.6

When correlating the level of knowledge of self-care and the stage of diabetic ulcers a value of $\chi^2=6.050$, $P=0.049$ was found. Therefore, we conclude that there is a relation between the stage of diabetic ulcers and the awareness about proper self-care of the feet in patients of the Family Medicine Unit Number 57, Mexican Institute of Social Security in Puebla, Mexico [See Table 2].

4. DISCUSSION

Self-awareness of patients with Diabetes Mellitus type 2 is essential for the control and prevention of complications that could lead to amputation of lower extremities. Foot ulcerations are the result of a combination of multiple factors such as age, sex, ethnicity, duration of the diabetes, peripheral neuropathy, peripheral artery disease, deformity, repetitive minor trauma and past foot ulceration or amputation. It has been shown that patients with previous foot ulcers have a risk of recurrence in up to 50% of the cases [4].

Table 2. Correlation of the level or knowledge of diabetic foot and its stages

Level of knowledge	Stage of diabetic foot		Total	
	Grade 0	Grade 1		
Low	124	5	129	
Medium	186	1	187	
High	44	0	44	P=.049
Total	354	6	360	

Sensory loss as a result of peripheral neuropathy triggers a higher risk of developing foot ulcers. It has been shown that up to 60% of diabetic patients have neuropathy, which results in a lack of the musculature of the foot leading to atrophy with muscle wastage and foot deformities that create areas susceptible to trauma that are often unnoticed by the patients and therefore, a higher risk of developing foot ulcers [11]. In addition, the repetitive plantar pressure, trauma, shear forces from ambulation, loss of sweat and malfunction of the sebaceous glands create a keratinized and dry skin that results in abnormal blood flow in the feet leading to higher risk of cracked skin, and foot ulcers that could result in infection and amputation as the final complication [11]. Therefore, in this study we aimed to determine the self-awareness about self-care of the feet in the 360 patients with diabetes mellitus type 2 who met the inclusion criteria. The results showed a higher incidence in the female gender with 55.8%, other studies confirmed this higher incidence in the female gender with a 64.7% of women with this entity [12]. On the other hand, in a study done in northwest Ethiopia, the male gender showed a higher incidence of 55.2% compared to the female gender with 44.8% [13].

The average age and years of diabetes mellitus being diagnosed was 55.7 and 6.07 respectively. Lopez L and associates showed similar data, in which the average age was 52.6 ± 5.8 years and the average years with diabetes mellitus was 112.00 (9.3 years) [12]. In contrast, in a study done by Alonso F the average age was 68.9 years [14].

The average level of education was undergraduate studies in 30% ($n=108$). Also, married was the most frequent marital status 48.3% ($n=174$). Moreover, Perez R, reported a higher percentage of unfinished elementary school in 46.8% [15].

The average occupation was housewives 37.8% ($n=136$) probably due to a higher population of women in this study. Perez R and associates

reported that 76.6% of its participants were also housewives [15]. In addition, Matute M and collaborators reported more frequent cases with grade 2 in 26.5% and grade 3 in 20.5% [16].

In addition, the average self-awareness of feet care was 51.9% ($n=187$) unlike Perez R and associates who showed an average of 55.8% similar to Sanchez U who reported an even higher percentage of 95.% in his study [15,17].

5. CONCLUSION

We can conclude that the stage of diabetic foot is related to the self-awareness of self-care; therefore, we should focus on patient education of diabetic patients, so they get to know this entity and know how to take care of their health to prevent complications, especially diabetic ulcers that can be prevented with the proper prevention measurements.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The ethics committee approved this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Sharoni SK, Abdul RH, Minhat HS, Ghazali SS, Ong MH. A self efficacy education programme on foot self-care behavior among older patients with diabetes in a public long-term care institution, Malaysia a quasi-experimental pilot study. *BMJ Open*. 2017;7(6):1-10. DOI: 10.1136/bmjopen-2016-014393
- Mar GJ, Peñarrieta DC, León HR, Gutiérrez GT, Banda GO, Rangel TS, et al. Relación entre automanejo y percepción de funcionalidad familiar en personas con diabetes mellitus tipo 2. *Enf Univ*. 2017; 14(3):155-161. Spanish. DOI: 10.1016/j.reu.2017.05.005
- Rojas MR, Basto AA, Aguilar SC, Zárate RE, Villalpando S, Barrientos GT. Prevalencia de diabetes por diagnóstico médico previo en México. *Salud Públ Mex*. 2018;60(3):1-9. Spanish. DOI: 10.21149/8566
- Boulton AJM, Armstrong DG, Kirsner RS, Attinger C, Lavery L, Lipsky B, et al.

- Diagnosis and management of diabetic foot complications. ADA; 2018. (Accessed 18 December 2018)
Available:https://www.ncbi.nlm.nih.gov/books/NBK538977/pdf/Bookshelf_NBK538977.pdf
5. Alarcon LC, López EL, Carbajal MJ, Torres MO. Level of knowledge in patients with type 2 diabetes mellitus and its relationship with glycemic levels and stages of grief according to Kübler-Ross. *J Diab Metab*. 2015;6:2-5. Spanish.
DOI: 10.4172/2155-6156.1000495
 6. Kaya Z, Karaca A. Evaluation of nurses' knowledge levels of diabetic foot care management. *Nurs Res Pract*; 2018.
DOI: 10.1155/2018/8549567
 7. Van Netten JJ, Lazzarini PA, Armstrong DG, Bus SA, Fitridge R, Hardig K, et al. Diabetic foot Australia guideline on footwear for people with diabetes. *J Foot Ankle Res*. 2018;11(2):2-14.
DOI: 10.1186/s13047-017-0244-z
 8. Wendling S, Beadle V. The relationship between self-efficacy and diabetic foot self-care. *J Clin Transl Endocrinol*. 2015;2(1): 37-41.
DOI: 10.1016/j.jcte.2015.01.001
 9. Montie JA, García VA, Castillo RC, Romero FM, Etchegaray MI, García CE, et al. Costes directos de atención médica del pie diabético en el segundo nivel de atención médica. *Rev Chil Cir*. 2017; 69(2):118-123. Spanish.
DOI: doi.org/10.1016/j.rchic.2016.09.009
 10. Montalvo LM. Nivel de conocimiento en la prevención del pie diabético en personas con diabetes mellitus tipo 2 de un hospital de Lima - Perú 2014. [Tesis licenciatura]. Lima Perú. Facultad de Medicina; 2014. Spanish.
(Accessed 14 November 2016)
Available:http://cybertesis.unmsm.edu.pe/bitstream/handle/cybertesis/4165/Castro_ah.pdf?sequence=1&isAllowed=y
 11. Pitocco D, Spanu T, Di Leo M, Vitiello R, Rizzi A, Tartaglione L, et al. Diabetic foot infections: A comprehensive overview. *Eur Rev Med Pharmacol Sci*. 2019;23(2):26-37.
DOI: 10.26355/eurev_201904_17471
 12. López LE, Ortiz GA, López CM. Intervención educativa sobre el nivel de conocimientos en pacientes con diabetes y baja o nula escolaridad. *Invest Educ Med*. 2016;5(17):11-16. Spanish.
DOI: 10.1016/j.riem.2015.08.003
 13. Mariam TG, Alemayehu A, Tesfaye E, Mequannt W, Temesgen K, Yetwale F, et al. Prevalence of diabetic foot ulcer and associated factors among adult diabetic patients who attend the diabetic follow-up clinic at the University of Gondar Referral Hospital, North West Ethiopia, 2016: Institutional-Based Cross-Sectional Study. *J Diabetes Res*; 2017.
[PMID: 28791310]
DOI: 10.1155/2017/2879249
 14. Alonso FM, Mediavilla BJ, Lopez SF, Comas SJ, Carramiñana BF, Mancera RJ. Evaluación de la realización del cribado del pie diabético en Atención Primaria. 2014;61(6):311-317. Spanish.
DOI: 10.1016/j.endonu.2014.01.007
 15. Pérez RM, Cruz OM, Reyes LP, Mendoza ZJ, Hernández IL. Conocimientos y hábitos decuidado: Efecto de una intervención educativa para disminuir el riesgo de pie diabético. *Cienc Enf*. 2015;XXI(3):23-36. Spanish.
DOI: 10.4067/S0717-95532015000300003
 16. Matute MC, Guillermo TA, Matute MF, Enrique PJ, Fernandez GE, Perdomo VR. Pie diabético y sus complicaciones. *Arch Med*. 2016;12(3):1-6. Spanish.
DOI: 10.3823 / 1306
 17. Sánchez UJ. Nivel de conocimiento sobre autocuidado de los pies y aplicación de medidas de autocuidado en pacientes adultos con diabetes. *Hospital Albrecht, Trujillo. Cientifi-k*. 2014;2(1):36-43.

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