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Original Research Article
Diabetic Foot and Self-Awareness of This Entity

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 χ^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.

ABSTRACT

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].

29 People with DM2 have higher risk to suffer from infectious diseases and other serious
30 illnesses. The high levels of glucose in blood could lead to severe entities that affect the
31 heart, blood vessels, eyes, kidneys, nerves and even cause periodontal issues. In countries
32 with the world's largest economy, Diabetes Mellitus type 2 is the first cause of cardiovascular
33 disease, blindness, kidney disease and amputation of lower extremities. In Mexico this
34 disease is one of the 10 most common causes of hospitalization in adults, and the cause of
35 30% of the general mortality [3]. In western countries the incidence of diabetic ulcers is
36 approximately 2%; however, in the United States the annual incidence varies from 5 to 6%.
37 In addition, recent data estimates a lifetime risk of foot ulcers of 34% in diabetic patients [4].

38 The presence of diabetic ulcers is a complication frequently seen in patients who lack basic
39 knowledge about this disease. Carrillo Al. and associates reported that even patients, who
40 are members of support groups of this entity, couldn't identify the basic signs of alarm [5].
41 The foot ulcers are the most frequent cause of hospitalization, which could lead to
42 amputation in up to 85% of the cases regardless receiving medical care. Furthermore, the
43 ulceration affects 12 to 25% of people diagnosed with this entity at some point in their lives,
44 which represents an important expense not only for the health system but also for the
45 patients leading to a higher risk of unemployment due to complications related to this entity,
46 damaged social relations, psychological harm, quality of life and general environmental
47 change. Diabetic foot ulcers and its lack of wound healing can lead to severe complications
48 following a skin lesion in people with DM2 and its incidence and high cost of treatment can
49 be reduced with an early education, early diagnosis and proper treatment [6].

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

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

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

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71 **2. MATERIAL AND METHODS**

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73 A descriptive, transversal study was done in patients with Diabetes Mellitus 2 who received
74 medical attention from January to June in 2017. A non-probabilistic sampling was used with
75 360 patients who met the inclusion criteria such as: diagnosis of diabetes mellitus 2,
76 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 =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 X^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].

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

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-

106 awareness of self-care of the feet was below 35.9% ($n=129$), medium 51.9% ($n=187$), high
107 12.2% ($n=44$).

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

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

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

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117 4. DISCUSSION

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

124 Sensory loss as a result of peripheral neuropathy triggers a higher risk of developing foot
125 ulcers. It has been shown that up to 60% of diabetic patients have neuropathy, which results
126 in a lack of the musculature of the foot leading to atrophy with muscle wastage and foot
127 deformities that create areas susceptible to trauma that are often unnoticed by the patients
128 and therefore, a higher risk of developing foot ulcers [11]. In addition, the repetitive plantar
129 pressure, trauma, shear forces from ambulation, loss of sweat and malfunction of the
130 sebaceous glands create a keratinized and dry skin that results in abnormal blood flow in the
131 feet leading to higher risk of cracked skin, and foot ulcers that could result in infection and
132 amputation as the final complication [11]. Therefore, in this study we aimed to determine the
133 self-awareness about self-care of the feet in the 360 patients with diabetes mellitus type 2
134 who met the inclusion criteria. The results showed a higher incidence in the female gender
135 with 55.8%, other studies confirmed this higher incidence in the female gender with a 64.7%
136 of women with this entity [12]. On the other hand, in a study done in northwest Ethiopia, the
137 male gender showed a higher incidence of 55.2% compared to the female gender with
138 44.8% [13].

139 The average age and years of diabetes mellitus being diagnosed was 55.7 and 6.07
140 respectively. Lopez L and associates showed similar data, in which the average age was

141 52.6 ± 5.8 years and the average years with diabetes mellitus was 112.00 (9.3 years) [12]. In
142 contrast, in a study done by Alonso F. the average age was 68.9 years [14].

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

146 The average occupation was housewives 37.8% (n=136) probably due to a higher
147 population of women in this study. Perez R and associates reported that 76.6% of its
148 participants were also housewives [15]. In addition, Matute M and collaborators reported
149 more frequent cases with grade 2 in 26.5% and grade 3 in 20.5% [16].

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

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155 5. CONCLUSION

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

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164 None

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167 COMPETING INTERESTS

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169 None of the authors have any conflicts of interest disclosed.

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171 AUTHORS' CONTRIBUTIONS

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173 All authors read and approved the final manuscript.

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CONSENT (WHERE EVER APPLICABLE)

Not applicable.

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

The ethics committee approved this study.

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240 **DEFINITIONS, ACRONYMS, ABBREVIATIONS**

241 None.

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243 **APPENDIX**

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245 None

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