

## **Effect of a podiatric health education intervention on the level of self-care in patients with Diabetes Mellitus. Pilot study.**

### **Abstract**

**Objective.** The main objective of this research was to test the effect of a podiatric health education activity on foot self-care and the degree of foot-related disability in a group of people with DM in the province of [[REDACTED FOR PEER REVIEW]]. A pretest-posttest quasi-experimental design was used. **Methods.** Twenty-nine people with DM participated. Foot pain-related disability was measured using the Manchester Foot Pain and Disability Index. The degree of foot self-care was measured with the University of Malaga Foot Self-Care questionnaire. **Results.** One month after the intervention, both parameters had improved significantly. Manchester Foot Pain and Disability Index showed  $59.96 \pm 8.69$  and  $67.39 \pm 6.99$  at baseline and at one month; and University of Malaga Foot Self-Care questionnaire showed  $11.65 \pm 20.07$  and  $4.52 \pm 5.47$ . **Conclusions.** According to our results, therapeutic education increases the level of self-care and decreases the degree of foot-related disability in people with DM.

### **Keywords**

Diabetes Mellitus; Health education; Diabetic foot; Podiatric self-care; Diabetes mellitus.

### **Introduction**

Diabetes Mellitus (hereafter, DM) has become a major public health problem with its prevalence estimated to be rising at an increasingly rapid rate worldwide.<sup>1</sup> It is closely associated with the development of foot ulcers and is responsible for a high percentage of amputations. About one in four people with DM will develop a foot ulcer in their lifetime and seven out of ten amputations performed are due to DM.<sup>2,3</sup>

Diabetic foot (hereafter, DF) is one of the most relevant and devastating complications of DM. It is defined as a group of syndromes in which neuropathy and peripheral vasculopathy of varying severity lead to infection, ulceration, tissue destruction and possible amputation. It is estimated that about 15% of patients with DM develop foot ulcers, preceding amputation in 85% of cases.<sup>4</sup>

DF is the most common cause of non-traumatic lower extremity amputation. Prevention of DF ulceration is crucial to reduce the associated high morbidity and mortality and the danger of amputation. Early diagnosis of diabetic neuropathy and peripheral arterial disease, health promotion and self-care are among the most effective preventive measures.<sup>5,6</sup> If adequate preventive measures are taken and appropriate health education is promoted, 49% to 85% of foot complications in people with DM could be avoided.<sup>3</sup>

In the treatment of DM conditions, the importance of an active role of the patient is emphasized, recognizing the need to promote educational strategies that provide them with the opportunity to assume a self-management role. Positive results are achieved by providing them with the necessary knowledge and skills in the management of their own disease.<sup>7</sup> Increasing patient knowledge and awareness of the disease has been shown to have significant benefits with respect to treatment compliance and decreased complications associated with the disease, and ultimately regarding quality of life.<sup>8,9</sup> There is a good correlation between knowledge, attitude and practice of self-care with respect to DM.<sup>1</sup> Education on podiatric self-care in people with DM is an essential part of disease management.<sup>1</sup> Patients who are educated in this regard develop self-awareness of their condition. However, few patients receive adequate diabetes education.<sup>10</sup>

According to Pinilla et al.<sup>4</sup>, patients who receive education about DM and the importance of foot health have a higher percentage of performing regular self-care practices, while the opposite occurs in the case of lack of education, with approximately a quarter of patients with high risk factors not self-examining their feet.

Health education in relation to self-care of the feet in patients with DM is of paramount importance, as DF is one of the most frequent complications that occur in the context of this disease. In Andalusia (Spain) there are Diabetic Foot Care Units, two of which are located in the province of [[REDACTED FOR PEER REVIEW]], in the [[REDACTED FOR PEER REVIEW]] University Hospitals. However, they are focused on the treatment of torpid wounds rather than on the prevention of the onset of the complication.<sup>11</sup> Podiatrists are not included in these units, as podiatric care is excluded from the portfolio of services offered by the Social Security of the Andalusian Health System.<sup>11</sup> Screening for this complication is carried out in primary care by the nursing staff, who establish the risk of suffering a complication (low, moderate or high) and,

depending on this, the frequency of a new assessment will vary (annual, six-monthly or quarterly/each visit), with the patient being referred to the podiatrist when they present a foot at risk or DF only once a year. Podiatric coverage of these patients is insufficient. In this sense, it is necessary to extend training, prevention and management through health education of the foot at risk in patients with DM not only once a year when there is a high risk or an established complication but also at earlier levels of prevention.<sup>11-13</sup>

The main objective of this research was to test the effect of a podiatric health education activity on foot self-care in a group of people with DM in the province of [[REDACTED FOR PEER REVIEW]]. The secondary objective was to determine the effect of this activity on the degree of disability related to foot pain.

## **Methods**

The type of study was quasi-experimental pretest and posttest. This study was approved by the Bioethics Committee of the [[REDACTED FOR PEER REVIEW]] University Hospitals of [[REDACTED FOR PEER REVIEW]], code 0227-N-17.

To recruit patients, various associations of patients with DM in the province of [[REDACTED FOR PEER REVIEW]] were contacted to organize health education activities. Data collection was carried out in [[REDACTED FOR PEER REVIEW]].

Inclusion criteria: over 18 years of age, a previous diagnosis of DM, and signature of the informed consent form prior to the intervention. Exclusion criteria: refusal to participate in the study and alterations in their mental faculties or disorientation, or other alterations that prevent them from understanding the questionnaires by themselves or with the help of the clinician.

After verbally informing all those individuals who volunteered and met the inclusion criteria for participation in the study, they were given an informative document on the nature of the study and an informed consent form.

Patient affiliation data were recorded: name, sex, date of birth, marital status, year of diagnosis of DM, and type of DM. Prior to the educational intervention, questionnaires were administered to each participant to assess foot pain and disability and podiatric self-care.

Foot pain-related disability was measured using the Manchester Foot Pain and Disability Index (hereafter, MFPDI), with values ranging from 0 to 38 with higher values being related to greater disability.<sup>14</sup> The degree of foot self-care was measured using the University of Malaga Foot Self-Care questionnaire (hereafter, APD-UMA), with values ranging from 16 to 80, with higher values being related to better levels of foot self-care.<sup>15</sup>

This was followed by a podiatric health education activity consisting of a one-hour informative talk on general aspects of the foot, general aspects related to DM, podiatric complications related to DM, specific foot care in people with DM, recommendations on the characteristics of footwear and socks depending on each activity and the role of the podiatrist. There was then a 30-minute discussion. One month after the intervention, participants were contacted by telephone and the MFPDI and APD-UMA questionnaires were administered again.

The IBM SPSS Statistics 22 for Windows was used for the statistical analysis. Descriptive values (mean, maximum, minimum and standard deviation) were calculated for the quantitative variables: age, years of evolution of DM, MFPDI and APD-UMA questionnaires. Pre- and post-intervention values were found for both questionnaires. The frequencies of the sample were calculated for the qualitative variables: location, sex, marital status and type of DM. The Shapiro-Wilk test was used to determine whether the values of the questionnaires followed a normal distribution. The values of the APD-UMA questionnaires followed a normal distribution, but the results obtained from the MFPDI questionnaire did not.

Pre- and post-intervention values were compared to determine whether there were significant differences. To compare the values obtained from the pre- and post-intervention APD-UMA questionnaires, the Student's t-test for independent samples was used since the variables followed a normal distribution. Meanwhile, to compare the values of the pre- and post-intervention MFPDI questionnaires, which did not follow a normal distribution, the Wilcoxon signed-rank test for related samples was used. Statistically significant differences were considered to exist if  $p < 0.05$ .

## **Results**

The total sample consisted of 29 persons, 12 men and 16 women, 44.8% and 55.2% of the total, respectively. A total of 34.5% had type 1 DM and 65.5% had type 2 DM. The characteristics of the sample are shown in the Table below 1.

Socio-demographic variables		n(%)		
Sex		Men=12(44.8%) Women=16(55.2%)		
Source		[[REDACTED FOR PEER REVIEW]]=12(41.4%) [[REDACTED FOR PEER REVIEW]]=7(24.1%) [[REDACTED FOR PEER REVIEW]]=10(34.4%)		
Marital status		Single=4(13.8%) Married=20(69%) Widowed=4(13.8%) Other=1(%)		
Type of DM		Type 1=10(34.5%) Type 2=19(65.5%)		
Variables	Minimum	Maximum	Average	Standard Deviation
Age	18	83	58.69	16.17
Years of evolution of DM	0	47	17.62	13.47

Table 1. Characteristics of the sample according to the following variables: sex, origin, marital status, type of DM, age and years of evolution of DM.

Descriptive statistics are calculated for the pre- and post-intervention values of the UPD-UMA and MFPDI questionnaires. Table 2

Values	Minimum	Maximum	Average	Standard Deviation
UPD-UMA pre	43	76	59.96	8.69
UPD-UMA post	52	89	67.39	6.99
MFPDI pre	0	104	11.65	20.07
MFPDI post	0	16	4.52	5.47

Table 2. Descriptive values for the UPD-UMA and MFPDI questionnaires.

The pre- and post-intervention values of the questionnaires were compared. For the UPD-UMA questionnaire the post-intervention values are higher than the pre-intervention values, which means a higher degree of self-care after the intervention. The difference is highly significant ( $p=0.001$ ). For the MFPDI questionnaire the pre-intervention values are lower than the post-intervention values, which means a lower degree of standing disability. The difference between the two is significant ( $p=0.029$ ).

## **Discussion**

This study was carried out in a rural setting, 3 towns in the province of [[REDACTED FOR PEER REVIEW]], since according to several studies the level of podiatric self-care is lower there than in urban areas.<sup>16,17</sup> These data show the greater need for this type of intervention in this setting.

For this study, we used the MFPDI questionnaire already validated in Spain by Gijón-Noguerón et al.<sup>14</sup> This same questionnaire has been used in the work of Domínguez-Olmedo et al. [18], where it was found that people with DM have a greater degree of disability than people who do not suffer from this disease, hence the suitability of its use in this population. In our study, more than 70% of our sample is over 50 years of age, which provides greater reliability in the results obtained since the suitability of this questionnaire has been demonstrated for use in adults over 50 years of age.<sup>18</sup>

In agreement with other authors, such as Li et al.<sup>19</sup>, Fardazar et al.<sup>20</sup>, and Mohammad and Khresher<sup>21</sup>, an intervention on foot care increases not only the knowledge of patients with DM, but also the self-care practices of the feet, as shown in our results obtained from the APD-UMA questionnaire. While we started from a previous level of self-care with a mean of 59.96 points, this score rises to 67.39 points after the intervention. This is contrary, for example, to the results of Baba et al.<sup>22</sup>, in which they do find an increase in foot health, but not in foot self-care practices. This may be due to the difficulty that patients may encounter in putting their knowledge into practice. In the study by Rodríguez et al.<sup>10</sup>, the APD-UMA questionnaire was also administered, and a mean of 59.07 points was obtained in relation to self-care; that is, a value similar to the pre-intervention value of our work. However, 42% of the interviewees in this study had foot ulcers. This indicates the importance of raising this level of self-care through

interventions that promote the prevention of complications such as, in this case, the risk foot.

Tankova et al.<sup>23</sup>, in their research on the education of patients with DM, demonstrate how therapeutic education is essential since, through a five-day structured education program, with a follow-up at 6 months and one year after the intervention, they saw a reduction in the rate of acute complications such as severe hypoglycemia and, at the same time, an increase in quality of life. On the other hand, we see that, in such structured education, despite working with a multidisciplinary team (doctors, nurses and a rehabilitation therapist), there are no podiatrists to provide adequate training in diabetic foot prevention, despite the degree of disability due to localized pain in the feet and its effect on gait being closely related to quality of life.<sup>24</sup>

We also found how an appropriate intervention decreases the degree of disability, in this case, very significantly: an average score of 11.65 points was obtained on the MFPDI scale before the intervention, this value decreasing to 4.52 points on average after the intervention. This undoubtedly leads to a better self-perception and a higher quality of life since therapeutic education not only increases self-care, but also decreases minor problems such as dry skin or calluses.<sup>25</sup>

Numerous studies<sup>19–21,26–28</sup> have shown that, with therapeutic education either by written or audiovisual means<sup>22,29</sup>, or through practical or theoretical interventions<sup>30</sup>, the levels of knowledge and self-care of patients with DM increase.

In contrast to these optimal results obtained through therapeutic education, other types of interventions, such as the one carried out in the work of Xiang et al.<sup>31</sup>, did not improve self-care outcomes. In this case, specifically, the intervention consisted of a group of patients with poorly controlled DM and the presence of complications adopting the role of mentor for other patients with DM who did not yet present these complications, including DF. Similarly, other interventions carried out through text messages (SMS) do not make their effectiveness clear since, for example, in the study by Nepper et al.<sup>32</sup>, where text messages are sent about self-care in general including foot care, no statistically significant results have been found. On the contrary, the research by Moradi et al.<sup>33</sup>, whose intervention is also based on text messages, but exclusively referring to foot self-care, has shown an improvement in both knowledge and practices of foot self-care.

This work has a fairly similar representation of the two fundamental types of DM that exist today. On the one hand, 34.5% of the sample have type 1 DM; on the other hand, 65.5% of the sample have type 2 DM. This achieves an adequate representation of both types of diabetes. Although the sample size is not large, the results obtained through validated questionnaires were statistically significant, suggesting that the intervention has been effective.

We highlight the limitation of the follow-up of the effectiveness of the intervention, although in other studies the reevaluation is performed after 6 months or even a year, we have performed it after one month **the same time used in the study by Rahamman et al. 2018.**<sup>29</sup> Extending this time period would help us to observe the curve of forgetting the training session. **As an additional variable, we could have registered if they had received any other forms of DM education from other sources recently.**

Nonetheless, the methodology of the study is novel because of the recruitment of patients through associations and not only through individuals who come for consultation. This is a key factor in proving the effectiveness of a podiatric intervention in people with DM without previous foot complications or who do not seek care in consultation. Thus, we have been able to see how their level of self-care improves without the need for them to suffer from a health problem that requires them to increase their self-care.

## **Conclusions**

Therapeutic education is fundamental for the prevention of complications in patients with chronic diseases, especially, due to its impact, DF in patients with DM. It is possible to increase the level of self-care and decrease the degree of disability in relation to the feet through informative talks, not only in patients with complications but also in those who do not present them. It is important to increase the number of training actions on a routine basis, not only in podiatry surgeries, but also through training, with the help of existing associations, in order to achieve good primary prevention.



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