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# Satisfaction with Orthopedic Treatments

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## Abstract

To determine the effectiveness and satisfaction with orthopodologic treatments in users of the University Clinic of podiatry at the University of A Coruña, according to various parameters. After approval from the ethics committee of the University of A Coruña, an observational retrospective study (n = 125). We analyzed the effectiveness and satisfaction with the orthopodologic treatments depending on the reason for consultation, diagnosis, treatment and goals of treatment. We performed a descriptive analysis of all variables collected. The most frequent reason for consultation was for pain of the hindfoot (58.2%). The most frequent diagnosis was plantar fasciitis, followed by metatarsalgia (29.7% vs. 18.6%). The orthotic treatment corrective was the most used (68.5%) with pronation control (52.3%). The majority of patients reported improvement in pain, and a high degree of satisfaction with the treatment used. The profile of the patient who consults the Podiatry clinic for a orthopodologic treatment is that of a man over the age of 50, who consulted for pain of the hindfoot. The most frequent diagnosis is plantar fasciitis and the treatment carried out the corrective for pronation control. The majority of patients used the brace between 4 and 8 hours a day, with a high satisfaction with the treatment and improvement in the evolution of the pain. The degree of satisfaction was significantly associated with age, younger patients more satisfied. The improvement of pain was significantly associated with age, younger patients who show improvement.

**Keywords:** foot orthosis, orthopedics, orthotic device, patient satisfaction

## 1. Introduction

Podiatry has evolved very quickly in recent years; much progress has been made in: posturology, adapted and individualized plantar orthoses of minimal dimensions, and all with a single purpose, to restore an optimal balance [1].

The realization of customized foot supports has been suffering a constant evolution, although it has not always been accompanied by scientific criteria, but rather by clinical experiences.

Currently, orthopedic treatments are highly demanded by patients and have a high prescription rate in the pathology of the adult foot, whether metatarsalgia (forefoot pain) or talalgia (back pain). In the adult, foot pain, whether due to inflammatory or mechanical causes, is very frequent and results in numerous sick leave and social disturbances [2]. Up to 10% of the population may have pain in the foot, either later or earlier in their lives [3].

In the adult, the pain of the feet, either of mechanical or inflammatory origin, is very frequent and is the cause of numerous sick leave and social upheavals.

There are numerous studies found in the literature that evaluate the efficacy of plantar orthoses, but all are focused on certain pathologies or alterations, most of these studies are focused on treating very specific alterations of the foot [4–7].

The University Clinic of Podiatry (CUP) of the University of Coruña (UDC), has been providing podiatric service to a large number of patients of all types for more than 10 years, among which the vast majority have multiple pathologies that need conservative treatment par excellence, the plantar orthosis. During the years in which this type of treatment has been carried out, the satisfaction of the patients with the same or the degree of pain improvement has not been evaluated, which is why there is a need to know the satisfaction with the plantar orthosis and the evolution of the main ailment of each patient.

The performance of this study may be justified due to:

The University Podiatry Clinic (CUP) of the Universidade da Coruña (UDC) has been providing podiatric service to a large number of patients of all kinds for more than 10 years, among which the vast majority have multiple pathologies that need conservative treatment due to excellence, the plantar orthosis. During the years in which this type of treatment has been carried out, patients' satisfaction with it and the degree of pain improvement have not been evaluated; therefore the need arises to know the satisfaction with the plantar orthosis and the evolution of the main ailment of each patient. Due to the lack of scientific evidence on the efficacy of orthotic treatments in general, the need has arisen to carry out this study, which aims to make known the estimated reality of the state of the patients we treat, to know their satisfaction with the prescribed treatment and if the same, it has been useful in the disappearance of the pain manifested at the beginning of the consultation.

With the aim of determining the effectiveness and satisfaction with orthopedological treatments in users of the University Clinic of Podiatry (CUP) of the University of Coruña, this study is carried out.

## **2. Methods**

An observational retrospective follow-up study was carried out in the university podiatric clinic (CUP) of the University of Coruña (UDC), located in the Naval Hospital of Ferrol (A Coruña). Those patients who came for the first time to the orthopedic service of the University Clinic of Podiatry in the period between September and December 2017 and who gave their written consent to the data collected in the medical history could be used were included in the study for research purposes.

Included in this study were: Patients who attended the orthopodology service of the University Podiatry Clinic of the University of La Coruña for the first time in 2017. Patients who gave their written consent that the data collected in the history can be used for research purposes.

Exclusion criteria: The following were excluded from the study: Patients who did not undergo any orthopedic treatment. Patients whose medical records show that they did not give their written consent that the data collected in the record can be used for research purposes.

We included 125 patients who met the inclusion and exclusion criteria. This sample size allows us to know the effectiveness of the treatment and patient satisfaction with an accuracy of  $\pm 8.8\%$  and 95% safety.

The following sociodemographic and clinical variables were studied from each clinical history:

Sociodemographic variables: Age, sex.

Anthropometric variables: Weight, height, body mass index.

Clinical variables: Reason for consultation: forefoot pain, hindfoot pain.

Diagnosis: plantar fasciitis, calcaneal spur, metatarsalgia, flat/pronged foot, first radius insufficiency, others.

Treatment: accommodative plantar orthosis, corrective/functional plantar orthosis.

Treatment objectives: supination control, pronation control, support damping, selectively discharging, compensating for differences (**Figure 1**).

Evaluation of the treatment: In the university clinic of Podiatry of the University of La Coruña, the patients, once the orthopedic treatment has been performed and delivered, the following revisions are made: revision to the month, to the 3 and to the 6 months, and in them it is evaluated: The degree of use of the treatment (it is not used, if it is used and how long), the satisfaction with the applied treatment (little, enough or very satisfied) and the evolution of the main ailment (worsens, without difference, improves slightly or notably).

The effectiveness of the treatment was evaluated by the evolution of the main ailment, according to the self-reported by the patient. Satisfaction with the treatment applied was also recorded according to what was recorded in the clinical history.

The study is authorized by the UDC ethics committee (EC 05/2016). All patients included in the study have previously given their consent for the use of their medical history for research purposes.

## 2.1 Statistic analysis

A descriptive analysis of all the variables collected was carried out.

The degree of use of treatment, the satisfaction with it and the evolution of pain were analyzed at month, at 3 months and at 6 months. To do this, tests were used for paired data, using the Student t test or the Wilcoxon signed rank test for numerical variables and the McNemar test for qualitative variables.



**Figure 1.**  
*Rearfoot control.*

The variables related to the effectiveness and satisfaction with the applied treatment were also analyzed. To do this, we used the Student t-test or the Mann–Whitney test for numerical data and the chi-square test or Fisher’s exact test for the comparison of percentages. The correlation between quantitative parameters was performed with Spearman’s rho correlation coefficient. The normality of the variables was determined by the Kolmogorov–Smirnov test.

3. Results

Of the 125 patients included in the study, there was a predominance of males versus females (54.4% vs. 45.6%), with a mean age of  $46.0 \pm 19.2$  years. The body mass index was  $28.0 \pm 6.2 \text{ kg/m}^2$ , with a median of 27 and a range of 13.8 to  $45.3 \text{ kg/m}^2$ .

|                           | n   | %     | Mean(SD)    | Median | Min-Max   |
|---------------------------|-----|-------|-------------|--------|-----------|
| Age (years)               | 125 | 100%  | 46 (19.2)   | 51     | 2–81      |
| Sex                       | 125 | 100%  |             |        |           |
| Man                       | 68  | 54.4% |             |        |           |
| Woman                     | 57  | 45.6% |             |        |           |
| Weight (kg)               | 105 |       | 74.9(19.49) | 73     | 11–132.4  |
| Size (cm)                 | 103 |       | 164.1(12.6) | 165    | 126–193   |
| BMI (kg/m2)               | 103 |       | 28(6.2)     | 27     | 13.8–45.3 |
| Reason for consultation   | 110 |       |             |        |           |
| Back pain                 | 64  | 58.2% |             |        |           |
| Forefoot pain             | 46  | 41.8% |             |        |           |
| Diagnosis                 | 118 |       |             |        |           |
| Fasciitis                 | 35  | 29.7% |             |        |           |
| Spur calcaneal            | 2   | 1.7%  |             |        |           |
| Metatarsalgia             | 22  | 18.6% |             |        |           |
| Flatfoot                  | 15  | 12.7% |             |        |           |
| Insufficiency first radio | 5   | 4.2%  |             |        |           |
| Others                    | 39  | 33.1% |             |        |           |
| Treatment                 | 111 |       |             |        |           |
| Accommodative             | 35  | 31.5% |             |        |           |
| Corrective                | 76  | 68.5% |             |        |           |
| Treatment objectives      | 111 |       |             |        |           |
| Pronation control         | 58  | 52.3% |             |        |           |
| Supination control        | 13  | 11.7% |             |        |           |
| Cushion props             | 21  | 18.9% |             |        |           |
| Download supports         | 15  | 13.5% |             |        |           |
| Compensate differences    | 4   | 3.6%  |             |        |           |

BMI: body mass index.

**Table 1.**  
Description of the general characteristics of the patients attended in the study period, reasons for consultation and applied treatment.



Regarding the reason for consultation, the most frequent was hindfoot pain (58.2%) followed by forefoot pain (41.8%). Regarding the diagnosis, the most frequent was plantar fasciitis (29.7%), followed by metatarsalgia (18.6%). The type of orthotic treatment performed most frequently was the corrective (68.5%), followed by the accommodative (31.5%). In relation to the treatment objectives, the most frequent was the control of pronation (52.3%), followed by the cushioning of supports (18.9%) (**Table 1**).

The degree of use of the orthosis, satisfaction and evolution of pain during the follow-up are shown in **Table 2**. In the majority of patients the degree of use was 4–8 hours in the first month as well as in the third and sixth months (75.9%, 77.8% and 75% respectively). Regarding the satisfaction with the treatment, almost two thirds of the patients treated said they were very satisfied with the treatment that has been performed in the first month as well as in the third and sixth (61.2%, 63% and 50% of the patients respectively). And if we evaluate the evolution of pain it is observed that most of the patients have experienced improvement of their pain (noticeable or slight).

Considering the evaluation that the patients made of the satisfaction with the orthosis and of the evolution of the pain in its first review in the clinic (independently of whether it was at one month, three months or six months after treatment) (**Table 3**). 81.8% of them were quite or very satisfied with the treatment, and they also reported a slight or notable improvement in the pain they experienced.

With reference to age, a statistically significant difference in age was observed between satisfied and unsatisfied patients, with significantly younger patients being satisfied than those with little or no satisfaction (44.9 vs. 57.3 years;  $p = 0.026$ ).

In turn, patients less satisfied with the treatment showed higher BMI values, although without statistically significant differences (29.4 vs. 27.6,  $p = 0.132$ ).

|                                | 1 month |       | 3 months |       | 6 months |       |
|--------------------------------|---------|-------|----------|-------|----------|-------|
|                                | n       | %     | n        | %     | n        | %     |
| Degree of use                  | 54      | 100%  | 27       | 100%  | 28       | 100%  |
| Null                           | 2       | 3.7%  | 0        | 0%    | 0        | 0%    |
| Occasional                     | 3       | 5.6%  | 0        | 0%    | 0        | 0%    |
| Daily                          | 8       | 14.8% | 6        | 22.2% | 7        | 25%   |
| <4 hours                       | 0       | 0%    | 0        | 0%    | 0        | 0%    |
| 4–8 hours                      | 41      | 75.9% | 21       | 77.8% | 21       | 75%   |
| Satisfaction with the orthosis | 54      | 100%  | 27       | 100%  | 28       | 100%  |
| Nothing satisfied              | 4       | 7.4%  | 1        | 3.7%  | 0        | 0%    |
| Little satisfied               | 6       | 11.1% | 4        | 14.8% | 5        | 17.9% |
| Pretty satisfied               | 11      | 20.4% | 5        | 18.5% | 9        | 32.1% |
| Very satisfied                 | 33      | 61.2% | 17       | 63%   | 14       | 50%   |
| Evolution of pain              | 54      | 100%  | 27       | 100%  | 28       | 100%  |
| Gets worse                     | 3       | 5.6%  | 1        | 3.7%  | 0        | 0%    |
| Without difference             | 8       | 14.8% | 4        | 14.8% | 4        | 14.3% |
| It slightly improves           | 12      | 22.2% | 6        | 22.2% | 11       | 39.3% |
| Significantly improves         | 31      | 57.4% | 16       | 59.3% | 13       | 46.4% |

**Table 2.**  
*Degree of use of the orthosis, satisfaction and evolution of pain during follow-up.*

A greater percentage of satisfaction with the orthosis was observed in men than in women (86.4% vs. 75.8%,  $p = 0.232$ ), as well as in patients who consulted for forefoot pain compared to those who presented pain of hindfoot (89.3% vs. 76.6%,  $p = 0.172$ ), although in none of the cases did the differences reach statistical significance. There were also no differences in the degree of satisfaction according to the established diagnosis, the type of treatment or its objective (**Table 3**).

The evolution of pain self-reported by patients after treatment with the orthosis, according to different variables, is shown in **Table 4**. Patients who report mild or notable improvement are significantly younger (44.8 vs. 57.8 years,  $p = 0.018$ ) and have a lower body mass index (27.5 vs. 29.8 kg/m<sup>2</sup>;  $p = 0.061$ ), although in this case without reaching statistical significance. Again men report a greater percentage of pain improvement than women (86.4% vs. 75.8%,

|                           | Nothing/little satisfied |        | Quite/ very satisfied |        | p     |
|---------------------------|--------------------------|--------|-----------------------|--------|-------|
|                           | Mean (SD)                | Median | Mean (SD)             | Median |       |
| Age(years)                | 57.3 (16.8)              | 59.5   | 44.9 (18.8)           | 47     | 0.026 |
| BMI (kg/m <sup>2</sup> )  | 29.4(5.7)                | 31.2   | 27.6 (5.9)            | 26.5   | 0.132 |
|                           | n                        | %      | n                     | %      |       |
| Total                     | 14                       | 18.2%  | 63                    | 81.8%  |       |
| Sex                       |                          |        |                       |        | 0.232 |
| Man                       | 6                        | 13.6%  | 38                    | 86.4%  |       |
| Woman                     | 8                        | 24.2%  | 25                    | 75.8%  |       |
| Reason for consultation   |                          |        |                       |        | 0.172 |
| Back pain                 | 11                       | 23.4%  | 36                    | 76.6%  |       |
| Forefoot pain             | 3                        | 10.7%  | 25                    | 89.3%  |       |
| Diagnosis                 |                          |        |                       |        | —     |
| Fasciitis                 | 3                        | 13.6%  | 19                    | 86.4%  |       |
| Spur calcaneal            | 0                        | 0%     | 2                     | 100%   |       |
| Metatarsalgia             | 3                        | 23.1%  | 10                    | 76.9%  |       |
| Flatfoot                  | 3                        | 25%    | 9                     | 75%    |       |
| Insufficiency first radio | 1                        | 25%    | 3                     | 75%    |       |
| Others                    | 4                        | 16.7%  | 20                    | 83.3%  |       |
| Treatment                 |                          |        |                       |        | 0.745 |
| Accommodative             | 3                        | 13.6%  | 19                    | 86.4%  |       |
| Corrective                | 11                       | 20%    | 44                    | 80%    |       |
| Treatment objectives      |                          |        |                       |        |       |
| Pronation control         | 9                        | 21.4%  | 33                    | 78.6%  |       |
| Supination control        | 2                        | 22.2%  | 7                     | 77.8%  |       |
| Cushion                   | 1                        | 9.1%   | 10                    | 90.9%  |       |
| Download supports         | 2                        | 16.7%  | 10                    | 83.3%  |       |
| Compensate differences    | 0                        | 0%     | 3                     | 100%   |       |

BMI: body mass index.

**Table 3.**  
*Analysis of the satisfaction of patients with the treatment at the first visit that come to review the clinic, according to different variables.*

|                           | Worse/no difference |        | Improvement slightly/<br>noticeably |        |       |
|---------------------------|---------------------|--------|-------------------------------------|--------|-------|
|                           | Mean (SD)           | Median | Mean (SD)                           | Median | p     |
| Age (years)               | 57.8 (16.9)         | 59.5   | 44.8 (18.7)                         | 47     | 0.018 |
| BMI (kg/m2)               | 29.8 (5.38)         | 31.2   | 27.5 (5.9)                          | 26.4   | 0.061 |
|                           | n                   | %      | n                                   | %      |       |
| TOTAL                     | 14                  | 18.2%  | 63                                  | 81.8%  |       |
| Sex                       |                     |        |                                     |        | 0.232 |
| Man                       | 6                   | 13.6%  | 38                                  | 86.4%  |       |
| Woman                     | 8                   | 24.2%  | 25                                  | 75.8%  |       |
| Reason for consultation   |                     |        |                                     |        | 0.172 |
| Back pain                 | 11                  | 23.4%  | 36                                  | 76.6%  |       |
| Forefoot pain             | 3                   | 10.7%  | 25                                  | 89.3%  |       |
| Diagnosis                 |                     |        |                                     |        |       |
| Fasciitis                 | 3                   | 13.6%  | 19                                  | 86.4%  |       |
| Spur calcaneal            | 0                   | 0%     | 2                                   | 100%   |       |
| Metatarsalgia             | 2                   | 15.4%  | 11                                  | 84.6%  |       |
| Flatfoot                  | 3                   | 25%    | 9                                   | 75%    |       |
| Insufficiency first radio | 1                   | 25%    | 3                                   | 75%    |       |
| Others                    | 5                   | 20.8%  | 19                                  | 79.2%  |       |
| Treatment                 |                     |        |                                     |        | 0.745 |
| Accommodative             | 3                   | 13.6%  | 19                                  | 86.4%  |       |
| Corrective                | 11                  | 20%    | 44                                  | 80%    |       |
| Treatment objectives      |                     |        |                                     |        |       |
| Pronation control         | 9                   | 21.4%  | 33                                  | 78.6%  |       |
| Supination control        | 2                   | 22.2%  | 7                                   | 77.8%  |       |
| Cushion                   | 0                   | 0%     | 11                                  | 100%   |       |
| Download supports         | 3                   | 25%    | 9                                   | 75%    |       |
| Compensate differences    | 0                   | 0%     | 3                                   | 100%   |       |

BMI: *body mass index*.

**Table 4.**  
*Analysis of the evolution of pain with self-reported treatment by patients at the first visit to which they come to review the clinic, according to different variables.*

p = 0.232), as well as patients with forefoot pain compared to those who complain of hindfoot pain (89, 3% vs. 76.6%, p = 0.172), although these differences are not statistically significant. The established diagnosis, the type of treatment applied or the objective of the treatment are not associated with the degree of pain improvement (**Table 4**).

4. Discussion

In the present study we have tried to verify that the plantar orthosis is a conservative method of treatment that has been used in patients of all ages, and in



multiple foot pathologies. 81.8% of the patients who attend the CUP are satisfied with the treatment main ailment has improved, compared to 18.2% who are not satisfied and their ailment remains the same. Patients who have improved are relatively younger, and with lower BMI.

The effectiveness of the orthoses performed at the University Clinic of Podiatry of the University of La Coruña, has been demonstrated in this study, where in most cases the satisfaction of patients, and the evolution of self-reported pain has improved.

In a review found in the literature, it is shown that in adults with different pathologies such as cavus foot, rheumatoid arthritis (RA), the custom-made foot orthosis reduces the patient's pain [4].

This review focuses only on tailor-made foot orthoses, which are defined in this review as removable, anatomical devices that are placed inside the footwear and are molded or manufactured from a foot print and manufactured according to the specifications prescribed by the doctor, in this case a podiatrist.

Foot pain may be experienced after an injury; overuse in the long term; infection; or systemic diseases that include any foot tissue, including bones, joints, ligaments, muscles, tendons, nerves, skin and nails. Foot pain can be generalized or diagnosed more specifically according to location (eg, heel pain), structure (eg, ligament or tendon damage) or disorder (eg, osteoarthritis) [8].

In another review found [9] carried out in children, the effect of non-surgical treatments for flatfoot is proven and shows that in children with flat feet and juvenile idiopathic arthritis, customized foot orthoses can slightly improve pain and function of the foot. Currently, the evidence from randomized controlled trials is too limited to draw definitive conclusions about the use of nonsurgical interventions for pediatric flatfoot. Future trials of high quality in this field are required. Only limited interventions that are frequently used in practice have been studied and there is much debate about the treatment of symptomatic and asymptomatic flatfoot [9].

We found several studies that speak about the use of plantar orthoses for the flatfoot [10–12] and the results of the studies speak of improvement in plantar pressures, as well as in the control of anomalous movements.

There are numerous studies in the literature that speak about the effects of plantar orthoses, both in the population with previous pathology such as arthritis, osteoarthritis, diabetic population, plantar fasciitis [13–18], as well as in people who practice sports and the effect that orthosis produces in the practice of certain sports practice [15].

For example, in the studies carried out by Hähni M [19] and Munteau S [20], the effectiveness of plantar orthoses in reducing plantar pressures and Achilles tendinopathies is highlighted.

It has been shown in the study by Coheña-Jiménez [7] that treatment with plantar orthoses is effective for plantar fasciitis. There are many studies that show the benefits of orthosis treatment, it would be good to carry out more studies focused on evaluating the efficacy in the treatment of flat feet, cavus for example. It is very difficult to evaluate patient satisfaction in this sense, since in most cases they are evaluated by pain improvement, so it would be good to have other measurement systems in which we could quantify patient satisfaction.

More studies are needed to evaluate satisfaction and effectiveness of the foot orthoses made to measure for the foot, especially to check if in certain pathologies it is possible to reduce pain and overload in the plantar pressures, something that would be very beneficial for the patient.

Selection biases Selection biases may arise from the inclusion and exclusion criteria determined for the execution of the study. In our case, they will also be

determined by the patients' decision to participate. To minimize these biases, the results will be compared with those of other similar studies.

**Information biases:** Information biases arising from how the data were obtained may occur: Variability produced by the type of procedure or test used to carry out the examinations, these biases can be minimized, as far as possible, through the establishment of validated questionnaires, calibrated instruments, training of observers.

**Confusion biases** Due to the absence of variables in the data collection that should have been taken into account for the realization of this study and that are not included due to ignorance of them. To minimize this bias, a multivariate logistic regression analysis will be performed.

## 5. Conclusions

1. The profile of the patient who consults in the podiatric clinic of the UDC for an orthopedological treatment is a male around 50 years of age, who consults for hindfoot pain. The most frequent diagnosis is that of plantar fasciitis and the orthotic treatment performed the corrective to control pronation.
2. The majority of patients use the orthosis between 4 and 8 hours a day, showing a high satisfaction with the treatment and improvement in the evolution of pain.
3. The degree of satisfaction is significantly associated with age, with younger patients being more satisfied. Greater satisfaction is observed in males, in patients with forefoot pain and lower body mass index, although without significant differences. The degree of satisfaction is not associated with the diagnosis, type and objective of the treatment.
4. The improvement in pain is significantly associated with age, the patients who show improvement with the pain younger. Men, with forefoot pain and lower body mass index, reported a greater degree of improvement, although without significant differences. The improvement of pain is also not associated with the diagnosis, type and objective of the treatment.

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