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Chapter 5

Quality of Life and Functionality in Patients with Flatfoot

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Additional information is available at the end of the chapter

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Abstract

The objective of the study is to determine the prevalence of a plan, its impact on quality of life, dependence and functional limitation in a random population of 40 years and over. Cross-sectional study in a random population sample in Cambre (A Coruña-Spain) (n = 835) ($\alpha = 0.05$; precision = ±3.4%). Anthropometric variables are studied, comorbidity (Charlson Score), foot functionality (FFI questionnaire), foot health questionnaire (FHSQ), quality of life (SF-36) and dependence on activities of daily living (Barthel index and Lawton). A logistic and linear multiple regression analysis was performed. The prevalence of flat feet was 26.62%. Patients with flat feet presented higher: age (65.73 ± 11.04 years), comorbidity index (0.92 ± 1.49), BMI (31.45 ± 5.55) and foot size (25, 16 ± 1.66 cm). Having flat feet decreases the quality of life and function of the foot. The association of flat feet with age, Charlson index, and BMI and foot size was found. The SF-36, Barthel and Lawton questionnaires remained unchanged due to the presence of the flat foot, a difference between the FHSQ and FFI that were significantly sensitive.

Keywords: flat foot, quality of life, dependence, prevalence, functionality

1. Introduction

Flexible flatfoot is a common deformity in adults [1]. It is characterized by medial rotation and plantar flexion of the talus, eversion of the calcaneus, collapsed medial arch, and abduction of the forefoot [2].

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In clinical practice flat foot may be diagnosed through different procedures, such as clinical diagnosis [3], radiological study [4] and footprint analysis [5].

Footprint analysis using a pedograph is a simple, swift, and cost-effective method. The three measurements habitually used in the diagnosis of flat foot using a pedograph are: Clarke's angle [6] the Chippaux-Smirak index [7] and the Staheli index [8].

Studies have found relation between these indices [9, 10] and their validity has been determined using diagnosis carried out with a podoscope on children as a reference group [11].

Prevalence changes with age, the type of population studied and the presence of other pathologies. Some studies show prevalence between 26.5% [12] and 19.0% [13] and other studies on patients with associated comorbidity report a prevalence of 37% [14].

Flat foot has been associated to family history, the use of footwear in infancy, obesity and urban residence [15], and it has also been associated with age [16], gender [17] and foot length [18].

The presence of flat foot has also been associated with the presence of different states of health [19], the presence of pain, and the fatigue in women [12]. Other studies, however, find no relationship of pain or functionality with the changes in the foot [20, 21].

We conducted this study, in order to determine the variables associated with the prevalence of flat foot in a random population sample, and the impact on quality of life, dependence, foot pain, disability and functional limitation, using specific and generic questionnaires.

2. Materials and methods

A cross-sectional study was conducted in a random population sample from 2009 to 2012 in Cambre (A Coruña-Spain).

The sample size was taken from people who lived in Cambre and were identified through the National Health System card census. People aged 40 and over were included who signed the informed consent.

The sample size is calculated of the total population of the municipality (n = 23,649) after stratification by age and gender. Finally, a total of 835 people were included in the study. This sample size (n = 835 people; 445 aged 40–64 years old and 390 aged 65 years and older) makes it possible to estimate the parameters of interest with a confidence of 95% ($\alpha = 0.05$) and a precision of ±3.4%). The general characteristics of a different sample from the same population have already been described above [22].

For each person included in the study, the following variables were studied: anthropometric variables (age, gender, body mass index), study of chronic comorbid diseases (comorbidities) using the Charlson comorbidity index [23], quality of life (SF-36 questionnaire) [24], Foot Health Status Questionnaire (FHS) [25], Foot Function Index (FFI) [25] Barthel index [26], Lawton index [27], podiatric examination and type of footwear. The podiatric examination was carried out by an experienced podiatrist.

The Charlson Index contains 19 categories of comorbidity, which are primarily defined using the ICD-9-CM diagnosis codes (a few procedure codes are also employed). Each category has an associated weight, taken from the original Charlson paper [20], which is based on the adjusted risk of one-year mortality. The overall comorbidity score reflects the cumulative increased likelihood of one-year mortality; the higher the score, the more severe the burden of comorbidity.

In order to study quality of life, the SF-36 health questionnaire was used, adapted and validated for Spain by Alonso et al. [21].

The questionnaire sf-36 is formed by 36 questions that evaluate the Physical Function, Physical Role, Corporal Pain, General Health, Vitality, Social Function, Emotional Role and Mental Health. The score scale varies from 0 to 100, with 100 the best state of health.

Foot Health Status Questionnaire (FHSQ) [22] is a health-related quality of life questionnaire and is specific to the foot, is divided into 4 domains that assess pain, functional capacity, footwear and overall health of the foot. The questionnaire does not provide an overall score. The score varies from 0 to 100, 0 is the worst state of health.

The questionnaire Foot function Index (FFI) [22] measures disability and pain in the feet.

The FFI consists of 23 items divided into 3 subscales: pain (9 items), disability (9 items) and functional limitation (5 items). To evaluate each item, it consists of a visual analog scale with values between 0 and 9, where 0 is the minimum score and 9 is the maximum score. To get the result, we must add all the scores made by the person and then divide this result by the maximum value that could reach. This result is then multiplied by 100 and rounded to integers. The final score will be between 0 and 100. Higher scores indicate worsening foot health and quality.

2.1. Flat foot diagnostic

The study of the footprint was obtained by a pedograph. Three measurements were used: Clarke's angle, the Chippaux-Smirak index, and the Staheli arch index [6–8].

The specific methods of measurements of these indexes was described previously [25].

For the study of the footwear, the type of footwear most used, the heel (flat, low, medium, high) and the shape (shoe, sporty, boot, clog) or type of closure (moccasin, zipper, buckle, drawstring).

2.2. Statistical analysis

A descriptive analysis of the variables collected in the study was carried out. The quantitative variables are expressed as mean ± standard deviation, median and range. The qualitative variables are expressed as frequency (n) and percentage with the estimation of the corresponding 95% confidence interval.

The association between qualitative variables was estimated using the Chi-square test or Fisher's test as appropriate. The assumption of normality was checked by the Kolmogorov-Smirnov test, which determined the use of the Student's T test or the Mann-Whitney test for the comparison of two means.

2.3. Ethics

The study complies with the principles laid down in the Declaration of Helsinki. Informed consent was obtained from all the participants in the study. Confidentiality was preserved in accordance with the current Spanish Data Protection Law (15/1999). Patient and ethical review approval was obtained previously (code 2008/264 CEIC Galicia).

3. Results

The general characteristics of the sample studied, according to different variables are shown in **Table 1**. The mean age is 61.70 ± 11.60 years, with a prevalence of overweight of 42.2% and a median Charlson comorbidity index from 2.0.

People with flat feet use closed shoes (88.0%), followed by sports (3.8%). The most used heel was the medium heel (2–4 cm) (71.8%). The most used footwear style would be moccasin type (48.1%) followed by cord shoe (44.2%).

This study shows that the prevalence of flatfoot is 26.62% (**Table 2**).

The presence of flatfoot is significantly associated with bivariate analysis with: age, comorbidity, BMI and foot size. Among patients with flat feet, there was a higher mean age (65.73 years vs. 61.03 years), higher comorbidity (2.99 vs. 2.09), higher BMI (31.45 kg/m^2 vs. 28.4045 kg/m^2) and have a greater average foot size (25.16 cm vs. 24.82 cm). They were not associated in the analysis bivariate with the presence of flat foot or forefoot width, or sex (**Table 3**).

After performing a multivariate logistic regression analysis, we observed that the variables that have an independent effect associated with the presence of flat feet are: BMI (OR = 1.137), age (OR = 1.029), mean foot size OR = 1.287) and comorbidity (OR = 1.217) (**Table 3**). That is, higher values of the different variables previously described increase the greater probability of flat foot.

If we study the area under the curve (AUC) to predict presence of flat feet according to each of the previously described variables, the most likely predictor is BMI (AUC = 0.683) and age (AUC = 0.614) (**Figure 1**).

Variables	n	Mean ± SD	Median	Minimum–maximum
Age (years)	835	61.70 ± 11.60	63	42–91
BMI (kg/m²)	835	29.18 ± 4.74	28.65	19.13–64.09
Charlson comorbidity index	786	2.31 ± 1.89	2	0–14
	n	**%**	**95% CI**	
Gender				
Male	369/835	44.2%	(40.76;47.62)	
Female	466/835	55.8%	(52.38;59.34)	
Age groups				
<65 years	445/835	53.3%	(49.85;56.74)	
65 years and over	390/835	46.7%	(43.26;50.15)	
BMI categories				
Normal weight (18.5 kg/m² ≤ BMI < 25 kg/m²)	140/832	16.8%	(14.17;19.36)	
Overweight (25 kg/m² ≤ BMI < 30 kg/m²)	369/832	44.2%	(40.19;47.62)	
Obesity (BMI ≥ 30 kg/m²)	323/832	38.7%	(35.32;42.05)	
Smoking habit				
Former smoker	212/835	25.4%	(22.38:28.40)	
Yes	136/835	16.3%	(13.72;18.52)	
No	213/835	58.3%	(22.49;28.53)	
Charlson comorbidity index				
Diabetes	100/815	12.3%	(9.71;14.24)	
COPD	55/816	6.7%	(4.84;9.33)	
Peripheral vascular disease	48/818	5.9%	(4.11;7.39)	
Peptic ulcer	46/818	5.6%	(3.69;6.85)	
Leukemia	44/812	5.4%	(3.69;6.85)	
Myocardial infarction	37/819	4.5%	(2.97;5.89)	
Liver disease	26/814	3.3%	(1.88;4.35)	
Connective tissue disease	21/818	2.6%	(1.39;3.68)	

Variables	n	Mean ± SD	Median	Minimum–maximum
Cerebrovascular disease	14/818	1.7%	(0.75;2.61)	
Moderate to severe chronic kidney disease	9/815	1.1%	(0.32;1.84)	
Congestive heart failure	7/819	0.9%	(0.16;1.52)	
Dementia	6/819	0.7%	(0.09;1.35)	
Metástatic	1/813	0.1%	(<0.01;0.66)	
AIDS	1/814	0.1%	(<0.01;0.66)	
Peripheral disease	0/819	—	—	
Hemiplegia	0/819	—	—	

Table 1. Distribution of patients according to demographic characteristics and comorbidity.

3.1. Quality of LIFE scales taking into account the foot and functionality of the foot

The scores of the different questionnaires used to measure the functionality, quality of life and dependence according to the presence or absence of flat foot in the entire sample studied and stratified by sex is shown in **Table 4**.

This table shows that patients with flat feet have significantly lower scores of the different quality of life domains of the FHSQ than those without flat feet. These values are consistent in both men and women being significantly inferior in the women and being in the men next to be significant.

It is also objected that FFI is greater in patients with flat feet than in patients who do not, and that difference is in the limit of statistical significance. This index reflects that the higher the score the worse functionality.

They are not significantly modified with the flatfoot or the dimensions of the physical and mental summary of the SF-36 questionnaire nor the Barthel index.

Although significant differences have been found between the values of the Lawton scale and whether or not having flat feet, in the bivariate analysis, dependence for instrumental activities (Lawton Scale) is not related to the presence of flat feet but to age and comorbidity (**Table 4**).

After identifying in the univariate analysis that the different FHSQ and FFI scores are modified with the presence of flat feet, the extent to which this effect is maintained after considering other variables such as age, gender and comorbidity is studied. For this, we perform different regression models presented in **Table 5**.

Anthropometric variables	n	Mean ± SD	Median	Minimum–maximum
Foot size (cm)	812	24.92 ± 1.66	24.75	20.50–29.80
Forefoot width (cm)	796	9.37 ± 0.62	9.40	7.55–11
Left footprint	**n**	**%**	**95% IC**	
Normal left footprint	413/803	51.4%	(47.91;54.95)	
Left flat footprint	174/803	21.7%	(18.76;24.59)	
Left cavus footprint	216/803	26.9%	(23.77;30.03)	
Right footprint				
Normal right footprint	385/793	48.50%	(45.01;52.09)	
Right flat footprint	184/793	23.20%	(20.20;26.20)	
Right cavus footprint	224/793	28.20%	(25.05;31.44)	
Flat foot	213/800	26.62%	(22.49;28.52)	
Unilateral	72/213	33.8%	(27.215;40.39)	
Bilateral	141/213	66.2%	(59.61;72.78)	
Hallux abductus valgus	325/805	40.4%	(36.92;43.82)	
Unilateral	38/325	11.7%	(8.04;15.34)	
Bilateral	287/325	88.3%	(84.66;91.95)	
Hallux rigidus	97/801	12.11%	(9.79;14.43)	
Unilateral	32/97	32.99%	(23.12;42.86)	
Bilateral	65/97	67.01%	(57.14;76.88)	
Hallux extensus	109/805	13.5%	(11.11;15.97)	
Unilateral	13/109	11.93%	(5.39;18.47)	
Bilateral	96/109	88.07%	(81.53;94.61)	
One or more claw toes left				
Yes	297/836	36.9%	(32.22;38.83)	
No	507/836	63.1%	(57.27;64.02)	
One or more claw toes right				
Yes	290/836	36.1%	(31.40;37.97)	
No	513/836	61.4%	(58.01;64.72)	

Table 2. Description of the sample according to type of footprint and presence of different foot pathologies.

	Flat foot				
	Yes	No			
	Mean (SD)*	Mean (SD)	P	Crude OR	Adjusted OR** (95% CI)
Age (years)	65.73 (11.04)	61.03 (11.45)	**<0.001**	1.037	**1.029 (1.012–1.046)**
Charlson comorbidity index adjusted for age	2.99 (2.11)	2.09 (1.75)	**<0.001**	1.275	
Charlson comorbidity index	0.92 (1.49)	0.50 (0.98)	**<0.001**	1.335	**1.217 (1.042–1.421)**
BMI (kg/m²)	31.45 (5.55)	28.40 (4.17)	**<0.001**	1.147	**1.137 (1.094–1.181)**
Forefoot width (cm)	9.42 (0.64)	9.41 (2.01)	0.983	1.001	
Foot size (cm)	25.16 (1.66)	24.82 (1.65)	**0.011**	1.131	**1.287 (1.102–1.504)**
	n (%)	**n (%)**	**p**		
Age groups			**<0.001**		
40–64 years	86/425 (20.22%)	339/425 (79.8%)		1	
≥65 years	127/375 (33.9%)	248/375 (66.1%)		2.019	
BMI categories			**<0.001**		
Normal weight (18.5 kg/m² ≤ BMI < 25 kg/m²)	23/135 (17%)	112/135 (83%)		1	
Overweight (25 kg/m² ≤ IMC < 30 kg/m²)	57/351 (16.2%)	294/351 (83.8%)	0.832	0.944	
Obesity (IMC ≥ 30 kg/m²)	133/312 (42.6%)	179/312 (57.4%)	**<0.001**	3.618	
Gender			0.419		
Male	99/353 (28%)	254/353 (72%)		1	1
Female	114/447 (25.5%)	333/447 (74.5%)		0.878	1.618 (0.963–2.717)

*SD: standard deviation.

**Adjusted OR: Adjusted Odds Ratio by age of the patient. Charlson's comorbidity score. BMI, foot size and gender. Statistical significative results are indicated in bold

Table 3. Differences between the presence or not of flatfoot and different variables.

After this regression, we objectified how the presence of flat feet continues to modify the score of the different dimensions of the FHSQ after adjusting or taking into account age, gender and comorbidity.

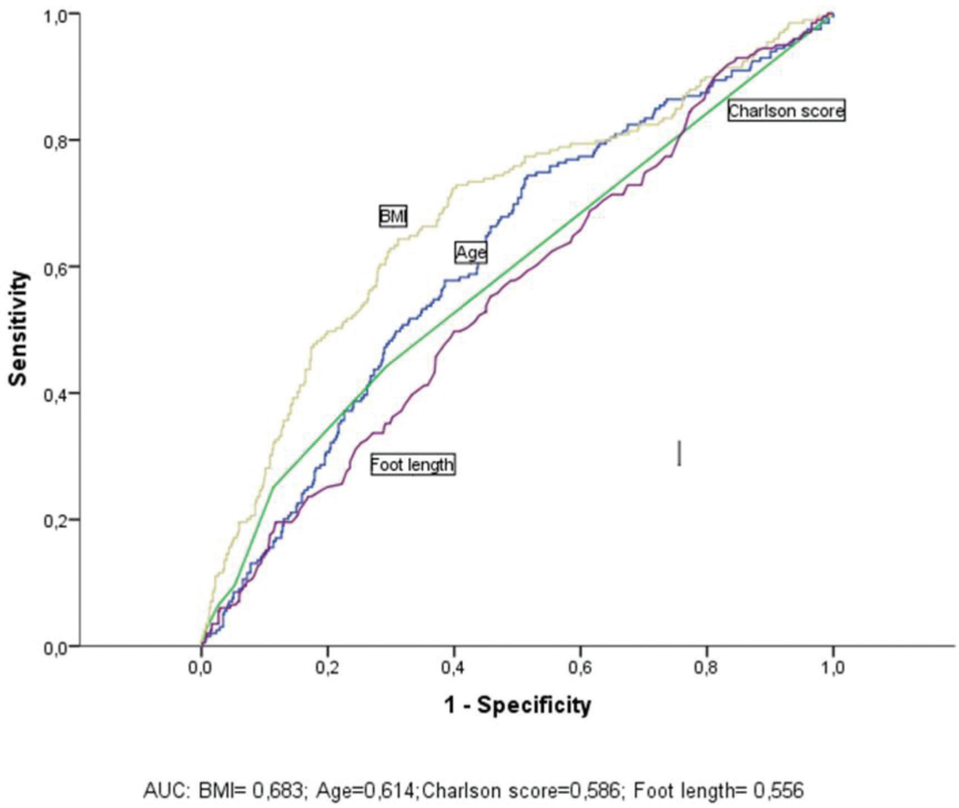

Figure 1. Area under the curve (AUC) to predict flatfoot according to different variables.

	Total sample (n = 835)			Female (n = 466)			Male (n = 369)		
	Flat foot			flat foot			flat foot		
	Yes	No		Yes	No		Yes	No	
	Mean (SD)	Mean (SD)	*p*	Mean (SD)	Mean (SD)	*p*	Mean (SD)	Media (SD)	*p*
SF-36									
Physical summary	53.72 (8.25)	54.55 (7.78)	0.189	53.06 (9.60)	55.48 (7.95)	**0.017**	54.48 (6.29)	53.34 (7.37)	0.148
Mental summary	47.25 (9.55)	48.53 (8.48)	0.086	48.14 (9.94)	48.49 (8.98)	0.744	46.22 (9.02)	48.60 (7.80)	**0.015**
Barthel index	97.38 (11.23)	99.43 (4.03)	0.052	96.80 (12.42)	99.41 (3.23)	0.112	97.95 (9.97)	99.46 (4.83)	0.183
Lawton index	6.14 (1.89)	6.52 (1.57)	**0.040**	7.54 (1.51)	7.87 (0.63)	0.104	4.74 (0.96)	4.91 (0.42)	0.188
Foot Health Status Questionnaire									
Foot pain domain	86.91 (29.63)	90.52 (17.62)	**0.024**	82.12 (22.56)	86.90 (19.97)	**0.047**	92.47 (10.19)	95.28 (12.49)	0.132
Function domain foot	90.30 (19.64)	94.36 (14.55)	**0.006**	86.51 (21.96)	92.13 (16.81)	**0.014**	94.71 (15.53)	97.30 (10.19)	0.129
Footwear domain	60.07 (37.38)	68.44 (35.60)	**0.004**	53.95 (37.79)	64.48 (35.77)	**0.008**	67.26 (35.75)	73.62 (34.77)	0.130

	Total sample (n = 835)			Female (n = 466)			Male (n = 369)		
	Flat foot			**flat foot**			**flat foot**		
	Yes	**No**		**Yes**	**No**		**Yes**	**No**	
	Mean (SD)	**Mean (SD)**	***p***	**Mean (SD)**	**Mean (SD)**	***p***	**Mean (SD)**	**Media (SD)**	***p***
General foot health domain	48.88 (21.66)	53.67 (20.89)	**0.005**	44.19 (22.99)	49.89 (21.02)	**0.021**	54.34 (18.66)	58.63 (19.67)	0.064
Foot function Index	7.63 (13.93)	5.22 (11.58)	0.055	9.76 (13.53)	12.73 (6.86)	0.082	4.91 (14.06)	2.84 (9.17)	0.178

SD, standard deviation.

Statistical significative results are indicated in bold

Table 4. Differences between the presence or not of flatfoot stratified by sex according to the questionnaires studied: SF-36, Barthel and Lawton index, Foot Health status questionnaire and Foot function index.

Variables	**B**	**Standard error**	**Beta**	**t**	**p**
	Linear regression model to predict dimension score foot pain FHSQ				
Gender	−9.225	3.743	−0.249	−7.016	**<0.001**
Age	−0.007	0.060	−0.004	−2.134	0.913
Charlson Score	−1.284	0.602	−0.080	−2.134	**0.003**
Flat foot	−2.931	1.510	−0.070	−1.942	0.053
	Linear regression model to predict dimension score function foot FHSQ				
Gender	−5.872	1.148	−0.183	−5.116	**<0.001**
Age	−0.054	0.053	−0.039	−1.029	0.304
Charlson Score	−1.009	0.525	−0.073	−1.922	0.055
Flat foot	−3.329	1.317	−0.092	−2.528	**0.012**
	Linear regression model to predict score footwear dimension FHSQ				
Gender	−10.305	2.591	−0.142	−3.977	**<0.001**
Age	−0.519	0.119	−0.165	−4.351	**<0.001**
Charlson Score	1.286	1.185	0.041	1.086	0.278
Flat foot	−6.897	2.979	−0.084	−2.315	**0.021**
	Linear regression model to predict overall health score foot dimension FHSQ				
Gender	−9.214	1.527	−0.215	−6.035	**<0.001**
Age	−0.094	0.070	−0.051	−1.336	0.182
Charlson Score	−1.248	0.699	−0.068	−1.786	0.074
Flat foot	−3.614	1.752	−0.075	−2.063	**0.039**
	Linear regression model to predict final score of the Foot Function Index				
Sexo	4.400	1.031	0.177	4.269	**<0.001**
Edad	0.056	0.049	0.051	1.155	0.249
Charlson Score	1.242	0.489	0.112	2.540	**0.011**
Pie plano	1.821	1.187	0.066	1.534	0.126

Statistical significative results are indicated in bold

Table 5. Multiple linear regression to predict the different dimensions of foot health status questionnaire and the FFI adjusting for gender, age, comorbidity and presence of flatfoot.

As for the functionality measured by the FFI we objectify how the presence of flat foot is in turn close to being significant and has a positive regression coefficient which implies that the presence of flat foot increases the FFI score and therefore decreases the functionality.

4. Discussion

This study shows that the prevalence of flatfoot was 26.62%. This finding is practically identical to a study carried out in Japan in a sample of 242 women and 98 men, with a prevalence of 26.5%, and as this finding is related to obesity and affection of pain and function [9].

Similar findings are found in other publications regarding the prevalence of flatfoot. In other population studies (Springfield, Massachusetts) the prevalence of flatfoot was 19.0% (20.1% in women and 17.2% in men) [10]. Another study conducted in the Boston area found a prevalence of 20% in women and 17% in men [11]. There are even studies in diabetic population in a sample of 230 patients that even refer to a prevalence of 37% [11].

It is evident that the characteristics and age of the population under study are determinants of this prevalence, so we also found that among Saudi Arabian army recruits in a sample of 2100 recruits aged 18–21 found a prevalence of 5% and factors associated with their presence have been family history, use of shoes in childhood, obesity and urban residence, no differences in functionality or discomfort in the foot [12].

Some studies conducted in India indicate that the use of shoes at earlier ages increases along with obesity and ligament laxity the prevalence of flat feet [26].

Another study carried out in Nigeria in 560 children between 6 and 12 years shows that although in the univariate analysis we found association with the type of footwear and age. However, after considering both, only age remained as a variable associated with the presence of flat foot [13].

The urban residence as a risk factor for the prevalence of flatfoot has also been described in a study carried out in Congo children where it was objected after studying 1851 footprints of 906 girls and 945 children between 3 and 12 years old that the prevalence decreases with the age is higher in urban areas, in the male sex and the use of footwear has little influence on this prevalence [14].

This study shows how BMI, age, comorbidity, and foot size are associated with the prevalence of flatfoot. Some studies describe how podologic pathology increases with age [17] while other studies describe how flatfoot decreases with age, after adjusting for other covariates [18], while others indicate that neither age nor gender nor the BMI, are related to the flat foot [19].

Studies carried out in primary schools identified gender and being overweight as a risk factor for flatfoot [20, 21] while studies with adolescents [22] and preschoolers [23] identified associated flatfoot to an increase in BMI.

Foot length and the presence of flatfoot associated with flatfoot have also been referenced in the literature [24] although there are also authors who say that it is not associated with length [19].

In the adult population this pathology was also found to be associated with race and concomitant pathology of the foot [16, 27–29].

Some studies even describe radiological findings of different morphology in the foot according to different ethnic groups [30].

Others point out how the different morphology radiology (angle of talus with the first metatarsal) is related to the symptomatic presence or not of flat foot [31].

Although obesity has been repeatedly associated with obesity [32]. Not all show this association with it [33].

4.1. Related to health

Some articles indicate not only the association of the flat foot with different characteristics such as age, sex, BMI, concomitant pathology, but also as a health modifier [16].

Thus there are studies of 97,279 recruits of the armed forces, who give flat feet to localized pains in the knee [34].

As we have previously pointed out in the article that finds a flat foot prevalence identical to ours, they also objectify how this alteration is also associated with the presence of pain and fatigue in women [9].

Others performed in Australian recruits of area forces show how foot alterations are not related to pain, injury or functionality, although flatfoot is associated with a lower subjective feeling of physical health than those with normal foot [18].

In another study where the adult population (n = 784) was studied in Boston, there was no association between foot alteration, pain and functionality [17].

Other studies find an association between the presence of flat feet and accidents produced in the training of professionals of the armed forces [35]. Although this finding is not consistent in all publications [36].

We also found an association between flat feet with disabilities in workers with spondylarthrosis [37] and fractures of the lower limbs [38].

This study shows that the quality of life and functionality in patients with flatfoot is lower than in those who do not, and that this effect is maintained after adjusting for age, sex and comorbidity using the FHSQ and FFI questionnaires. The use of specific instruments to measure this affectation is important because general health questionnaires such as the SF-36 in this study have shown no differences between those with or without flat feet. Similar results were found by other authors who did not objectify differences between patients with podiatric pathology and did not use SF-36 as a quality of life measurement instrument [39].

The SF-36 is sensitive to changes but is a generic questionnaire. The SF-36 was described as a relevant tool to detect changes in results after Hallux valgus surgery [40].

Other authors have described a progressive reduction of SF-36 components as the severity of Hallux valgus increases [41].

The use of specific questionnaires to study the quality of life and the functionality of the foot is widely documented in the literature [22, 42, 43].

The changes experienced in quality of life by the FHSQ questionnaires and the pathological pathology have also been described in the literature [42, 44, 45].

The validity of the Spanish version of the FHSQ and the FFI has been described in the literature [46, 47].

It is therefore reasonable to have objectified in this study that the use of specific questionnaires on the foot objective significant differences that other more generic questionnaires have not detected.

5. Conclusions

Age, Charlson's comorbidity index, BMI and foot size are associated with the presence of flat feet.

The questionnaires SF-36, Barthel and Lawton were not altered with the presence of flat feet, while the questionnaires FHSQ and FFI were sensitive to the presence of flat feet.

Conflict of interest

The authors declare no conflicts of interest.

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