ORIGINAL ARTICLE

Influence of quality of life related to perceived foot health between in a rural an urban population: A case–control research

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Abstract

Foot problems are very common in the community. Studies indicate that between 18% and 63% of people have foot pain or stiffness and that foot problems have a large impact on people's functional decline and a significant detrimental impact on measures of quality of life related to health. The general objective of this research was to compare foot health in people from the rural population compared to people from the urban population and its relationship with quality of life. A case–control descriptive study was developed with a sample of 304 patients, 152 patients from the rural population and 152 patients from the urban population. Quality of life was measured through the SF-36 Health Questionnaire in its Spanish version. The rural population group had a mean age of 46.67 ± 13.69 and the urban population group 49.02 ± 18.29. Regarding the score of the lowest levels of quality of life related to foot problems, the rural population group compared to the urban population group showed: for body pain (52.21 ± 30.71 vs. 67.80 ± 25.28, $p < 0.001$); and for mental health (69.58 ± 18.98 vs. 64.60 ± 14.88, $p < 0.006$). Differences between groups were analysed using Student's t-test for independent samples, which showed statistical significance ($p < 0.05$). This research offers evidence that the rural population presents better levels of mental health and lower levels of

bodily pain in the domains of the SF-36 Health Questionnaire comparing with the urban population.

Key Messages
- We have compared the foot health in people from the rural and urban population and its relationship with quality of life.
- The rural population presents better levels of quality of life related to foot problems.
- Preventive care in rural and urban people are extremely important to control foot and general health.

1 | INTRODUCTION

Foot problems are very common in the community. Studies indicate that between 18% and 63% of people have foot pain or stiffness[1–3] and various investigations have clinically evaluated foot conditions such as hallux valgus, calluses and nail problems.[1,4] Factors associated with foot problems include increasing age,[1,5,6] the female gender[1,7,8] and chronic diseases such as obesity, osteoarthritis and diabetes that impose an important economic burden, and severe costs highly disproportionate linked to the severity of the foot condition.[8–10] In older people, foot problems contribute to a decreased ability to perform activities of daily living, problems with balance and gait and increased risk of falls[11–14]; and several studies have shown that foot problems have a detrimental impact on measures of health-related quality of life[15,16] and an increase in the costs for foot surgery.[7]

Currently, there is a great lack of knowledge about the complications in foot health of people residing in rural areas. Australians living in rural areas are five to six times more likely to develop foot complications than those who do not live in rural areas.[17] Rural African Americans report up to five times the rate of leg amputations compared to urban areas.[18] For these reasons, it is necessary to promote foot health, for prevention, care and proper management throughout life.[19]

Poor foot health is now recognized by governments in general as a major public health problem due to its negative impact on individuals and society. This includes difficulty putting on shoes, pain, gait disturbances, reduced walking speed, variation in plantar pressures and risk of falls.[20–22]

Untreated foot problems can lead to scoliosis, postural problems, slower gait speeds, uneven distribution of plantar pressure, difficulty carrying out activities of daily living, increased risk of falls and development of neurological diseases[23,24] all of which can affect people's quality of life, personal autonomy and well-being.[25]

Foot problems, accompanied by pain, are a widespread condition throughout the world, affecting one in five people over the age of fifty.[3] Foot pain has a great impact on people's functional decline. A case–control research was done in 2023 by Andreo-García et al., on the impact of quality of life related to with and without foot problems in a rural population in Spain, concludes that people with foot pathologies present a negative impact of the quality of life compared to those who do not present foot pathology, especially for the overall health domains: physical role, physical function, body pain and health general.[26]

Despite this impact, there are no studies in Spain that have compared foot health in people with foot problems in the rural population compared to the urban population and its relationship with quality of life.

The general objective of this research was to compare foot health in people with foot problems in the rural population compared to the urban population and its relationship with quality of life. Finally, we hypothesized that patients from the rural population with foot problems may present a worse QoL based on SF-36 Health Questionnaire, regardless of gender.

2 | MATERIALS AND METHODS

2.1 | Design and sample

A case–control descriptive study was carried out in a podiatry clinic in a rural region of southeastern Spain between October 2022 and August 2023. A consecutive and non-random sampling method was used to recruit the 304 study patients, divided into rural population (152 patients) and urban population (152 patients). The

inclusion criteria were to be over 18 years of age and residents of rural and urban areas with foot pathologies.

Patients were excluded if they were not adults, residents of rural and urban settings, people with a unable to independently undertake activities of daily living, that is, they needed help to carry out basic tasks, people with cognitive disorders, subjects who did not sign their consent to participate in the research, subjects who did not respond to affiliation questions or those who did not understand the rules of participation.

2.2 | Procedure

All the data recording was carried out by a single principal investigator before the evaluation, through interviews in which data on sociodemographic variables (age and sex), anthropometric variables (height, weight and BMI), social health (marital status, educational level, professional activity and sports activity) and comorbidities (presence of pathologies, previous interventions).

Next, the research subjects completed a validated tool to measure quality of life, the Short Form Health Questionnaire-36 (SF-36) in the Spanish version, through interviews in a podiatry clinic.

The SF-36 Health Questionnaire has 36 items that offer a general perspective of the person's state of health. It covers 8 scales, which represent the health concepts most used in the main health questionnaires, as well as the aspects most related to disease and treatment. Scores for each of the eight questionnaire domains range from 0 to 100, with 100 indicating optimal health and 0 indicating very poor health.[27]

The 36 items on the instrument cover the following scales: Physical function with 10 questions, Physical role with four questions, Bodily pain with two questions, General health with five questions, Vitality with four questions, Social function with two questions, Emotional role with three questions and Mental health with five questions.[28]

2.3 | Sample size estimation

The sample size calculation was performed through the difference between two independent groups using the G*Power 3.1.9.2 software; a two-tailed hypothesis, an effect size of 0.50, an error probability α of 0.05, with a β level of 20% and the desired power analysis of 80% (1-β error probability) and an allocation ratio (N2/N1) of 1 were used for the sample size calculations. A total sample size of 128 participants was calculated with at least 64 participants per group.

The total sample (304 patients) consisted of 152 patients from the rural population (65 men and 87 women) and 152 patients from the urban population (44 men and 108 women).

2.4 | Ethical considerations

We obtained approval from the Ethics Committee of the Rey Juan Carlos University of Madrid in Spain, under code number 1901202202322. Informed consent was obtained from each participant after an explanation of the purpose and process of the study and that the privacy of the participants' information would be guaranteed. Also highlighted was the fact that their participation was completely voluntary. In addition, the guidelines associated with ethical standards for research and experimentation with humans were followed, as reported in the Declaration of Helsinki,[29] as last modified, and the declarations of human rights and biomedicine of the Council of Europe Convention.

2.5 | Statistical analysis

The Spanish version of the SF-36 questionnaire was administered to calculate the quality-of-life values related to foot health. To calculate the statistical analysis of the questionnaire domain scores, a database was created in an Excel spreadsheet with the appropriate statistics (mean, standard deviation and number of cases) for each of the SF-36 dimensions and for each of the comparison samples, to which the t-test algorithms were applied.[30]

To calculate quantitative data, the Kolmogorov–Smirnov test was used to assess normality, and the data were determined to be normally distributed if $p < 0.05$. All variables presented a parametric distribution (the Kolmogorov–Smirnov test showed a p-value of less than 0.05), and were described as mean $\pm$ standard deviation (SD) and range (minimum-maximum). The contrasts between both groups were compared with Student's t-test for independent samples, to determine if statistically significant differences were obtained in all the variables between the two groups, that is, rural population and urban population. The other quantitative data also presented a parametric distribution, including the results of the health domains assessed using the SF-36 Health Questionnaire.

Regarding the categorical data, they were calculated by applying frequencies and percentages to distinguish these values, and the differences between both groups were compared with the Chi square test, to determine if there was a significant difference between the observed frequencies.

TABLE 1 Sociodemographic characteristics of the urban and rural population.

Sociodemographic characteristics	Total group mean ± SD range ($n = 304$)	Urban population mean ± SD range ($n = 152$)	Rural population mean ± SD range ($n = 152$)	p-value
Age (years)	46.38 ± 17.04 (18–92)	49.02 ± 18.29 (18–92)	46.67 ± 13.69 (20–90)	**0.03**[a]
Height (m)	1.67 ± 1.00 (1.45–1.94)	1.66 ± 0.09 (1.45–1.91)	1.68 ± 0.10 (1.47–1.94)	0.052[a]
Weight (kg)	73.57 ± 14.52 (45–130)	74.71 ± 15.68 (47.5–130)	72.72 ± 13.25 (45–107)	0.156[a]
BMI (kg/m^2)	26.21 ± 4.44 (17.6–46.1)	26.79 ± 4.83 (17.6–46.1)	25.63 ± 3.93 (18.59–37.78)	**0.011**[a]
Sex (%)				
Male	109 (35.9%)	44 (29%)	65 (42.8%)	**0.012**[b]
Female	195 (64.1%)	108 (71%)	87 (57.2%)	

Note: In all analyses, $p < 0.05$ (with a 95% confidence interval) was considered statistically significant (bold). The mean ± the interquartile range, the range (minimum-maximum).

Abbreviations: BMI, body mass index; SD, standard deviation.

[a]Student's *t*-test was applied for independent samples.

[b]Pearson's Chi square test was applied.

TABLE 2 Social characteristics of the urban and rural population.

	Social features	Total group ($n = 304$)	Urban population ($n = 152$)	Rural population ($n = 152$)	p-value
Civil status	Married	132 (43.4%)	70 (46.1%)	62 (40.8%)	0.08[a]
	Single	84 (27.6%)	39 (25.7%)	45 (29.6%)	
	Couples	34 (11.2%)	24 (15.8%)	29 (19.1%)	
	Divorced	13 (4.3%)	7 (4.6%)	10 (6.6%)	
	Widow/ers	41 (13.5)	12 (7.9%)	6 (3.9%)	
Level of studies	Incomplete primary education	66 (21.7%)	25 (16.4%)	41 (27%)	**0.01**[a]
	Complete primary education	54 (17.8%)	50 (32.9%)	4 (2.6%)	
	Secondary education	81 (26.7%)	38 (25%)	43 (28.3%)	
	Degree	86 (28.3%)	33 (21.7%)	53 (34.9%)	
	Master	15 (4.9%)	6 (3.9%)	9 (5.9%)	
	Doctorate	2 (0.1%)	0 (0%)	2 (1.3%)	
Professional activity	Self-employed	37 (12.2%)	14 (9.2%)	23 (15.1%)	**0.02**[a]
	Employees	159 (52.3%)	72 (47.4%)	87 (57.2%)	
	Unemployed	56 (18.4%)	32 (21.1%)	24 (15.8%)	
	Retired	52 (17.1%)	34 (22.4%)	18 (11.8%)	
Sport activity	Yes	156 (51.3%)	74 (48.7%)	82 (53.9%)	0.36[a]
	No	148 (48.7%)	78 (51.3%)	70 (46.1%)	

Note: In all analyses, $p < .05$ (with a 95% confidence interval) was considered statistically significant (bold).

Abbreviation: *n*, number.

[a]Pearson's Chi-square test was used.

A *p*-value <0.05 with a 95% confidence interval was considered statistically significant for all tests.

All analyses were performed using SPSS 25.0v statistical software (IBM Corp., Armonk, NY, USA), referring to an alpha error of 0.05 for a confidence interval of 95%.

3 | RESULTS

A sample of 304 subjects completed the research and was divided into urban population (152 subjects) and rural population (152 subjects). Statistically significant

T A B L E 3 Comorbidities of the urban population and rural population.

Comorbidities		Total group ($n = 304$)	Urban population ($n = 152$)	Rural population ($n = 152$)	p-value
General pathology	Yes	152 (50%)	89 (59.33%)	63 (41.44%)	**0.03**[a]
	No	152 (50%)	63 (41.44%)	89 (59.33%)	
Arterial hypertension	Yes	57 (18.75%)	38 (25.33%)	19 (12.5%)	**0.05**[a]
	No	247 (81.25%)	114 (76%)	133 (87.5%)	
Diabetes	Yes	23 (7.56%)	16 (10.52%)	7 (4.60%)	0.051[a]
	No	281 (92.43%)	136 (89.47%)	145 (95.39%)	
Other cardiovascular diseases	Yes	78 (25.65%)	64 (42.10%)	14 (9.21%)	**0.01**[a]
	No	226 (74.34%)	88 (57.89%)	138 (90.78%)	
Skin diseases	Yes	6 (1.97%)	3 (1.97%)	3 (1.97%)	1[a]
	No	298 (98.02%)	149 (98.02%)	149 (98.02%)	
Rheumatic diseases	Yes	26 (8.55%)	12 (7.89%)	14 (9.21%)	0.68[a]
	No	278 (91.44%)	140 (92.10%)	132 (86.84%)	
Neurological diseases	Yes	9 (2.96%)	5 (3.28%)	4 (6.08%)	0.73[a]
	No	295 (97.03%)	147 (96.71%)	148 (97.36%)	
Smoking	Yes	6 (1.97%)	1 (0.65%)	5 (3.28%)	0.10[a]
	No	298 (98.02%)	151 (99.34%)	147 (96.71%)	
Digestive diseases	Yes	6 (1.97%)	3 (1.97%)	3 (1.97%)	1[a]
	No	298 (98.02%)	149 (98.02%)	149 (98.02%)	
Respiratory diseases	Yes	15 (4.93%)	9 (5.92%)	6 (3.94%)	0.43[a]
	No	289 (95.06%)	143 (94.07%)	146 (96.05%)	
Other general pathologies	Yes	53 (17.43%)	33 (21.71%)	20 (13.15%)	**0.049**[a]
	No	251 (82.56%)	119 (78.28%)	132 (86.84%)	

Note: In all analyses, $p < .05$ (with a 95% confidence interval) was considered statistically significant (bold).

Abbreviation: n, number.

[a]Pearson's Chi-square test was used.

differences ($p < 0.05$) were found in age, BMI and sex, as shown in Table 1.

3.1 | Outcome measurements

A sample of 304 subjects completed the research and was divided into urban population (152 patients) and rural population (152 patients). Statistically significant differences ($p < 0.05$) were found in educational level and professional activity, as shown in Table 2.

Statistically significant differences ($p < 0.05$) were found in general pathology, arterial hypertension, other cardiovascular diseases and other general pathologies, as shown in Table 3.

Statistically significant differences ($p < 0.05$) were found in analgesics, antihypertensives and other drugs, which are shown in Table 4.

The variables that did not show a normal distribution were age, BMI, sex and the domains analysed by the SF-36 questionnaire ($p < 0.05$), while height and weight showed a normal distribution ($p > 0.05$).

Regarding the comparison of the scores obtained with the SF-36, the results appear in Table 5. These scores were higher for the bodily pain variable in the urban population and in the mental health variable for the rural population, with statistically significant differences.

4 | DISCUSSION

The results of this research show that the rural population had better levels of mental health and lower levels of bodily pain. To the best of our knowledge, this is the first study to compare foot health in people with foot problems in the rural population compared to the urban population and its relationship with quality of life.

The reason for carrying out this study is the lack of knowledge and studies on the quality of life related to foot health in rural and urban populations.

TABLE 4 Allergies and pharmacology of the urban and rural population.

Drugs		Total group ($n = 304$)	Urban population ($n = 152$)	Rural population ($n = 152$)	p-value
Allergies	Yes	76 (25%)	37 (24.34%)	39 (25.65%)	0.79[a]
	No	228 (75%)	115 (75.65%)	113 (74.34%)	
Analgesics	Yes	156 (51.31%)	96 (63.15%)	60 (39.47%)	**0.01[a]**
	No	148 (48.68%)	56 (36.84%)	92 (60.52%)	
Antihypertensives	Yes	62 (20.39%)	42 (27.63%)	20 (13.15%)	**0.02[a]**
	No	242 (79.60%)	110 (72.36%)	132 (86.84%)	
Antidiabetics	Yes	23 (7.56%)	16 (10.52%)	7 (4.60%)	0.051[a]
	No	281 (92.43%)	136 (89.47%)	145 (95.39%)	
Other cardiovascular drugs	Yes	15 (4.93%)	5 (3.28%)	10 (6.57%)	0.185[a]
	No	289 (95.06%)	147 (96.71%)	142 (93.42%)	
Diuretics	Yes	3 (0.98%)	0 (0%)	3 (1.97%)	0.082[a]
	No	301 (99.01%)	152 (100%)	149 (98.02%)	
Hormonal	Yes	18 (5.92%)	9 (5.92%)	9 (5.92%)	1[a]
	No	286 (94.07%)	143 (94.07%)	143 (94.07%)	
Anticoagulants	Yes	3 (0.98%)	2 (1.31%)	1 (0.65%)	0.56[a]
	No	301 (99.01%)	150 (98.68%)	151 (99.34%)	
Antiplatelet agents	Yes	10 (3.28%)	5 (3.28%)	5 (3.28%)	1[a]
	No	294 (96.71%)	147 (96.71%)	147 (96.71%)	
Analgesics	Yes	17 (5.59%)	8 (5.26%)	9 (5.92%)	0.803[a]
	No	287 (94.40%)	144 (94.73%)	143 (94.07%)	
Other drugs	Yes	102 (33.55%)	72 (47.36%)	30 (19.73%)	**0.01[a]**
	No	202 (66.44%)	80 (52.63%)	122 (80.26%)	

Note: In all analyses, $p < .05$ (with a 95% confidence interval) was considered statistically significant (bold).

Abbreviation: n, number.

[a]Pearson's Chi-square test was used.

Knowing the state of foot health in a population is important for evaluating interventions and predicting health and social care needs. Quality of life studies are an essential complement to medical evaluation.

Foot problems can be considered a prevalent condition that has a negative impact on health-related quality of life. Several existing studies indicate lower satisfaction in quality of life related to foot health in people with foot problems and systemic diseases.[26,31–35]

To the best of our knowledge, there is a lack of studies comparing foot health and its relationship to quality of life between rural and urban populations.

Regarding the sociodemographic characteristics of the sample, we found statistically significant differences in BMI ($p < 0.05$), as did Andreo-García et al. in a study on the effect of foot-health-related quality of life in rural and urban populations: a case–control study.[26]

We also show statistically significant differences for age and sex ($p < 0.05$), as did Mazoteras-Pardo et al., in a study of the degree of impact of the tailor's bunion on the quality of life.[36]

Regarding the comparison of the scores obtained with the SF-36, they were higher for the variables bodily pain and mental health with statistically significant differences ($p < 0.05$), the same as Sabbah et al., found in a study of quality of life of rural and urban populations in the Lebanon using the SF-36 health survey.[37]

This study has several limitations. First, all the patients involved in the study came exclusively from a single podiatry clinic. In addition, the investigation was carried out by a single investigator. These factors could affect the representativeness of the study, reducing its external validity. For more robust results, it would be necessary to have a larger sample collected from multiple centres, encompassing participants from different regions or countries, who could be matched based on sociodemographic characteristics, such as gender, age or body mass index.

TABLE 5 Characteristics of the quality of life of the urban and rural population.

SF-36 domains	Total group mean ± SD range ($n = 304$)	Urban population mean ± SD range ($n = 152$)	Rural population mean ± SD range ($n = 152$)	*p*-value
Physical function	86.36 ± 20.45 (0–100)	86.48 ± 19.76 (0–100)	86.25 ± 21.18 (0–100)	0.461[a]
Physical Role	80.02 ± 36.52 (0–100)	78.95 ± 37.53 (0–100)	81.09 ± 35.59 (0–100)	0.305[a]
Body ache	60.00 ± 29.14 (0–100)	67.80 ± 25.28 (0–100)	52.21 ± 30.71 (0–100)	**0.001[a]**
General health	64.76 ± 20.78 (0–100)	64.98 ± 21.63 (0–100)	64.54 ± 19.96 (0–100)	0.426[a]
Vitality	61.41 ± 16.98 (10–100)	60.16 ± 13.36 (35–90)	62.66 ± 19.92 (10–100)	0.1[a]
Social function	80.67 ± 22.08 (0–100)	82.48 ± 21.16 (12.5–100)	78.86 ± 22.89 (0–100)	0.077[a]
Emotional role	78.07 ± 39.63 (0–100)	75.66 ± 42.54 (0–100)	80.48 ± 36.48 (0–100)	0.145[a]
Mental health	67.09 ± 17.21 (24–100)	64.60 ± 14.88 (24–88)	69.58 ± 18.98 (24–100)	**0.006[a]**

Note: The mean ± interquartile range, (min-max).

Abbreviations: SD, standard deviation; SF-36, Quality of Life Questionnaire.

[a]Student's *t*-test for independent samples a were used. In all analyses, $p < 0.05$ (with a 95% confidence interval) was considered statistically significant (bold).

In future research, the inclusion of a larger number of participating clinics, as well as a larger and more diverse sample of subjects from various regions, is recommended in order to improve the external validity of the study.

Among the advantages is the fact of having used a validated questionnaire to collect data on foot problems between two populations and quality of life, which makes it possible to use a reliable measurement instrument and also to be able to compare the results obtained with those of other investigations that have used the same questionnaire.

It seems difficult to compare the impact of these results with other studies, since we have not been able to find any article that compares foot health between rural and urban populations and its relationship with quality of life. This shows the need to continue investigating this topic, to learn about the therapeutic techniques carried out by podiatry professionals that could improve the foot health and quality of life of people residing in rural and urban areas.

5 | CONCLUSIONS

This research offers evidence that the rural population presents better levels of mental health and lower levels of bodily pain in the domains of the SF-36 Health Questionnaire comparing with the urban population. Thereby, securing such results could be help the magnitude of probable unmet needs psychological and podiatric medical challenges in these populations and will provides planning better treatments and preventive care activities to improve quality of life and well-being in both populations.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The dataset supporting the conclusions of this article is available upon request to daniellopez@udc.es in the Research, Health and Podiatry Group, Department of Health Sciences, Faculty of Nursing and Podiatry, Industrial Campus of Ferrol, Universidade da Coruña.

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