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ORIGINAL ARTICLE

Impact of Hallux Valgus related of quality of life in Women

Patricia Palomo-López[1], Ricardo Becerro-de-Bengoa-Vallejo[2], Marta Elena Losa-Iglesias[3], David Rodríguez-Sanz[4], César Calvo-Lobo[5] & Daniel López-López[6]

1 University Center of Plasencia, Universidad de Extremadura, Plasencia, Spain
2 School of Nursing, Physiotherapy and Podiatry, Universidad Complutense de Madrid, Madrid, Spain
3 Faculty of Health Sciences, Universidad Rey Juan Carlos, Madrid, Spain
4 Department, Faculty of Health, Exercise and Sport, European University of Madrid, Madrid, Spain
5 Departamento de Fisioterapia, Centro Superior de Estudios Universitarios La Salle, Motion in Brains Research Group, Instituto de Neurociencias y Ciencias del Movimiento, Universidad Autónoma de Madrid, Madrid, Spain
6 Research, Health and Podiatry Unit, Department of Health Sciences, Faculty of Nursing and Podiatry, Universidade da Coruña, Ferrol, Spain

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Correspondence to
Dr D López-López
Universidade da Coruña
Unidade de Investigación Saúde e Podoloxía
Departamento de Ciencias da Saúde
Campus Universitario de Esteiro s/n
15403 Ferrol (España)
Spain
E-mail: daniellopez@udc.es

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Abstract

The purpose of this study is to analyse and compare the impact of hallux valgus (HV) in a sample of adult women with varying degrees of HV scores obtained with regard to foot health and health in general. A total 100 female patients of mean age 43·04 ± 16·84 years who attended a podiatric clinic were asked to answer a questionnaire. The degree of deformity, HV, was determined on both feet of the patients using the Manchester Scale tool and the scores from the Foot Health Status Questionnaire were compared. Participants with varying degrees of HV recorded lower scores in Section 1 for the footwear and general foot health and higher scores for foot pain and foot function. In Section 2, they obtained lower scores in physical activity and social capacity and higher scores in vigour and general health. Differences between the four groups were evaluated by means of a *t*-test for independent samples, showing statistical significance ($P < 0{\cdot}001$). This study has detected measurable differences of association between varying degrees of HV with impaired quality of life related to foot health in women.

Introduction

Hallux valgus (HV) is one of the most common chronic deformations (1), affecting approximately 12–70% of general population (2,3) and 30–58% of women (4,5). The condition is a progressive foot deformity characterised by a lateral deviation of the great toe at the metatarsophalangeal joint (6,7), which is by itself an irreversible foot deformity (8). Although the exact aetiology of HV is not understood (9) and it is sometimes accompanied in women by the presence of lower extremity alignment (10), increased pressure under the hallux (11), intolerance to foot wear (12), deviation of the lesser toes (13) and concerns about foot appearance (9).

HV is recognised as a major public health problem with escalating trajectories (14); given the high incidence related to orthopaedic foot surgery (15), its association may pose notable health problems in women, such as osteoarthritis (16), disability (17), greater risk of falling (18), impaired balance and gait patterns (19), toe muscle weakness (20), worse physical performance (21), lesser quality of daily life (22) and many others. However, the effects of varying degrees of HV on the quality of life related to foot health in women are not well understood.

The purpose of the present study is to analyse and compare the impact of HV related to foot health in a sample of adult women with varying degrees of HV of the scores obtained with regard to foot health and health in general.

Key Messages

- we have evaluated the impact of foot health on the quality of life in women with varying degrees of HV
- a negative impact was seen on the quality of life related to foot health in women
- the progressive reduction in health is associated with the presence of greater degree of HV
- preventive care in women is extremely important to control foot and general health

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Materials and methods

Design and sample

A total of 100 women participated in the study. This descriptive observational study was carried out in a clinic of podiatric medicine and surgery that provides treatment for diseases and disorders of the foot at University of Extremadura in the city of Plasencia (Spain) between May 2015 and January 2016. A non-randomised and consecutive sampling method was used to select the 121 participants, of whom 100 gave consent and were enrolled into the study. Eligibility criteria include age between 18 and 64 years. Exclusion criteria are over 65 years of age, immunocompromised, previous foot trauma or foot surgery, neurological condition, non- or semi-autonomous in daily activities and unable to understand instructions relating to the study and/or carry them out.

Procedure

Each participant was examined by a trained examiner who first measured the height and weight with the subject barefoot and wearing light clothing; the body mass index (BMI) was calculated from the height (m) and weight (kg), applying Quetelet's equation as follows: $\text{BMI} = \text{weight}/\text{height}^2$ (23).

All subjects were asked to complete the Foot Health Status Questionnaire (FHSQ) (24). This validated questionnaire on health-related quality of life is intended specifically for the foot (25). FHSQ, which when scored, provides three separate section scores and two composite scores from 0 to 100, with 100 being a perfect score. Section 1 assesses foot pain, foot function, footwear, general foot health and has demonstrated a high degree of content, criterion and construct validity (Cronbach $\alpha = 0{\cdot}89–0{\cdot}95$) and high retest reliability (intraclass correlation coefficient $= 0{\cdot}74–0{\cdot}92$) (24). Section 2 looks at general health, physical activity, social capacity and vigour, largely adapted from the Medical Outcomes Study 36-Item Short-Form Health (25), which has been validated (26). Section 3 focuses on sociodemographic data such as age, sex and the participant's medical record.

Presence of varying degrees of HV in women was evaluated based on the Manchester Scale (27,28). This clinical scale determines four levels of HV – none, mild, moderate and severe – and showed excellent interobserver repeatability with a combined κ-type statistic of 0·86 to evaluate the severity of HV (29), and compared with radiographs showed a very high inter-rater reliability (intraclass correlation coefficients greater than 0·96) and 95% limits of agreement between measurements were acceptable. This study was conducted according to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines (STROBE).

Ethical considerations

This research was approved by the Bioethics and Biosafety Committee at the University of Extremadura (Spain), record number 10/2016. All participants gave informed written consent before being included. Ethical standards in human experimentation contained in the World Medical Association Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine, the UNESCO Universal Declaration on the Human Genome and Human Rights and those of the relevant national bodies and institutions were observed at all times.

Sample size

Having established a minimal difference score of at least 21 (as clinically relevant) among the groups under study in the FHSQ, and considering that the standard deviation (SD) on that scale for the people is around 29 (30,31) for a bilateral hypothesis, an alpha risk of 5% and a statistical power of 80%, at least 94 cases must be included in the sample.

Statistical analysis

Demographic characteristics, including subject age, height, weight and BMI, and independent variables were summarised as mean and SD, maximum and minimum values and compared between varying degrees of HV in women.

All variables were examined for normality of distribution using the Kolmogorov–Smirnov test, and data were considered normally distributed if $P > 0{\cdot}05$. Independent student's *t*-tests were performed to find if differences are statistically significant when showing a normal distribution. Measurements that were not normally distributed were tested using non-parametric Kruskal–Wallis test to examine differences between HV groups. Finally, a stepwise multiple linear regression was then performed to determine whether the presence of HV was independently associated with FHSQ scores for specific foot domains, namely foot pain, foot function, general foot health, footwear and for the four domains of general well-being, overall health, physical function, social capacity and vigour.

The FHSQ version 1.03 was used to obtain quality-of-life scores related to foot health. In all of the analyses, statistical significance was established if *P*-value was $< 0{\cdot}01$ with a confidence interval of 99%. All the analyses were performed with commercially available software (SPSS 19.0, Chicago, IL, USA).

Results

A total of 100 women between 19 and 64 years of age, the mean age being $43{\cdot}04 \pm 16{\cdot}84$ years, were enrolled to this study. Table 1 shows the sociodemographic characteristics of the participants with significant difference in age level, education and professional activity ($P < 0{\cdot}01$), but there were no differences in height, weight, BMI and civil status ($P > 0{\cdot}01$).

The results of a comparison between FHSQ scores of the four groups' degree of HV deformity are shown in Table 2. Section 1 of the FHSQ evaluates four specific foot domains, namely pain, function, health and footwear. Mean scores ± SD were significantly high in the assessment of foot pain and foot function and lower in footwear and general foot health for all groups. Section 2 gives an assessment of four domains of general well-being: overall health, physical function, social capacity and vigour. In this case, mean scores ± SD were significantly lower in the physical activity and social capacity domain when compared with those for other domains of vigour and general health for all four groups: HV 1, HV 2, HV 3 and HV 4.

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Table 1 Sociodemographic and clinical characteristics of the sample population*

	Total group Mean ± SD (range, $n = 100$)	HV 1 Mean ± SD (range, $n = 25$)	HV 2 Mean ± SD (range, $n = 25$)	HV 3 Mean ± SD (range, $n = 25$)	HV 4 Mean ± SD (range, $n = 25$)	*P*-value
Age, years	43·04 ± 16·84 (19–64)	35·80 ± 15·45 (20–64)	38·80 ± 15·90 (20–64)	40 ± 16·43 (19–64)	57·56 ± 10·30 (27–64)	0·001
Weight (kg)	68·02 ± 13·52 (44–112)	68·16 ± 13·1 (50–112)	69·34 ± 17·35 (47–105)	64·64 ± 12·64 (44–100)	70·24 ± 10·06 (45–98)	0·190
Height (cm)	163·67 ± 6·56 (149–183)	163·64 ± 6·28 (154–182)	166·84 ± 7·39 (158–183)	164·08 ± 6·32 (155–180)	160·12 ± 4·47 (149–168)	0·003
BMI (kg/m^2)	25·34 ± 4·43 (16·9–40·16)	25·39 ± 4·27 (20·3–40·2)	24·75 ± 5·15 (16·9–35·86)	23·79 ± 3·63 (17·91–31·92)	27·41 ± 3·98 (19·48–39·26)	0·095
Civil status	2·89 ± 1·76 (0–5)	2·1 ± 1·71 (0–5)	3 ± 1·85 (0–5)	2·8 ± 1·78 (1–5)	3·68 ± 1·41 (1–5)	0·033
Level of education	2·97 ± 1·28 (0–5)	3·12 ± 1·17(0–5)	3·24 ± 1·05(2–5)	3·64 ± 1·1(1–5)	1·88 ± 1·13(1–5)	0·001
Professional activity	2·80 ± 1·54 (0–5)	2·2 ± 1·38(0–5)	2·28 ± 1·31(1–5)	2·8 ± 1·55(0–5)	3·92 ± 1·32(1–5)	0·001

BMI, body mass index; HV, hallux valgus; SD, standard deviation.
*In all the analyses, $P < 0·01$ (with a 99% confidence interval) was considered statistically significant.

Table 2 Comparisons of FHSQ scores with varying degrees of HV*

	HV 1 Mean ± SD (range, $n = 25$)	HV 2 Mean ± SD (range, $n = 25$)	HV 3 Mean ± SD (range, $n = 25$)	HV 4 Mean ± SD (range, $n = 25$)	*P*-value
Foot pain	80·83 ± 15·61 (47–100)	79·60 ± 17·56 (36–100)	66·97 ± 24·76 (0–100)	38·85 ± 19·57 (0–78)	0·001
Foot function	86·50 ± 20·06 (19–100)	86·50 ± 17·56 (44–100)	74·44 ± 27·91 (0–100)	50·50 ± 29·14 (0–100)	0·001
Footwear	63·67 ± 29·65 (0–100)	60·00 ± 24·18 (0–100)	43·67 ± 29·73 (17–83)	16·33 ± 19·76 (0–58)	0·001
General foot health	61·7 ± 23·26 (25–100)	67·00 ± 26·2 (25–100)	48·12 ± 30·37 (0–100)	17·50 ± 19·96 (0–55)	0·001
General health	64·00 ± 23·81 (20–100)	80·40 ± 17·2 (40–100)	63·80 ± 27·95 (0–100)	43·60 ± 28·56 (0–100)	0·001
Physical activity	83·78 ± 21·09 (11–100)	94·67 ± 8·41 (67–100)	78·50 ± 28·01 (0–100)	55·11 ± 36·67 (0–100)	0·001
Social capacity	83·50 ± 22·16 (25–100)	84·00 ± 23·81 (25–100)	75·50 ± 28·09 (0–100)	53·00 ± 28·25 (0–100)	0·001
Vigour	57·50 ± 19·43 (25–100)	63·00 ± 18·3 (25–100)	53·06 ± 24·37 (0–100)	34·25 ± 26·40 (0–100)	0·001

FHSQ, Foot Health Status Questionnaire; HV, hallux valgus; SD, standard deviation.
*In all the analyses, $P < 0·01$ (with a 99% confidence interval) was considered statistically significant.

The differences between the four groups were statistically significant ($P < 0·001$) for all dimensions in the questionnaire, which assessed foot pain, foot function, footwear, general foot health, general health, physical activity, social capacity and vigour.

Discussion

Although varying degrees of HV is recognised as an important disorder among women, there was no clear relationship between impact of foot deformity and quality of life (6). We investigated, for the first time, the impact of varying degrees of HV in a sample of adult women, in relation to foot health and health in general, because this condition was reported to be associated with women (3,4), to increase as a person ages (5,22), to present notable health problems in women (16) and to be a major contributor to the costs of forefoot surgery (31).

The results of the present study suggest that adult women present lower scores on the dimensions related to footwear, general foot health, general health and vigour. López López *et al.* (32) showed that a sample of older people with varying degrees of HV revealed progressive reduction in general health and foot health with increasing severity of HV deformity, which appears to be associated with the presence of greater degree of HV, regardless of gender (32), and confirmed that varying degrees of HV impact the quality of life in relation to foot health.

It appears difficult to compare the impact of these results with other studies of HV because of differences in criteria and methodological variations, as we have not been able to find any articles relating quality of life to foot health in adult women in the literature.

This study has important strengths and limitations that should be acknowledged. First, there was lack of data on genetics and structural foot differences and behavioural differences in women, including choice of footwear, so our study ensured to examine these factors. Furthermore, a larger and more diverse (individuals from various countries) random sample size would be beneficial to improve the strength of the study and may help to identify if there is a specific population in which this association does not exist and to identify the mechanisms involved. Future studies should examine or adjust for other factors such as ethnicity, geographic location, shoe wearing or socioeconomic status on the impact of HV related to quality of life.

Conclusions

This study has detected measurable differences of association between varying degrees of HV with impaired quality of life

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related to foot health in women. Our findings suggest a negative impact on the quality of life related to foot health, which appears to be associated with the severity of HV deformity.

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Author contribution

All authors were involved in the concept, design, analyses, interpretation of data, drafting of manuscript and revising it critically for significant intellectual content.

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