



Impact of chronic kidney diseases in feet health & quality of life: A case-series study

Ana María Jiménez-Cebrián^a, Ricardo Becerro-de-Bengoa-Vallejo^b, Marta Elena Losa-Iglesias^c, César Calvo-Lobo^b, Victoria Mazoterías-Pardo^f, Juan Francisco Morán-Cortés^d, Patricia Palomo-López^d, Daniel López-López^e

^a Department Nursing and Podiatry, Faculty of Health Sciences, University of Malaga, Arquitecto Francisco Peñalosa 3, Ampliación de Campus de Teatinos, 29071, Malaga, Spain

^b Facultad de Enfermería, Fisioterapia y Podología. Universidad Complutense de Madrid, Spain

^c Faculty of Health Sciences. Universidad Rey Juan Carlos, Spain

^d University Center of Plasencia. Universidad de Extremadura, Spain

^e Research, Health and Podiatry Group. Department of Health Sciences. Faculty of Nursing and Podiatry. Universidade da Coruña, Ferrol, Spain

^f Research Group "ENDOCU". Faculty of Physiotherapy and Nursing of Toledo. Universidad de Castilla-La Mancha

ARTICLE INFO

Keywords

Kidney diseases
Foot
Foot diseases
Quality of life

ABSTRACT

Purpose: The objective of this study is examine Quality of Life in subjects with chronic kidney disease utilizing Foot Health Status Questionnaire (FHSQ).

Material and methods: 101 subjects with chronic kidney disease (CKD) was studied in specialized clinics, in Extremadura (Spain). An observational descriptive study. The FHSQ was utilized to assess specific foot health (first section) and overall health (second division). The differences between clumps they were assessed using a t-test to independent samples.

Results: 59.40% (n = 60) were men and 40.59% (n = 41) women. The mean age was 68.77 ± 14.07. In first division of the FHSQ, a less score was registered in footwear domain (39.25) and in general foot health domain (46.37). In second division, less scores were resulted in general health domain (72) and vigour domain (60.43). CKD women got less scores in every domain. Women with CKD obtained significantly less scores in dimensions of foot pain, foot function, footwear, general foot health, general health and physical activity and there was no difference contrasted with men in the dimensions of social capacity and vigour.

Conclusions: The studied CKD population has problems their feet. Quality of life of CKD subjects is negatively impacted by health of their feet, difficulties with footwear, their overall health, and lack of vitality. Women with CKD show lower values of quality of life contrasted to male patients, associated with inability to perform physical activity, lack of energy and tiredness.

1. Introduction

The Chronic Kidney Disease (CKD) is identified as an important worldwide public health issue. It is defined as a set of heterogeneous diseases that affect kidney structure and function [1]. In 2002, US National Kidney Foundation in Clinical Practice Guideline of Kidney Disease Outcomes Quality Initiative (K/DOQI) [2] recognized CKD according to two diagnostic criteria: presence of glomerular filtration lower than 60 ml/min/1.73m², or kidney damage, for at least 3 months and that causes a reduction in glomerular filtration rate. The disease was differentiated in 5 stages by the glomerular filtration rate and renal deterioration. Being stage 5 (terminal CKD) the subsidiary to start a replacement treatment for kidney function or dialysis. The main motives

of CKD in higher countries are hyperglycemia and hypertension while in other countries they are infectious, toxic or unknown [3,4].

The worldwide estimated prevalence of CKD is 11.8% in female and 10.4% in male. In Spain, in 2018, the prevalence of CKD was around 15%, analogous to United States, being more recurrent in males, elderly subjects, diabetics and in persons with cardiovascular disease [5]. Currently near 850 million people are afflicted by diverse types of kidney disorders. One in 10 adults global has progressive and irreversible CKD [6]. Over the past decade, the incidence rate of terminal or advanced CKD has stagnated in developed countries (Europe, the Nordics, and United States). This stabilization is indicating greater success in prevention of CKD and a slowdown in progression of this disease [7].

The symptoms of CKD are nonspecific and highly varied [8]. CKD patients suffer from many complications and a high risk of comorbid-

Address correspondence and reprint requests to: Prof. Dr. Patricia Palomo López. Universidad de Extremadura. Grupo de Investigación Docencia e Innovación Biomédica y Sociosanitaria (GIDIBS). Centro Universitario de Plasencia. Avda. Virgen del Puerto, s/n. 10.600 Plasencia, Cáceres, Spain.

E-mail addresses: amjimenezc@uma.es (A.M. Jiménez-Cebrián); ribebeva@uclm.es (R. Becerro-de-Bengoa-Vallejo); marta.losoa@urjc.es (M.E. Losa-Iglesias); cescalvo@uclm.es (C. Calvo-Lobo); victoria.mazoterias@uclm.es (V. Mazoterías-Pardo); juanfmoran@unex.es (J.F. Morán-Cortés); patibiom@unex.es (P. Palomo-López); daniellopez@udc.es (D. López-López)

ties [9]. CKD causes multiple clinical manifestations, some with repercussions in lower limbs, such as uremic pruritus, xerosis and onychopathies, muscle cramps, edema in feet and ankles, osteoporosis and tendency to fractures, chronic musculoskeletal pain, peripheral neuropathic pain with foot pain, numbness of the legs and feet due to uremic neuropathy, gait disturbances and fall risks [9–16].

According to World Health Organization, quality of life (QoL) is a dynamic concept based on the subjective sensation of the patient with variability over time [17]. The QoL associated to health is the assessment that a subject makes about their health and the state of execution of their basic daily tasks, including consequences it causes on physical, emotional and social function [18]. It is a fundamental notion for an exhaustive care of the person with chronic disease [19]. CKD is a chronic, progressive, disabling disease with no expectation of cure that influences on QoL of sick persons [20]. CKD patients have a low QoL, it can be associated to implicit disease or complications associated with CKD [21].

There are multiple published instruments that measure health-related QoL, many researchers used them as tools to measure this variable with questionnaires. For CKD, specific questionnaires measuring health-related QoL were developed and validated [19]. However, to date, studies of QoL related to the state of health of foot have not been addressed in patients with CKD, although the clinical manifestations and affections in the lower limbs, ankles and feet are very recurrent in this pathology.

Different authors have carried out previous studies on well-being of foot health and how it influences QoL of population groups, patients and various pathologies [22–30]. Considering the value of foot care in subjects with CKD together with need to establish strategies for promotion and prevention of podiatric health, it is established carry out a study of QoL associated to state of foot health in patients with CKD. Our hypothesis that the patients with CKD will decrease the QoL on all domains related with the foot health.

For that reason, the objective of this study was to examine Quality of life in patients with CKD utilizing the Foot Health Status Questionnaire (FHSQ).

2. Material and Methods

2.1. Design and sample

An observational descriptive and cross-sectional studio was conducted following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations [31].

Using a consecutive sampling method, a final sample of 101 subjects were studied from June to December 2019. All subjects were attended the Fresenius Medical Care dialysis clinics of Plasencia, Coria and Badajoz (Extremadura, Spain) and were completely reported about investigation protocol. Every participant autographed an informed consent to participate in studio.

The participant selection and inclusion were [1]: persons with Chronic Kidney Disease [2], older than 18 and rules for exclusion were [1]: rejection to autograph the written informed consent [2], misunderstanding to understand research instructions [3], subjects that did not know Spanish[30,32].

2.2. Procedure

Before completing the questionnaire, sociodemographic data such as age, height, weight, and body mass index (BMI) were collected. Subjects completed the validated self-FHSQ in Spanish (Version 1.03) made up of 3 sections or divisions [33].

Section 1 comprised 13 questions and was divided into 4 specific domains or dimensions in relation to QoL associated with foot health: foot function (4 questions), foot pain (four questions), footwear (3

questions) and general foot health (2 questions). An adequate content, criterion and construct validity (Cronbach α from 0.89 to 0.95) and reliability of intraclass test-retest correlation coefficient (ICC from 0.74 to 0.92) were confirmed for section 1.

Section 2 was made up of 4 general domains of QoL corresponding to health (physical activity, general health, social capacity and vigor), whose questions were considerably adapted from health-related quality of life questionnaire, SF-36 [34].

Section 3 introduced descriptive data such as socioeconomic status, comorbidities, satisfaction or data from medical records.

Each question contained several Likert ordinal scale responses, including only 1 response as the most appropriate. This instrument generated different scores (from 0 to 100) for each domain obtained through computer software. Examining health-related QoL, score 0 indicated the worst state of health, while 100 showed the best state of health [35–37].

2.3. Ethical consideration

This research got a positive approbation issued by Institutional Research and Ethical Committee at the University of Extremadura (Badajoz, Spain), with the code 64/2018. The Declaration of Helsinki was respected [38].

2.4. Sample size calculation

The G*Power 3.1.9.2 software has been utilized to performed the sample size calculation. In order to achieve a large effect size, a Cohen d of 0.80 was used for this calculation. In addition, a two-tailed hypothesis, an alpha error probability of 0.05 and a potency of 0.80 were applied for sample size calculations. Thus, an overall sample size of 52 participants was required to achieve an actual power of 0.807. According to a possible 15% loss to follow-up, 60 subjects were required. Ultimately, an amount of 101 subjects were recruited and incorporated in the present research.

2.5. Statistical analysis

Demographic particularities, including age, height, weight and BMI of participants and independent variables were summarized as mean and SD, maximum and minimum values and contrasted between populations by sex.

Every variables were considered for normality of distribution utilizing Kolmogorov–Smirnov test, and data were regarded normally distributed if $P > 0.05$. Independent student's t-tests were determined to decide if contrasts are statistically significant when showing a normal distribution. Measurements that were not normally distributed were tested using non-parametric Mann-Whitney U test to consider contrasts between man and women groups. Categorical data were showed as frequencies and percentages (%) and compared by the Chi-squared test.

The FHSQ version 1.03 was utilized to obtain quality-of-life results related to foot health. All analyses, statistical significance was set if P -value was < 0.05 with a confidence interval of 95%. All analyses were realized with commercially available software (SPSS 22.0, Chicago, IL, USA).

3. Results

3.1. Descriptive data

The research sample was integrated of 101 male and female with CKD from Fresenius Medical Care Dialysis Clinics in Plasencia, Coria and Badajoz (Extremadura, Spain). 59.40% ($n = 60$) were men and 40.59% ($n = 41$) women, mean age was 68.77 (SD:14.07) and age range from 26 to 88. Table 1 presents demographic and descriptive in-

Table 1
Sociodemographic and descriptive data of sample population by gender.

Sociodemographic and descriptive data	Total group n = 101	Male n = 60	Female n = 41	P-value
	Mean ± SD (range)	Mean ± SD (range)	Mean ± SD (range)	
Age (years)	68.77 ± 14.07 (26–88)	68.2 ± 12.93 (32–85)	69.61 ± 15.72 (26–88)	0.329 ^b
Weight (Kg)	69.39 ± 15.29 (32–101)	71.24 ± 13.25 (46–100)	66.69 ± 17.69 (32–101)	0.166 ^a
Height (cm)	161.76 ± 8.56 (142–177)	1.63 ± 0.52 (1.61–1.64)	1.73 ± 0.77 (1.70–1.75)	<0.001 ^a
BMI (Kg/m ²)	26.55 ± 5.84 (12.3–43.72)	25.63 ± 4.31 (18.07–37.34)	27.90 ± 7.41 (12.3–43.72)	0.146 ^b

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

In all analyses, P < 0.05 (with a 95% confidence interval) was considered statistically significant.

^a Student’s t-test for independent samples was applied.

^b Mann-Whitney U test was applied.

formation of sample population by gender with significant difference in height (p < 0.05), there were no contrast in age, weight and BMI (p > 0.05). Table 2 demonstrates there were not statistically significant differences (P > 0.05) in social characteristics of sample.

3.2. FHSQ result between by gender

Table 3 shows differentiation of FHSQ results of total sample and between patients CKD male and female. Women with CKD scored significantly lower and worse than men in FHSQ domains of physical activity (P = 0.004) and vigour (P = 0.016). The rest of FHSQ dimen-

Table 2
Social Characteristics of sample by gender.

Social Characteristics		Total group n = 101	Male n = 60	Female n = 41	P-value ‡
Civil Status	Single	13 (12.87%)	8 (13,33%)	5 (12,20%)	0.402
	Divorced	14 (13.86%)	9 (15,00%)	5 (12,20%)	
	Widowed	18 (17.82%)	7 (11,67%)	11 (26,83%)	
	Couple	2 (01.98%)	1 (1,67%)	1 (2,44%)	
	Married	54 (53.47%)	35 (58,33%)	19 (46,34%)	
Study Level	I. Primary	56 (55.45%)	31 (51,67%)	25 (60,98%)	0.239
	C. Primary	22 (21.78%)	15 (25,00%)	7 (17,07%)	
	Secondary	12 (11.88%)	5 (08,33%)	7 (17,07%)	
	Degree	8 (07.92%)	6 (10,00%)	2 (04,88%)	
	S. Degree	3 (02.97%)	3 (05,00%)	0 (0%)	
Professional activity	Student	0 (0%)	0 (0%)	0 (0%)	0.240
	Freeland	1 (0.99%)	1 (1,67%)	0 (0%)	
	Employed	1 (0.99%)	1 (1,67%)	0 (0%)	
	Unemployed	7 (6.93%)	2 (3,33%)	5 (12,2%)	
	Retired	92 (91.09%)	56 (93,33%)	36 (87,8%)	

Abbreviations: C: complete; I: incomplete; S: superior; Frequency, percentage (%); ‡Chi-squared test was utilized. In all analyses, P < 0.05 (with a 95% confidence interval) was considered statistically significant.

Table 3
Comparisons of Foot Health Status Questionnaire scores by gender.

FHSQ Domains	Total group n = 101	Male n = 60	Female n = 41	P-value ^a
	Mean ± SD (range)	Mean ± SD (range)	Mean ± SD (range)	
Foot pain	82.62 ± 24.38 (6.25–100)	85.89 ± 23.79 (6.25–100)	77.84 ± 24.73 (29.38–100)	0.076
Foot function	82.24 ± 30.72 (0–100)	86.87 ± 26.42 (0–100)	75.30 ± 35.32 (0–100)	0.072
Footwear	76.15 ± 35.17 (0–100)	80.00 ± 31.60 (0–100)	70.52 ± 39.57 (0–100)	0.264
General foot health	52.59 ± 30.95 (0–100)	57.04 ± 29.49 (0–100)	46.09 ± 32.22 (0–100)	0.084
General health	43.56 ± 27.84 (0–100)	45.66 ± 28.30 (0–100)	40.48 ± 27.19 (0–90)	0.366
Physical activity	58.47 ± 29.23 (0–100)	65.74 ± 25.30 (0–100)	47.83 ± 31.57 (0–100)	0.004
Social capacity	57.05 ± 38.58 (0–100)	62.70 ± 37.64 (0–100)	48.78 ± 38.91 (0–100)	0.062
Vigour	52.41 ± 22.07 (0–100)	57.08 ± 26.50 (0–100)	45.57 ± 24.13 (0–100)	0.016

Abbreviations: FHSQ: Foot Health Status Questionnaire; SD: standard deviation; In all analyses, P < 0.05 with a 95% confidence interval was considered statistically significant (bold).

^a Mann-Whitney U test was utilized.

sions did not present statistically significant contrasts (P > 0.05) by gender.

4. Discussion

The objective our research was to analyze QoL related to foot health and general health in patients with CKD using the Foot Health Status Questionnaire (FHSQ). It is the first time health status of the foot and associated to QoL are studied in CKD subjects, and that comparing results according to gender.

It is observed lowest results obtained in section 1 of the FHSQ (section that responds to the specific health status of the foot) were general foot health and footwear. This means that in patient samples with CKD negatively affects to them to use of footwear and health of their feet to their QoL. These two factors, footwear and general foot health, affect the QoL of subjects with CKD.

The low result obtained in domain of foot health in subjects with CKD is similar to obtained in study of QoL and foot health measured with FHSQ in women with fibromyalgia [30], being both chronic diseases coincident due to reperussion and feet pain.

Other studies that analyzed foot health related QoL utilizing the FHSQ [29,30] agree that footwear factor has a clear impact on QoL. In FHSQ analysis in chronic asthmatic patients, López et al. [24] obtain

identical findings that indicate these patients present a deterioration in QoL associated to footwear compared to healthy control group. Reinoso et al. [39], in a study on foot health and QoL in rheumatoid arthritis patients, measured with other instruments, obtained a similar result to our study regarding negative influence of footwear on QoL.

On the other hand, lowest results obtained in section 2 of the FHSQ (section that responds to the subject's general health status) were for general health and vigor domains. This means that study patients had a poor perception of their general health, as well as energy and vitality (vigor), damaging their QoL. CKD patients perceived deterioration of their health in a multicausal way, since there are many reasons that make them appreciate deterioration of their physical and mental state.

These patients are also often accompanied by anemia as a complication of kidney disease, causing a lack of energy, strength and vitality [40]. There are several studies that agree with our result of lack of vitality, all effected in very different populations such as persons with breast cancer, pregnant women, subjects with foot problems, patients with musculoskeletal pain in the feet and type 2 diabetes mellitus [41–45].

Likewise, in the present study, when comparing the FHSQ results by gender, it was observed all values were lower in women, denoting a worse state of health of their feet. Numerous studies support this statement, Menz et al. conclude foot problems of women over 70 years of age, among other reasons, are frequently related to chronic diseases [46].

Specifically, in our research, in physical activity and vigor domains, significant differences were encountered between male and female, with a negative impact on women and similar to another study on quality of life and health status in subjects with problems in the feet analyzed by gender [23].

However, it is necessary to highlight lack of findings related to foot health and its influence on QoL in patients with CKD, making it impossible to contrast results with ours. However, there are multiple general investigations on health-related QoL in subjects with CKD [20,47], all with results of low quality of life and lack of wellness. It must be considered some clinical manifestations in CKD with repercussions on the lower extremities and feet that decrease QoL of patient. Among others they are: alterations in the quality of walk with risk of falls [16,49], uremic itching [51], xerosis and onicopathies [11] and musculoskeletal chronic foot pain [52].

For all the above, more podiatric research is required in this pathology focused on the effectiveness of treatments to be instituted and on protocols for preventive actions, to influence the improvement of QoL by promoting foot health.

Finally, this research had some limitations. For future research, a larger sample size and longitudinal evaluation would be appropriate. Similarly, a simple random sampling process would be better to ensure sample homogeneity. And, although the proper validity and reliability of the FHSQ is known, the reliability for CKD patients has not been recognized and should be considered for future research.

5. Conclusions

The studied CKD population has problems their feet. Quality of life of CKD subjects is negatively involved by health of their feet, difficulties with footwear, their overall health, and lack of vitality. Women with CKD show lower values of quality of life contrasted to male subjects, associated with inability to perform physical activity, lack of energy and tiredness. Since CKD requires multidisciplinary care and treatment, the podiatrist must join this collaborative team to contribute to prevention and promotion of foot health, improving the quality of life of persons with CKD.

Uncited references

[48], [50].

Declaration of competing interest

None.

Acknowledgments

We are grateful for collaboration patients and medical staff from Freisenius Medical Care clinic in Plasencia, Coria and Badajoz, especially Dr. Alejandro Cives, nephrologist.

References

- [1] Grupo de trabajo de la Guía de Práctica Clínica sobre la Detección y el Manejo de la Enfermedad Renal Crónica Guía de Práctica Clínica sobre la Detección y el Manejo de la Enfermedad Renal Crónica. Minist Sanidad. Serv Soc e Igualdad Inst Aragon Ciencias la Salud; 2016. p. 1–166.
- [2] A.S. Levey, J. Coresh Clinical Practice guidelines clinical Practice guidelines K/ doqi; 2002. p. 1–356.
- [3] K.M. Andrassy Comments on “KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease.”. *Kidney Int* 2013;84(3):622–623.
- [4] A. Forbes, H. Gallagher Chronic kidney disease in adults: assessment and management. *Clin Med J R Coll Physicians London* 2014;20(2):128–132.
- [5] M. Gorostidi, M. Sánchez-Martínez, L.M. Ruilope, A. Graciani, J.J. de la Cruz, R. Santamaría, et al. Prevalencia de enfermedad renal crónica en España: impacto de la acumulación de factores de riesgo cardiovascular. *Nefrología* 2018;38(6):606–615.
- [6] P.K.T. Li, G. García-García, S.F. Lui, S. Andreoli, W.W.S. Fung, A. Hradsky, et al. Kidney health for everyone everywhere - from prevention to detection and equitable access to care. *Blood Purif* 2020;31(2):298–311.
- [7] B.M. Robinson, T. Akizawa, K.J. Jager, P.G. Kerr, R. Saran, R.L. Pisoni Factors affecting outcomes in patients reaching end-stage kidney disease worldwide: differences in access to renal replacement therapy, modality use, and haemodialysis practices. *Lancet* 2016;388(10041):294–306.
- [8] F. Caravaca, B. Gonzales, M. Ángel, E. Luna Dolor músculo-esquelético en pacientes con enfermedad renal crónica. *Nefrología* 2016;36(4):433–440.
- [9] H. Hsu, C. Yen, K. Hsu, I. Wu, C. Lee, M. Hung, et al. Factors associated with chronic musculoskeletal pain in patients with chronic kidney disease. *BMC Nephrol* 2014;15(6):1–9.
- [10] P. Gupta, R. Gupta Severity of chronic kidney disease associated pruritus clinically related to symptomatic peripheral neuropathy in patients of end stage renal disease on maintenance Hemodialysis : our experience. *JK Sci* 2016;18(3):150–154.
- [11] G.M. Chanda, S.R. Chintagunta, G. Arakkal Dermatological manifestations in chronic renal failure patients with and without hemodialysis : a study at a tertiary care centre. *J Dr NTR Univ Heal Sci* 2017;6:8–14.
- [12] A. Masmoudi, M.H. Darouiche, H Ben Salah, M Ben Hmdia Cutaneous abnormalities in patients with end stage renal failure on chronic hemodialysis . A study of 458 patients. *J Dermatol Case Rep* 2014;8(4):86–94.
- [13] S. Senanayake, N. Gunawardena, P. Palihawadana, P. Bandara, R. Haniffa, R. Karunaratna, et al. Symptom burden in chronic kidney disease; A population based cross sectional study. *BMC Nephrol* 2017;18(1):1–8.
- [14] K.J. Cox, M.B. Parshall, S.H.A. Hernandez, S.Z. Parvez, M.L. Unruh Symptoms among patients receiving in-center hemodialysis: a qualitative study. *Hemodial Int* 2017;21(4):524–533.
- [15] Dushyanth Babu Jasti, A. Apparao Sarat Mallipeddi, B. Vengamma Vs, S. Kolli A clinical and electrophysiological study of peripheral neuropathies in predialysis chronic kidney disease patients and relation of severity of peripheral neuropathy with degree of renal failure. *J Neurosci Rural Pract* 2017;8:516–524.
- [16] D.D. Zemp, O. Giannini, P. Quadri, E D De Bruin Gait characteristics of CKD patients : a systematic review. *BMC Nephrol* 2019;20(83):1–12.
- [17] Z. Metelko, S. Szabo, M. Diseases, S. Kumar, N. Delhi, V. Heck, et al. The World health organization quality of life assessment (WHOQOL): position paper from the World health organization. *Soc Sci Med* 1995;41(10):1403–1409.
- [18] L. Barros Higgins, Y. Herazo Beltrán, G. Aroca Martínez Calidad de vida relacionada con la salud en pacientes con enfermedad renal crónica. *Rev la Fac Med* 2015;63(4):641–647.
- [19] A. Rebollo-Rubio, J.M. Morales-Asencio, M.E. Pons-Raventos, J.J. Mansilla-Francisco Revisión de estudios sobre calidad de vida relacionada con la salud en la enfermedad renal crónica avanzada en España. *Nefrología* 2015;35(1):92–109.
- [20] S. Senanayake, N. Gunawardena, P. Palihawadana, S. Senanayake, R. Karunaratna, P. Kumara, et al. Health related quality of life in chronic kidney disease; a descriptive study in a rural Sri Lankan community affected by chronic kidney disease. *Health Qual Life Outcome* 2020;18(1):1–9.
- [21] G. Morais Arruda, M. Berenice Gomes Nascimento, S. Maria de, R. Raniere de Oliveira, M. Santos Quality of life of patients with chronic kidney disease undergoing hemodialysis. *Enfermería Glob* No. 2016;43:1–13.
- [22] D. López López, N.Z. López Martínez, M.E. Losa Iglesias, D. Rodríguez Sanz, P. Palomo López, R. Becerro de Bengoa Vallejo Impact on quality of life related to foot health in a sample of menopausal women: a case-control observational study. *Climacteric* 2016 Sep 2;19(5):501–505.
- [23] D. López-López, R. Becerro-de-Bengoa-Vallejo, M.E. Losa-Iglesias, P. Palomo-López, D. Rodríguez-Sanz, J.M. Brandariz-Pereira, et al. Evaluation of foot health

- related quality of life in individuals with foot problems by gender: a cross-sectional comparative analysis study. *BMJ Open* 2018 Oct 18;8(10):e023980.
- [24] D. López-López, R. Paineira-Villar, V. García-Paz, R. Becerro-De-bengoa-vallejo, M.E. Losa-Iglesias, D. Rodríguez-Sanz, et al. Impact of the allergic asthma on foot health-related quality of life and depression: a novel case-control research. *Medicine* 2019 May 1;55(5).
- [25] D.L. López, M. Rivas López, M.D.L.Á. Bouza Prego, L. María Mónaco, M.E. Losa Iglesias, J.L. Saleta Canosa, et al. Quality of life impact related to foot health in a sample of sea workers. *J Tissue Viability* 2015 Nov 1;24(4):146–152.
- [26] D. López-López, R. Paineira-Villar, R. Becerro-de-Bengoa-Vallejo, M.E. Losa-Iglesias, D. Rodríguez-Sanz, P. Palomo-López, et al. Impact of the mechanical hyperkeratotic lesions and its association with quality of life: an observational case-control study. *J Eur Acad Dermatol Venereol* 2018;32:1549–1553.
- [27] D. López-López, L. Callejo-González, M.E. Losa-Iglesias, J.L. Saleta-Canosa, D. Rodríguez-Sanz, C. Calvo-Lobo, et al. Quality of life impact related to foot health in a sample of older people with hallux valgus. *Aging Dis* 2016 Jan;7(1):45–52.
- [28] P. Palomo-López, R. Becerro-de-Bengoa-Vallejo, M.E. Losa-Iglesias, D. Rodríguez-Sanz, C. Calvo-Lobo, D. López-López Impact of hallux valgus related of quality of life in women. *Int Wound J* 2017 Oct;14(5):782–785.
- [29] P. Palomo-López, M.E. Losa-Iglesias, R. Becerro-de-Bengoa-Vallejo, D. López-López, D. Rodríguez-Sanz, C. Romero-Morales, et al. Specific foot health-related quality-of-life impairment in patients with type II versus type I diabetes. *Int Wound J* 2019 Feb;16(1):47–51.
- [30] P. Palomo-López, C. Calvo-Lobo, R. Becerro-De-Bengoa-Vallejo, M.E. Losa-Iglesias, D. Rodríguez-Sanz, R. Sánchez-Gómez, et al. Quality of life related to foot health status in women with fibromyalgia: a case-control study. *Arch Med Sci* 2019;15(3):694–699.
- [31] J.P. Vandembroucke, E. Von Elm, D.G. Altman, P.C. Götzsche, C.D. Mulrow, S.J. Pocock, et al. Strengthening the reporting of observational studies in Epidemiology (STROBE): explanation and elaboration. *Epidemiology* 2007;18(6):805–835.
- [32] P. Palomo López, D. Rodríguez-Sanz, R. Becerro de Bengoa Vallejo, M.E. Losa-Iglesias, J. Guerrero Martín, C. Calvo Lobo, et al. Clinical aspects of foot health and their influence on quality of life among breast cancer survivors: a case-control study. *Canc Manag Res* 2017 Nov;9:545–551.
- [33] K.B. Landorf, A.M. Keenan An evaluation of two foot-specific, health-related quality-of-life measuring instruments. *Foot Ankle Int* 2002;23(6):538–546.
- [34] P.J. Bennett, C. Patterson, M.P. Dunne Health-related quality of life following podiatric surgery. *J Am Podiatr Med Assoc* 2001 Apr;91(4):164–173.
- [35] P.J. Bennett, C. Patterson, S. Wearing, T. Baglioni Development and validation of a questionnaire designed to measure foot-health status. *J Am Podiatr Med Assoc* 1998 Sep;88(9):419–428.
- [36] M.J. Sirera-Vercher, P. Sáez-Zamora, M.D. Sanz-Amaro Traducción y adaptación transcultural al castellano y al valenciano del Foot Health Status Questionnaire. *Rev Española Cirugía Ortopédica Traumatol* 2010 Jul;54(4):211–219.
- [37] Antonio Cuesta-Vargas, P. Bennett, M.T.L.-M. Ana María Jimenez-Cebrian The psychometric properties of the Spanish version of the foot health status questionnaire. *Qual Life Res* 2013;22:1739–1743.
- [38] Asociación Médica Mundial Universidad de Navarra Centro de Documentación de Bioética Declaración de Helsinki de la AMM. Principios éticos para las investigaciones médicas en seres humanos; 2013. p. 1–8.
- [39] A. Reinoso-Cobo, G. Gijón-Nogueron, R. Caliz-Caliz, M.A. Ferrer-Gonzalez, M.T. Vallejo-Velazquez, J. Miguel Morales-Asencio, et al. Foot health and quality of life in patients with rheumatoid arthritis: a cross-sectional study. *BMJ Open* 2020;10(5):e036903.
- [40] A. Cases, M.L. Egocheaga, S. Tranche, V. Pallarés, R. Ojeda, J.L. Górriz, et al. Anemia en la enfermedad renal crónica: protocolo de estudio, manejo y derivación a Nefrología. *Semergen* 2018;44(1):37–41.
- [41] P. Palomo-López, D. Rodríguez-Sanz, R. Becerro-De-Bengoa-Vallejo, M.E. Losa-Iglesias, J. Guerrero-Martín, C. Calvo-Lobo, et al. Clinical aspects of foot health and their influence on quality of life among breast cancer survivors: a case-control study. *Canc Manag Res* 2017;9:545–551.
- [42] D. López-López, I. Rodríguez-Vila, M.E. Losa-Iglesias, D. Rodríguez-Sanz, C. Calvo-Lobo, C. Romero-Morales, et al. Impact of the quality of life related to foot health in a sample of pregnant women: a case control study. *Med (United States)*. 2017;96(12).
- [43] P. Palomo-López, D. López-López, R. Becerro-De-Bengoa-Vallejo, M.E. Losa-Iglesias, D. Rodríguez-Sanz, J. Fernández-Carnero, et al. Concurrent validity of the foot health status questionnaire and study short form 36 for measuring the health-related quality of life in patients with foot problems. *Medicine* 2019 Nov 1;55(11).
- [44] G.J. Hendry, L. Fenocchi, H. Mason, M. Steultjens The impact of multimorbidity on foot health outcomes in podiatry patients with musculoskeletal foot pain: a prospective observational study. *J Foot Ankle Res* 2019;12(1):1–12.
- [45] F.J. Domínguez-Muñoz, M.A. García-Gordillo, R.A. Díaz-torres, M.Á. Hernandez-mocholi, S. Villafaina, D. Collado-mateo, et al. Foot health status questionnaire (FHSQ) in Spanish people with type 2 diabetes Mellitus : preliminary values study. *Int J Environ Res Public Heal* 2020;17(10):3643–3657.
- [46] H.B. Menz, E.L.M. Barr, W.J. Brown Predictors and persistence of foot problems in women aged 70 years and over: a prospective study. *Maturitas* 2011;68(1):83–87.
- [47] S. Senanayake, N. Gunawardena, P. Paliwardana, S. Senanayake, R. Karunaratna, P. Kumara, et al. Health related quality of life in chronic kidney disease: A descriptive study in a rural Sri Lankan community affected by chronic kidney disease. *Health Qual Life Outcome* 2020;18(1):1–9.
- [48] E.K. Tannor, B.R. Norman, K.K. Adusei, F.S. Sarfo, M.R. Davids, G. Bedu-Addo Quality of life among patients with moderate to advanced chronic kidney disease in Ghana - a single centre study. *BMC Nephrol* 2019;20(1):1–10.
- [49] D.D. Zemp, O. Giannini, P. Quadri, E.D. De Bruin Gait characteristics of CKD patients: a systematic review. *BMC Nephrol* 2019;20(1):1–12.
- [50] N.T.Q. Nguyen, P. Cockwell, A.P. Maxwell, M. Griffin, T. O'Brien, C. O'Neill Chronic kidney disease, health-related quality of life and their associated economic burden among a nationally representative sample of community dwelling adults in England. *PLoS One* 2018;13(11):1–12.
- [51] I.U. Rehman, K.G. Chan, S. Munib, L.H. Lee, T.M. Khan The association between CKD-associated pruritus and quality of life in patients undergoing hemodialysis in Pakistan: a STROBE complaint cross-sectional study. *Med (United States)*. 2019;98(36).
- [52] E. Sadigova, A. Yalcin, S. Ozkurt Pain assessment in hemodialysis patients. *Cureus* 2020;12(2):1–10.