folia medica

Folia Medica 64(2):229-239
DOI: 10.3897/folmed.64.e64876

Original Article

# Quality of Life in Diabetic Foot Ulcer, Grade 3: Associated Demographic Factors

Maria Polikandrioti[1]

[1] *University of West Attica, Athens, Greece*

**Corresponding author:** Maria Polikandrioti, University of West Attica, Athens, Greece; Email: mpolik2006@yahoo.com

**Received:** 23 Feb 2021 ♦ **Accepted:** 11 Mar 2021 ♦ **Published:** 30 Apr 2022

**Citation:** Polikandrioti M. Quality of life in diabetic foot ulcer, grade 3: associated demographic factors. Folia Med (Plovdiv) 2022;64(2):229-239. doi: 10.3897/folmed.64.e64876.

## Abstract

**Introduction:** Patients with diabetic foot ulcer grade 3 experience some limitations that adversely affect their quality of life (QoL).

**Aim:** The aim of the study was to explore demographic characteristics associated with the quality of life of diabetic foot ulcer patients, grade 3.

**Materials and methods:** The present study recruited 120 diabetic foot ulcer patients. Data collected by completion of SF-36 Health Survey (SF-36).

**Results:** Of the 120 participants, 65.8% were men and 73% were more than 60 years of age. Patients showed moderate to high levels of quality of life in social functionality, energy/fatigue, emotional well-being, and physical pain (medians: 50, 60, 72, and 67.5, respectively) and poor levels in physical functioning, role physical, and role emotional (medians: 22, 0 and 0, respectively). In addition, patients had moderate levels of quality of life in general health (median: 48.5). It was observed that physical functioning was significantly associated with place of residence ($p$=0.005). Moreover, physical role was significantly associated with age ($p$=0.020) and occupation ($p$=0.018), while emotional role was significantly associated with age ($p$=0.012), marital status ($p$=0.016), and occupation ($p$=0.012). Energy/fatigue was significantly associated with age ($p$=0.026), marital status ($p$=0.018), and occupation ($p$=0.009). Emotional well-being was significantly associated with gender ($p$=0.009), level of education ($p$=0.001), and occupation ($p$=0.007). Social functionality was significantly associated with marital status ($p$=0.001) while pain was significantly associated with education level ($p$=0.010). General health was significantly associated with marital status ($p$=0.037), and place of residence ($p$=0.024).

**Conclusions:** The findings of the present study may adequately inform stakeholders in the field of diabetic foot ulcer grade 3 when planning effective care.

## Keywords

diabetic ulcer, quality of life, Wagner classification

## INTRODUCTION

Diabetic foot ulcers (DFUs) are an inexorable complication of diabetes mellitus which is expanding globally at an alarming rate.[1] DFUs represent a staggering economic burden for the National System of each country either directly due to the increased use of health care services (emergency room visits and hospitalizations) or indirectly due to productivity loss, or the need of rehabilitation and home care.[1-3] Approximately 33% of diabetes mellitus costs are spent on DFUs treatment with the majority to be related with hospitalizations.[4]

DFUs are associated with increased morbidly, mortality, and high risk for amputation[4,5] as well as with 2.4-fold higher risk of death than in diabetic patients without ulcers.[6] DFUs limit one's physical functionality and abili-

ty to perform daily tasks, thus increasing dependency on others. Additionally, patients experience several concerns associated with ulceration (healing or recurrence) that may be converted into a long-term stress capable of delaying wound healing. All aforementioned factors adversely affect patients' quality of life (QoL).[7-9]

Nowadays, there is a growing awareness of the impact of DFU not only on patients' bodies but also on their lives including psychological, and social well-being. QoL refers to those physical, psychological, and social domains of health that are influenced by a person's experiences, beliefs, expectations, and perceptions. Though QoL represents a subjective view, it is a well-accepted tool for evaluation of disease management or assessment of care effectiveness.[10,11]

Wagner classification is the most widely used classification system of DFUs.[12] Interestingly, there is a close relationship between DFU severity and QoL impairment. In more detail, a severe DFU takes longer time to treat, demands more intensive care from family or health care professionals, causes more severe limitations in daily activities, and increases dependence on others. Furthermore, a severe DFU requires multiple visits to foot clinics over a long period of time or increased hospital stay which are of a significant concern among patients who still belong to labour force.[13-16]

Strikingly more, Wagner classification is associated with the potential risk for amputation showing different predictors in different grades. Higher Wagner grade, lower ankle brachial pressure index, serum albumin and hemoglobin as well as the elevated white blood cell count are significantly associated with increased risk of amputation.[15] Therefore, DFU patients who perceive an imminent threat of amputation may also experience low QoL.

Although the impact of DFUs on QoL is studied in many countries, we need more data referring to QoL in patients with grade 3 ulcer according to Wagner classification system. An in-depth understanding of QoL will enable clinicians to provide beneficial care to this growing group of population.

## AIM

Therefore, the present study was conducted to determine QoL among DFU patients with grade 3 ulcer by the Wagner classification system and the associated demographic factors.

## MATERIALS AND METHODS

### Study population

The present cross-sectional study enrolled 120 outpatients (79 men) attending follow-up visits in an outpatient clinic of a public hospital in Attica between January and October, 2019. It was a convenience sample.

The criteria for including patients in the study were as follows: a) patients with type 2 diabetes with grade 3 DFUs according to Wagner classification; b) adequate attendance of follow-up visits during the study period; and c) patients that are able to write and read the Greek language fluently. The exclusion criteria were as follows: a) patients with a history of mental disorders; b) patients with foot lesions due to trauma after any type of accident; c) patients with other severe or chronic diseases which are not associated with diabetes; d) patients that are unable to communicate throughout the study period; and e) patients with ulcers in other grades by Wagner classification than grade 3. In terms of race/ethnicity all patients were Greek.

The Wagner diabetic foot ulcer classification system we used to recruit only grade 3 ulcer patients uses the following grades[12]:

Grade 0 – intact skin
Grade 1 – superficial ulcer of skin or subcutaneous tissue
Grade 2 – ulcers extend into tendon, bone, or capsule
Grade 3 – deep ulcer with osteomyelitis, or abscess
Grade 4 – partial foot gangrene
Grade 5 – whole foot gangrene

This widely used DFU grading system has the advantages of simplicity and ease of bedside application while it does not require sophisticated laboratory or imaging tests.[12] Since the aim of this study was merely to explore demographic correlates of QoL, there was no intervention or control group and no evaluation of clinical characteristics such as glycemic control, duration of diabetes diagnosis, ulcer size, etc.

The interview lasted approximately 15 minutes and for all participants it took place while they were waiting for their clinical follow-up in the outpatient setting.

### Ethical considerations

The study was approved by the Medical Research Ethics Committee of the hospital where it was conducted. The study was performed in full accordance with the Declaration of Helsinki (World Medical Association, 1989). Prior to data collection, the patients were explained the nature and objectives of the study. All patients participated in the study voluntarily and had their anonymity preserved. Written informed consent was obtained from all patients being interviewed.

### Data variables

Data collection was performed by completing the SF-36 Health Survey (SF-36) and a questionnaire which included the patients' self-reported demographic characteristics (gender, age, marital status, educational level, profession, place of residence, and number of their children).

### Assessment of patients' QoL

The SF-36 Health Survey (SF-36) scale was used to assess patients' QoL. This scale assesses physical and mental health. It consists of 36 questions comprising 8 dimensions:

physical functioning, role-physical, role-emotional, energy/fatigue, emotional well-being, social functioning, pain, and general health. Respondents answer the questions on Likert-type scales. The scores assigned to the questions are summed up separately for the questions that evaluate the 8 dimensions. Higher scores indicate better QoL.[17]

## Statistical analysis

Categorical data are presented with absolute and relative frequencies (%) while continuous data are presented with median and interquartile range since they did not follow the normal distribution (tested with Kolmogorov-Smirnov criterion and graphically with Q-Q plots and histograms). Non-parametric Mann-Whitney and Kruskal-Wallis tests were used to test for association between patients' QoL and characteristics.

In addition, multiple linear regression analysis was performed to test which independent factors were independently significantly associated with QoL after testing for potential confounders. Results are presented as β regression coefficients and 95% confidence interval (95% CI). The observed level of 5% was considered significant. All statistical analyses were performed with SPSS version 22 (SPSS Inc, Chicago, IL, USA).

# RESULTS

## Sample description

**Table 1** presents the sample description. 65.8% of the patients were men, 73% were over 60 years of age, 67.5% were married, and 24.2% had primary education. The majority of the sample (55.8%) were retired, lived in Attica (62.5%) and had two children (46.7%).

## Patient's QoL

**Table 2** presents the results regarding QoL as measured by both values of mean and median. Patients showed moderate to high levels of QoL in social functionality, energy/fatigue, emotional well-being, and physical pain (medians: 50, 60, 72, and 67.5, respectively), while they showed poor levels in physical functioning, role physical and role emotional (medians: 22, 0, and 0, respectively). In addition, patients had moderate levels of general health (median 48.5). Patients' physical health was a little lower than the patients' mental health. In general, the patients had moderate levels of physical and mental health (median 43.5 and 56, respectively). Furthermore, 43.3% and 56.7% scored above 50 in physical and mental score, respectively.

## Association between patient's demographic characteristics and QoL

**Tables 3-5** present the association between patient's characteristics and QoL.

Physical functioning was significantly associated with the place of residence ($p$=0.005). Specifically, patients living in a small town or rural areas had worse physical functioning (median 20) than those living in Attica (median 22) and those living in the capital city **(Table 3)**.

Physical role was significantly associated with age ($p$=0.020) and occupation ($p$=0.018) **(Table 3)**. Specifically, patients younger than 50 years had better physical role

**Table 1.** Sample demographic characteristics (n=120)

| | n (%) | | n (%) |
|---|---|---|---|
| Sex (Males) | 79 (65.8%) | Job | |
| Age (years) | | Unemployed | 2 (1.7%) |
| 30-40 | 3 (2.5%) | Public servant | 10 (8.3%) |
| 41-50 | 11 (9.2%) | Private employee | 10 (8.3%) |
| 51-60 | 18 (15.0%) | Freelancer | 13 (10.8%) |
| 61-70 | 58 (48.3%) | Household | 18 (15.0%) |
| 71-80 | 30 (25.0%) | Pensioner | 67 (55.8%) |
| Family Status | | Residency | |
| Married | 86 (71.2%) | Attica | 75 (62.5%) |
| Single | 10 (8.3%) | County capital | 23 (19.2%) |
| Divorced | 14 (11.7%) | Small city | 8 (6.7%) |
| Widowed | 10 (8.3%) | Rural area | 14 (11.7%) |
| Education | | Number of children | |
| Primary | 29 (24.2%) | None | 15 (12.5%) |
| Secondary | 43 (35.8%) | One | 28 (23.3%) |
| University | 46 (38.3%) | Two | 56 (46.7%) |
| MSc PhD | 2 (1.7%) | More than two | 21 (17.5%) |



Folia Medica

**Table 2.** Patients' QoL

| | Mean (SD) | Median (IQR) |
|---|---|---|
| Physical functioning (range: 0–100) | 22.5 (±10.7) | 22 (16-27) |
| Role physical (range: 0–100) | 35.4 (±41.1) | 0 (0-75) |
| Role emotional (range: 0–100) | 38.9 (±45.2) | 0 (0-100) |
| Energy/fatigue (range: 0–100) | 57.1 (±20.1) | 60 (45-70) |
| Emotional well-being (range: 0–100) | 66.5 (±18.8) | 72 (52-84) |
| Social functioning (range: 0–100) | 61.7 (±27.0) | 50 (50-87.5) |
| Pain (range: 0–100) | 63.8 (±28.5) | 67.5 (45-90) |
| General health (range: 0–100) | 48.0 (±20.1) | 48.5 (35-65) |
| Physical health (range: 0–100) | 44.7 (±16.9) | 43.5 (32-55.6) |
| Mental health (range: 0–100) | 55.7 (±23.9) | 56 (34-76) |
| | **N (%)** | |
| Physical health score above 50 | 44 (±43.3%) | |
| Mental health score above 50 | 68 (±56.7%) | |

±SD: standard deviation; IQR: interquartile range

**Table 3.** Association between patient's characteristics and QoL (physical functioning, role physical, role emotional)

| | Physical functioning | | Role physical | | Role emotional | |
|---|---|---|---|---|---|---|
| | Median (IQR) | *p*-value | Median (IQR) | *p*-value | Median (IQR) | *p*-value |
| Sex | | 0.929 | | 0.178 | | 0.868 |
| Male | 23 (16-26) | | 0 (0-50) | | 0 (0-100) | |
| Female | 22 (16-30) | | 25 (0-100) | | 0 (0-100) | |
| Age (years) | | 0.075 | | 0.020 | | 0.012 |
| ≤50 | 24 (20-27) | | 75 (0-100) | | 100 (0-100) | |
| 51-60 | 26 (21-38) | | 0 (0-0) | | 0 (0-0) | |
| 61-70 | 21 (14-26) | | 25 (0-75) | | 17 (0-100) | |
| >70 | 25 (20-28) | | 0 (0-75) | | 0 (0-67) | |
| Family status | | 0.158 | | 0.156 | | 0.016 |
| Married | 23.5 (16-28) | | 12.5 (0-100) | | 17 (0-100) | |
| Single / Divorced / Widowed | 22 (16-26) | | 0 (0-50) | | 0 (0-67) | |
| Education | | 0.172 | | 0.481 | | 0.051 |
| Primary | 20 (14-25) | | 0 (0-50) | | 0 (0-33) | |
| Secondary | 22 (18-26) | | 25 (0-100) | | 0 (0-100) | |
| University | 26 (15.5-31) | | 25 (0-75) | | 33 (0-100) | |
| Job | | 0.385 | | 0.018 | | 0.012 |
| Employee | 26 (19-28) | | 25 (0-75) | | 10 (0-100) | |
| Pensioner | 22 (15-27) | | 0 (0-75) | | 0 (0-100) | |
| Residency | | 0.005 | | 0.444 | | 0.160 |
| Attica | 22 (15-26) | | 25 (0-75) | | 33 (0-100) | |
| County capital | 28 (22-38) | | 0 (0-75) | | 0 (0-33) | |
| Small city / Rural area | 20 (14-26) | | 0 (0-50) | | 0 (0-67) | |
| Number of children | | 0.268 | | 0.931 | | 0.980 |
| None | 26 (22-26) | | 0 (0-50) | | 0 (0-100) | |
| One | 24.5 (20-29.5) | | 0 (0-75) | | 17 (0-100) | |
| Two | 20.5 (11-26.5) | | 12.5 (0-62.5) | | 0 (0-100) | |
| More than two | 22 (16-26) | | 50 (0-75) | | 0 (0-100) | |

IQR: Interquartile range

(median 75) than older patients did (median 0 and 25). Similarly, employees had better physical role (median 25) than pensioners (median 0).

Emotional role was significantly associated with age ($p$=0.012), marital status ($p$=0.016), and occupation ($p$=0.012) **(Table 3)**. Specifically, patients younger than 50 years had better emotional role (median 100) than older patients (median 0 and 17). Similarly, married patients and employees had better emotional role (median 17 and 10) than other patients did.

Energy/fatigue was significantly associated with age ($p$=0.026), marital status ($p$=0.018), and occupation ($p$=0.009) **(Table 4)**. Specifically, patients 51-60 years old had better QoL in energy/fatigue (median 70). Similarly, married patients and employees had better QoL in energy/fatigue (between 60 and 70) than other patients.

Emotional well-being was significantly associated with gender ($p$=0.009), level of education ($p$=0.001), and occupation ($p$=0.007) **(Table 4)**. More specifically, male patients had better emotional well-being (median 76). Similarly, higher education patients and employees had better emotional well-being (median 76 and 76) than other patients.

Regarding social functionality, it was significantly associated with marital status ($p$=0.001). In particular, married patients had better social functioning (median 62.5) **(Table 4)**.

Pain was significantly associated with education level ($p$=0.010). Specifically, patients with primary education experienced more physical pain (median 45) **(Table 5)**.

General health was significantly associated with marital status ($p$=0.037) and place of residence ($p$=0.024). In particular, married patients had better general health (median 50) than single patients (median 40) **(Table 5)**. Patients living in the countryside had better general health (median 65) than others (median 0 and 40).

**Table 4.** Association between patient's characteristics and QoL (energy/fatigue, emotional well-being, social functioning)

| | Energy/fatigue | | Emotional well-being | | Social functioning | |
|---|---|---|---|---|---|---|
| | **Median (IQR)** | ***p*-value** | **Median (IQR)** | ***p*-value** | **Median (IQR)** | ***p*-value** |
| Sex | | 0.076 | | 0.009 | | 0.798 |
| Male | 60 (50-75) | | 76 (52-84) | | 50 (50-87.5) | |
| Female | 55 (35-65) | | 68 (48-76) | | 62.5 (50-87.5) | |
| Age (years) | | 0.026 | | 0.802 | | 0.228 |
| ≤50 | 57.5 (50-70) | | 74 (52-80) | | 75 (50-100) | |
| 51-60 | 70 (60-75) | | 74 (64-84) | | 50 (37.5-75) | |
| 61-70 | 57.5 (50-70) | | 68 (48-84) | | 50 (50-87.5) | |
| >70 | 50 (30-65) | | 72 (48-84) | | 50 (50-87.5) | |
| Family status | | 0.018 | | 0.115 | | 0.001 |
| Married | 60 (50-75) | | 72 (56-84) | | 62.5 (50-100) | |
| Single / Divorced / Widowed | 50 (35-65) | | 68 (44-80) | | 50 (25-50) | |
| Education | | 0.125 | | 0.001 | | 0.053 |
| Primary | 55 (30-65) | | 52 (40-68) | | 50 (50-50) | |
| Secondary | 60 (45-75) | | 72 (48-88) | | 75 (50-100) | |
| University | 57.5 (50-70) | | 76 (66-84) | | 50 (50-75) | |
| Job | | 0.009 | | 0.007 | | 0.147 |
| Employee | 70 (55-75) | | 76 (68-84) | | 50 (37.5-75) | |
| Pensioner | 55 (35-65) | | 64 (48-84) | | 50 (50-87.5) | |
| Residency | | 0.161 | | 0.948 | | 0.464 |
| Attica | 55 (40-70) | | 68 (52-84) | | 50 (50-100) | |
| County capital | 55 (35-70) | | 72 (60-80) | | 50 (50-75) | |
| Small city / Rural area | 65 (60-75) | | 76 (52-84) | | 50 (37.5-75) | |
| Number of children | | 0.430 | | 0.056 | | 0.408 |
| None | 50 (45-75) | | 76 (48-80) | | 50 (25-100) | |
| One | 60 (55-75) | | 80 (68-84) | | 75 (50-100) | |
| Two | 60 (37.5-70) | | 64 (48-84) | | 50 (43.75-81.25) | |
| More than two | 55 (45-60) | | 68 (56-76) | | 50 (50-100) | |

IQR: interquartile range

**Table 5.** Association between patient's characteristics and QoL (pain, general health)

| | Pain | | General health | |
|---|---|---|---|---|
| | **Median (IQR)** | ***p*-value** | **Median (IQR)** | ***p*-value** |
| Sex | | 0.203 | | 0.604 |
| Male | 57.5 (45–90) | | 45 (35–65) | |
| Female | 75 (45–100) | | 50 (40–65) | |
| Age (years) | | 0.102 | | 0.184 |
| ≤50 | 95 (57.5–100) | | 38.5 (25–50) | |
| 51-60 | 57.5 (55–67.5) | | 52.5 (40–70) | |
| 61-70 | 67.5 (45–77.5) | | 50 (40–65) | |
| >70 | 76.25 (45–100) | | 42.5 (25–60) | |
| Family status | | 0.172 | | 0.034 |
| Married | 67.5 (45–90) | | 50 (40–65) | |
| Single / Divorced / Widowed | 50 (45–90) | | 40 (27–55) | |
| Education | | 0.010 | | 0.205 |
| Primary | 45 (45–67.5) | | 50 (27–60) | |
| Secondary | 67.5 (32.5–100) | | 50 (40–65) | |
| University | 72.5 (56.25–100) | | 45 (35–70) | |
| Job | | 0.711 | | 0.087 |
| Employee | 67.5 (57.5–100) | | 50 (40–70) | |
| Pensioner | 67.5 (45–90) | | 45 (35–60) | |
| Residency | | 0.362 | | 0.024 |
| Attica | 67.5 (45–100) | | 50 (35–65) | |
| County capital | 67.5 (45–77.5) | | 40 (27–50) | |
| Small city / Rural area | 57.5 (32.5–70) | | 65 (40–65) | |
| Number of children | | 0.063 | | 0.175 |
| None | 67.5 (55–100) | | 40 (32–55) | |
| One | 77.5 (62.5–100) | | 45 (40–60) | |
| Two | 57.5 (45–90) | | 55 (40–65) | |
| More than two | 55 (32.5–70) | | 40 (27–60) | |

IQR: interquartile range

## Impact of patient's characteristics on QoL

Multiple linear regression analysis was then performed with dependent variables the sub-groups of patient's QoL to estimate the effect of patient characteristics (independent factors).

**Table 6** shows that patients living in county capitals had 8.15 points better physical function than those living in Attica (b=8.15; 95% CI: 3.12–13.1; *p*=0.001). Regarding physical role, it is observed that patients over 50 years of age had a much worse physical role than patients under 50 (b=-55.59; 95% CI: -84.81–26.6; *p*=0.001; β=-29.1; 95% CI: -55.1–2.97; *p*=0.029 and β=-33.1; 95% CI: -61.1–5.1; *p*=0.021). Regarding emotional role, it was observed that patients aged 51-60 years had a worse emotional score of 53 points than patients under 50 years of age (b=-53.7; 95% CI: -84.5–22.9; *p*=0.001). Similarly, for patients over 70 years of age (β=-41.3; 95% CI: -71.1–11.5; *p*=0.007).

**Table 7** reveals that single patients had 8 points worse QoL in energy/fatigue than married ones (β=-8.4; 95% CI: -15.3–1.4; *p*=0.018).

Concerning emotional well-being, it is observed that female patients had 10.3 points worse emotional well-being than men did (β=-10.3; 95% CI: -16.7–3.8; *p*=0.002). Patients with university education had 12 points better emotional well-being than those with primary education (b=2.0; 95% CI: 3.9-20.0; *p*=0.002). Retired patients had 11 points worse emotional well-being than employees (β=-11.2; 95% CI: -18.2–4.2; *p*=0.002). Regarding social functionality, it is observed that single patients had 20.1 points worse social functioning than married patients (b=-20.1; 95% CI: -30.2–10.0; *p*=0.001).

**Table 8** shows that higher education patients experience 16.4 points less pain than those with primary education (b=16.4; 95% CI: 3.1–29.7; *p*=0.016).

**Table 6.** Impact of patient's characteristics on QoL (physical functioning, role physical, role emotional)

| | Physical functioning | | Role physical | | Role emotional | |
|---|---|---|---|---|---|---|
| | β (95% CI) | *p*-value | β (95% CI) | *p*-value | β (95% CI) | *p*-value |
| Age (years) | | | | | | |
| ≤50 | - | | Ref. Cat. | | Ref. Cat. | |
| 51-60 | - | | -55.59 (-84.81–26.6) | 0.001 | -53.7 (-84.5–22.9) | 0.001 |
| 61-70 | - | | -29.1 (-55.1–2.97) | 0.029 | -25.2 (-52.8–2.35) | 0.073 |
| >70 | - | | -33.1 (-61.1–5.1) | 0.021 | -41.3 (-71.1–11.5) | 0.007 |
| Family Status | | | | | | |
| Married | - | | - | | Ref. Cat. | |
| Single / Divorced / Widowed | - | | - | | -16.7 (-34.22–0.62) | 0.059 |
| Job | | | | | | |
| Employee | - | | Ref. Cat. | | Ref. Cat. | |
| Pensioner | - | | -5.24 (-23.8–13.37) | 0.578 | 3.28 (-16.9–23.5) | 0.748 |
| Residency | | | | | | |
| Attica | Ref. Cat. | | - | | - | |
| County capital | 8.15 (3.12–13.1) | 0.001 | - | | - | |
| Small city / Rural area | 0.49 (-4.49–5.49) | 0.843 | - | | - | |

CI: confidence interval; Ref. Cat.: reference category

**Table 7.** Impact of patient's characteristics on QoL (energy/fatigue, emotional well-being, social functioning)

| | Energy/fatigue | | Emotional well-being | | Social functioning | |
|---|---|---|---|---|---|---|
| | β (95% CI) | *p*-value | β (95% CI) | *p*-value | β (95% CI) | *p*-value |
| Sex | | | | | | |
| Male | - | | Ref. Cat. | | - | |
| Female | - | | -10.3 (-16.7–3.8) | 0.002 | - | |
| Age (years) | | | | | | |
| ≤50 | Ref. Cat. | | - | | - | |
| 51-60 | 5.2 (-7.1–17.4) | 0.406 | - | | - | |
| 61-70 | -4.9 (-16.2–6.3) | 0.385 | - | | - | |
| >70 | -9.9 (-21.8–1.9) | 0.100 | - | | - | |
| Family Status | | | | | | |
| Married | Ref. Cat. | | - | | Ref. Cat. | |
| Single / Divorced / Widowed | -8.4 (-15.3–1.4) | 0.018 | - | | -20.1 (-30.2–10.0) | 0.001 |
| Education | | | | | | |
| Primary | - | | Ref. Cat. | | - | |
| Secondary | - | | 7.9 (-0.2–16.0) | 0.055 | - | |
| University | - | | 12.0 (3.9–20.0) | 0.004 | - | |
| Job | | | | | | |
| Employee | Ref. Cat. | | Ref. Cat. | | - | |
| Pensioner | -5.7 (-13.8–2.2) | 0.156 | -11.2 (-18.2–4.2) | 0.002 | - | |

CI: confidence interval; Ref. Cat.: reference category



Folia Medica

**Table 8.** Impact of patient's characteristics on QoL (pain, general health)

| | Pain | | General Health | |
|---|---|---|---|---|
| | **β (95% CI)** | ***p*-value** | **β (95% CI)** | ***p*-value** |
| Family status | | | | |
| Married | - | | Ref. Cat. | |
| Single / Divorced / Widowed | - | | -6.7 (-14.6–1.1) | 0.093 |
| Education | | | | |
| Primary | Ref. Cat. | | - | |
| Secondary | 10.9 (-2.1–23.9) | 0.101 | - | |
| University | 16.4 (3.1–29.7) | 0.016 | - | |
| Residency | | | | |
| Attica | - | | Ref. Cat. | |
| County capital | - | | -4.9 (-14.2–4.5) | 0.302 |
| Small city / Rural area | - | | 8.2 (-1.0–17.5) | 0.080 |

CI: confidence interval; Ref. Cat.: reference category

## DISCUSSION

The present results showed low QoL levels in physical functioning, role physical and role emotional, and moderate QoL levels in general health. Similar observations were made in a recent meta-analysis of 12 studies which showed poor QoL in four of eight subscales of SF-36: physical functioning, role physical, general health, and vitality.[18] A high-grade ulcer, as determined by Wagner's classification, is a significant and independent predictor of QoL impairment in DFU patients.[19,20] Valensi et al.[19] demonstrated an independent inverse relationship between good QoL in domain of leisure and Wagner grade. A high-risk wound, as defined by grade 3 Wagner classification, having complications, along with poor glycemic control are clinical variables associated with QoL impairment.[20] Amputation risk is significantly higher in DFU patients with lower QoL.[20] Moreover, the higher the initial Wagner grade, the greater the patient perceives irritation due to the appearance of DFU and the duration of care.[19] Also, the longer the duration of an ulcer, the worse QoL, regarding the domains of physical health, side effects, treatment, and financial burden.[19] Since Wagner's staging is a clinical variable having strong association with QoL, this underlines the necessity for routine detection and monitoring of DFU patients in order to prevent continuing deterioration of their QoL.[19]

When compared to patients with no ulcer, the DFU ones have poor QoL[19,20] especially in domains of pain, general health perceptions, mental health, and vitality.[20] Ribu et al.[21] demonstrated poorer QoL in 127 DFU outpatients compared to a control group of 221 diabetes mellitus patients in domains of role limitation-physical (32.1 vs. 62.2), physical functioning (57.5 vs. 77.3), and role limitation-emotional (57.4 vs. 72.0).

In terms of age, the finding that participants below 50 years reported better QoL in physical and emotional role is almost in line with Al-Maskari et al.[22], who showed better QoL below the age of 40. However, Trief et al.[23] showed that patients ≥65 years with diabetes mellitus report less disease-related emotional distress, and better ability to cope with their health condition when compared to those 30 to 64 years of age. Possibly, older adults have the tendency to regulate their emotions more effectively and lead their lives towards minimizing negative emotions.[23] These findings suggest that individuals of advanced age may confront more efficiently with DFU and QoL related issues. Remarkably, the prevalence of foot complications is increasing with age and diabetes duration predominantly among male patients.[24] Therefore, age is a crucial demographic factor when evaluating QoL.

Results also revealed better QoL among participants of higher education in emotional well-being (vitality), while patients of primary education experienced more pain. Al-Maskari et al.[22], who explored 200 outpatients with type 2 diabetes illustrated better QoL in those having ≥6 years of education. According to Pedras et al.[25], the level of education may either hinder or promote understanding of the provided information by health professionals. Patients of low education level may not follow the required and regular follow-up of an already established DFU or may be unable to identify ulceration at earlier stages. Patients of high educational level can easily read and understand the effects of diabetes mellitus, which leads to better prevention of complications.[26]

Married participants had better QoL in emotional role, vitality, social functioning, and general health. Possibly, support provided in marital bonds prompts patients to develop adaptive mechanisms or to handle the disease more effectively, thus having better QoL. The family was shown to be the main source of support in a cross-sectional study

of 140 DFU outpatients.[27] Close and mutual relationships, strong family ties, and supportive attitudes have a positive influence on physical and psychological well-being of patients, which is reflected in better QoL.[22]

Compared to married participants, the single ones had 8 and 20.1 points worse QoL in energy/fatigue and in social functioning, respectively. Aschalew et al.[26] demonstrated that being single or widower had a significant association with lower QoL. Being single and living alone appears to lower the likelihood of engaging in positive health practices as well as the willingness and motivation to comply with treatment. Moreover, living alone is associated with psychological problems and frequent use of health care services. Therefore, healthcare providers should monitor these patients during daily clinical practice or follow-up and take preventive measures or involving relatives to treatment.[28,29]

In terms of occupation, employees had better QoL in physical role, emotional role, energy/fatigue, and emotional well-being. Employment status and DFU seem to have an interactive relationship. On the one hand, DFU management may lead to unemployment, prolonged medical leave, and increased economic costs for patient. On the other hand, unemployment may be threatening to health state. In more detail, unemployment may increase DFU onset mainly through unhealthy behaviours such as smoking, lack of regular exercise, obesity, heavy alcohol drinking or sleeping <6 hours per night.[30,31]

Concerning gender, male patients had better QoL in emotional well-being. AlSadrah et al.[32] illustrated poor QoL in females of advanced Wagner grade. Del Core et al.[33], who explored QoL in 120 DFU male patients matched with 120 female of the same primary diagnosis, age, type, duration of diabetes and insulin use showed that women reported worse physical function, and pain as well as a trending decrease in general health score. Interestingly, women tend to be more active in self-care activities or in preventive care, in searching for information and in trying to adapt to the situation. Men more often seek for help regarding acute problems, discuss more foot-related problems, have a pessimistic view of the future, show a passive attitude, accept provided information, and use more complementary care from the lay sector (wife) or the professional sector (nurse, home care staff, podiatrist).[34]

Last but not least, DFU patients living in a small town or rural areas had worse physical functioning. A possible contributor to the lower QoL is the rural related issues, such as lack of immediate access to specialized medical help or transportation difficulties, especially in winter, limited information and living standards.[35]

DFUs as a chronic condition need multidisciplinary interventions which are promising to meet the complexity of patients' needs. This approach includes several professionals from different sectors, such as nurses, physicians, psychotherapists, and occupational therapists.[36]

## Limitations of the study

This study has some limitations. Convenience sampling is one of the limitations since this method is not representative of all population with DFU grade 3 living in Greece, thus limiting the generalizability of results.

The present sample size was relatively small, although many significant associations were observed.

Moreover, there was no other measurement in future time that would allow evaluation of possible changes in QoL. It would be interesting to compare QoL and association with demographic characteristics among different stages of Wagner classification.

# CONCLUSIONS

Results of the present study showed the following:

Age was associated with physical and emotional role and energy/fatigue.

Gender was associated with emotional well-being.

Marital status was associated with emotional role, energy/fatigue, social functionality, and general health.

Occupation was associated with physical and emotional role, energy/fatigue, and emotional well-being.

Level of education was associated with emotional well-being and pain.

Place of residence was associated with physical functioning and general health.

Evaluation of association between patients' demographic profiles and QoL is essential to provide a context for improvement in ulceration management. Also, this measurement may enable clinicians to provide specialized education tailored to the patients' needs. Thereinafter, better QoL means a significant decrease in the economic burden of DFU for both patient and the health care system.

## Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

## Conflict of Interest

The author declares no conflict of interest.

## Ethical approval

The study was approved by the Medical Research Ethics Committee of the hospital.

## Informed consent

Written informed consent was obtained from all individual participants included in the study.

## Research involving human participants

All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## REFERENCES


1. Yazdanpanah L, Nasiri M, Adarvishi S. Literature review on the management of diabetic foot ulcer. World J Diabetes 2015; 6(1):37–53.
2. Papatheodorou K, Papanas N, Banach M, et al. Complications of diabetes 2016. J Diabetes Res 2016; 2016:6989453.
3. Thapa S, Pyakurel P, Baral DD, et al. Health-related quality of life among people living with type 2 diabetes: a community based cross-sectional study in rural Nepal. BMC Public Health 2019; 19(1):1171.
4. Hicks CW, Selvarajah S, Mathioudakis N, et al. Burden of infected diabetic foot ulcers on hospital admissions and costs. Ann Vasc Surg 2016; 33:149–58.
5. Kontodimopoulos N, Veniou A, Tentolouris N, et al. Validity and reliability of the Greek version of the Diabetic Foot Ulcer Scale – Short Form (DFS-SF). Hormones (Athens) 2016; 15(3):394–403.
6. Goodridge D, Trempan E, Embil JM. Health-related quality of life in diabetic patients with foot ulcers: literature review. J Wound Ostomy Continence Nurs 2005; 32(6):368–77.
7. Alrub AA, Hyassat D, Khader YS, et al. Factors associated with health-related quality of life among Jordanian patients with diabetic foot ulcer. J Diabetes Res 2019; 2019:4706720.
8. Sothornwit J, Srisawasdi G, Suwannakin A, et al. Decreased health-related quality of life in patients with diabetic foot problems. Diabetes Metab Syndr Obes 2018; 11:35–43.
9. Polikandrioti M, Vasilopoulos G, Koutelekos I, et al. Quality of life in diabetic foot ulcer: associated factors and the impact of anxiety/depression and adherence to self-care. Int J Low Extrem Wounds 2020; 19(2):165–79.
10. Hand C. Measuring health-related quality of life in adults with chronic conditions in primary care settings: critical review of concepts and 3 tools. Can Fam Physician 2016; 62(7):e375–83.
11. Addington-Hall J, Kalra L. Who should measure quality of life? BMJ 2001; 322(7299):1417–20.
12. Smith RG. Validation of Wagner's classification. A literature review. Ostomy Wound Management 2003; 49:54–62.
13. Ugwu E, Adeleye O, Gezawa I, et al. Predictors of lower extremity amputation in patients with diabetic foot ulcer: findings from MEDFUN, a multi-center observational study. J Foot Ankle Res 2019; 12:34.
14. Wang DD, Jamjoom RA, Alzahrani AH, et al. Prevalence and correlates of lower-extremity amputation in patients with diabetic foot ulcer in Jeddah, Saudi Arabia. Int J Low Extrem Wounds 2016; 15(1):26–33.
15. Sun JH, Tsai JS, Huang CH, et al. Risk factors for lower extremity amputation in diabetic foot disease categorized by Wagner classification. Diabetes Res Clin Pract 2012; 95(3):358–63.
16. Tabur S, Eren MA, Çelik Y, et al. The major predictors of amputation and length of stay in diabetic patients with acute foot ulceration. Wien Klin Wochenschr 2015; 127:45–50.
17. Ware JE. SF-36 Health Survey update. Spine 2000; 25(24):3130–9.
18. Khunkaew S, Fernandez R, Sim J. Health-related quality of life among adults living with diabetic foot ulcers: a meta-analysis. Qual Life Res 2019; 28(6):1413–27.
19. Valensi P, Girod I, Baron F, et al. Quality of life and clinical correlates in patients with diabetic foot ulcers. Diabetes Metab 2005; 31(3 Pt 1):263–71.
20. Yekta Z, Pourali R, Ghasemi-Rad M. Comparison of demographic and clinical characteristics influencing health-related quality of life in patients with diabetic foot ulcers and those without foot ulcers. Diabetes Metab Syndr Obes 2011; 4:393–9.
21. Ribu L, Hanestad BR, Moum T, et al. A comparison of the health-related quality of life in patients with diabetic foot ulcers, with a diabetes group and a non diabetes group from the general population. Qual Life Res 2007; 16(2):179–89.
22. Al-Maskari MY, Al-Shookri AO, Al-Adawi SH, et al. Assessment of quality of life in patients with type 2 diabetes mellitus in Oman. Saudi Med J 2011; 32(12):1285–90.
23. Trief PM, Wade MJ, Pine D, et al. A comparison of health-related quality of life of elderly and younger insulin-treated adults with diabetes. Age Ageing 2003; 32(6):613–18.
24. Al-Rubeaan K, Al Derwish M, Ouizi S, et al. Diabetic foot complications and their risk factors from a large retrospective cohort study. PLoS One 2015; 10(5):e0124446.
25. Pedras S, Carvalho R, Pereira MD. Sociodemographic and clinical characteristics of patients with diabetic foot ulcer. Rev Assoc Med Bras (1992) 2016; 62(2):171–8.
26. Aschalew AY, Yitayal M, Minyihun A. Health-related quality of life and associated factors among patients with diabetes mellitus at the University of Gondar referral hospital. Health Qual Life Outcomes 2020; 18(1):62.
27. Laopoulou F, Kelesi M, Fasoi G, et al. Perceived social support in individuals with diabetic foot ulcers: a cross-sectional survey. J Wound Ostomy Continence Nurs 2020; 47(1):65–71.
28. Theeke LA, Mallow J. Loneliness and quality of life in chronically ill rural older adults. Am J Nurs 2013; 113(9):28–37.
29. Kusaslan Avci D. Evaluation of the relationship between loneliness and medication adherence in patients with diabetes mellitus: A cross-sectional study. J Int Med Res 2018; 46(8):3149–61.
30. Alvaro-Afonso FJ, Lazaro-Martinez JL, Papanas N. To smoke or not to smoke: cigarettes have a negative effect on wound healing of diabetic foot ulcers. Int J Low Extrem Wounds 2018; 17(4):258–60.
31. Kang YJ, Kang MY. Chronic diseases, health behaviors, and demographic characteristics as predictors of ill health retirement: findings from the Korea health panel survey (2008-2012). PLoS One 2016; 11(12):e0166921.
32. AlSadrah SA. Impaired quality of life and diabetic foot disease in Saudi patients with type 2 diabetes: A cross-sectional analysis. SAGE Open Med 2019; 7:2050312119832092.
33. Del Core MA, Ahn J, Wukich DK, et al. Gender differences on SF-36 patient-reported outcomes of diabetic foot disease. Int J Low Extrem

Wounds 2018; 17(2):87–93.
34. Hjelm K, Nyberg P, Apelqvist J. Gender influences beliefs about health and illness in diabetic subjects with severe foot lesions. J Adv Nurs 2002; 40(6):673–84.
35. Legaki F, Babatsikou F, Koutis C, et al. State and trait anxiety in islander cardiac patients: associated factors and the impact of perceived social support. Archives of Medical Science – Atherosclerotic Diseases 2020; 5(1):85–97.
36. Nazarov S, Manuwald U, Leonardi M, et al. Chronic diseases and employment: which interventions support the maintenance of work and return to work among workers with chronic illnesses? A systematic review. Int J Environ Res Public Health 2019; 16(10):1864.

# Качество жизни при диабетической язве стопы 3 степени: сопутствующие демографические факторы

Мария Поликандриоти[1]

[1] *Университет Западной Аттики, Афины, Греция*

**Адрес для корреспонденции:** Мария Поликандриоти, Университет Западной Аттики, Афины, Греция; Email: mpolik2006@yahoo.com

**Дата получения:** 23 февраля 2021 ♦ **Дата приемки:** 11 марта 2021 ♦ **Дата публикации:** 30 апреля 2022

**Образец цитирования:** Polikandrioti M. Quality of life in diabetic foot ulcer, grade 3: associated demographic factors. Folia Med (Plovdiv) 2022;64(2):229-239. doi: 10.3897/folmed.64.e64876.

## Резюме

**Введение:** Пациенты с диабетической язвой стопы 3 степени испытывают некоторые ограничения, которые отрицательно сказываются на качестве их жизни (КЖ).

**Цель:** Целью исследования было изучение демографических характеристик, связанных с качеством жизни больных диабетической язвой стопы 3 степени.

**Материалы и методы:** В настоящее исследование было включено 120 пациентов с диабетической язвой стопы. Данные, собраны по завершении обследования состояния здоровья SF-36 (SF-36).

**Результаты:** Из 120 участников 65.8% были мужчинами, а 73% были старше 60 лет. Пациенты демонстрировали умеренный или высокий уровень качества жизни в социальных функциях, энергии/усталости, эмоциональном благополучии и физической боли (медианы: 50, 60, 72 и 67.5 соответственно) и низкие уровни физического функционирования, физического ограничения и эмоционального состояния (медианы: 22, 0 и 0 соответственно). Кроме того, пациенты имели средний уровень качества жизни в целом (медиана: 48.5). Было замечено, что физическое функционирование было значимо связано с местом жительства ($p$=0.005). При этом физическая роль достоверно связана с возрастом ($p$=0.020) и родом занятий ($p$=0.018), а эмоциональная роль – с возрастом ($p$=0.012), семейным положением ($p$=0.016) и профессией ($p$=0.012). Энергия/усталость была значимо связана с возрастом ($p$=0.026), семейным положением ($p$=0.018) и родом занятий ($p$=0.009). Эмоциональное благополучие было значимо связано с полом ($p$=0.009), уровнем образования ($p$=0.001) и родом занятий ($p$=0.007). Социальная функциональность была значимо связана с семейным положением ($p$=0.001), а боль – с уровнем образования ($p$=0.010). Общее состояние здоровья достоверно связано с семейным положением ($p$=0.037) и местом жительства ($p$=0.024).

**Заключение:** Результаты настоящего исследования могут адекватно информировать заинтересованные стороны в области диабетической язвы стопы 3 степени при планировании эффективного лечения.

## Ключевые слова

диабетическая язва, качество жизни, классификация Вагнера