

Acceptance of Illness, Quality of Life and Nutritional Status of Patients After Lower Limb Amputation Due to Diabetes Mellitus

Jan Juzwiszyn

Uniwersytet Medyczny im Piastów Śląskich we Wrocławiu: Uniwersytet Medyczny im Piastow Slaskich we Wrocławiu

Adrianna Łabuń

Uniwersytet Medyczny im Piastów Śląskich we Wrocławiu: Uniwersytet Medyczny im Piastow Slaskich we Wrocławiu

Wojciech Tański

Wojskowy Szpital Kliniczny z Poliklinika SP ZOZ we Wrocławiu

Anna Szymanska-Chabowska

Uniwersytet Medyczny im Piastów Śląskich we Wrocławiu: Uniwersytet Medyczny im Piastow Slaskich we Wrocławiu

Dorota Zielińska

Wojskowy Szpital Kliniczny z Poliklinika SP ZOZ we Wrocławiu

Mariusz Chabowski (✉ mariusz.chabowski@gmail.com)

Wrocław Medical University <https://orcid.org/0000-0002-9232-4525>

Research article

Keywords: lower limb amputation, acceptance of illness, quality of life, nutritional status, diabetes mellitus

Posted Date: November 12th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-102679/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at Annals of Vascular Surgery on October 1st, 2021. See the published version at <https://doi.org/10.1016/j.avsg.2021.07.023>.

Abstract

Introduction. Diabetes mellitus is one of the most common chronic diseases with a high number of sufferers worldwide. Diabetic neuropathy and diabetic angiopathy lead to serious infectious complications which are very difficult to combat and may finally lead to the amputation of a lower limb.

The aim of the study was to evaluate the quality of life, the level of acceptance of the illness and the nutritional status of patients after lower limb amputation due to diabetes.

Methods. Ninety nine patients (23 men and 76 women) were enrolled into the study. They had all undergone lower limb amputation due to diabetic foot and were treated in the Department of General and Oncological Surgery. The following questionnaires were used: the WHO Quality of Life-BREF (WHOQOL-BREF), the Mini Nutritional Assessment (MNA), the Acceptance of Illness Scale (AIS) and the anonymous specific socio-demographic characteristics questionnaire.

Results: The diabetes-related amputees were revealed to have a higher QoL within the social domain (mean score 64.48), an intermediate QoL – within the environmental domain (mean score 63.04) and the mental domain (mean score 59.61), and a lower QoL – within physical (somatic) domain (mean score 54.69). There was no statistical correlation between genders or between all the domains of QoL ($p>0.05$). The mean MNA score was 22.66, which means that patients were at risk of malnutrition. There were statistical differences between women and men as regards nutritional status ($p=0.034$). The mean AIS score was 27.65 (27.09 women and 29.48 men), which means that the respondents accept their disease. There was no statistical correlation between gender and the acceptance of the disease ($p=0.288$). There was not statistical correlation between age and QoL ($p>0.05$). There were statistical differences between age and nutritional status ($p<0.05$), and between age and acceptance of the illness ($p=0.044$).

Conclusions: The better the quality of life was in all the domains, the better the level of acceptance of illness was. The less malnourished the patient was, the better their quality of life was in all the domains.

Introduction

Diabetes mellitus is one of the most important chronic diseases with a high number of sufferers worldwide and diabetic foot is a chronic complication that usually leads to non-traumatic amputations. The number of people worldwide with diabetes has risen from 108 million in 1980 to 422 million in 2014. The risk of limb amputation in diabetic patients is 15 to 20 times higher than that in non-diabetic individuals, reaching even 15% [1, 2]. Overall mortality after amputation ranges from 13–40% at 1 year, 35–65% at 3 years, and 39–80% at 5 years [3].

There are two types of surgery: minor, i.e. the amputation of toes or the whole foot, and major, i.e. below knee (transtibial) and above knee (transfemoral) amputations. In Poland, the total number of amputations is still very high, and equals 10 amputations per 100,000 inhabitants. In comparison with

other countries there are only 2 amputations per 100,000 in Denmark, and only 1 amputation per 100,000 in the Netherlands [4].

It is believed that lower limb amputees have reduced mobility which affects their ability to perform daily work and to successfully reintegrate into social life [5]. In 1996 Carrington et al explored the psychological aspects of QoL for people with chronic foot ulceration and unilateral amputation [6]. In 2001 Peters et al revealed that any amputation negatively impacted on functional status and that the greater the extent of the limb loss, the greater the impact upon functional status. This supports the need for surgeons to attempt foot salvage procedures before performing a major amputation [7]. In 2019 Palomo-Lopez et al evaluated 62 patients by means of Foot Health Status Questionnaire and pointed out that the patients with type II diabetes present a negative impact on the specific foot health-related QoL compared with type I diabetes patients [8]. In 2017 López-López et al studied the foot health-related beliefs of 282 patients and confirmed the positive social attitude to podiatry, which help the patients to lead a healthy life and avoid dependency [9]. In 2018 López-López et al also used Foot Health Status Questionnaire to evaluate patients with foot problems and revealed that women present a negative impact on QoL as compared with men, which was associated with the presence of foot conditions [10].

There has been little research on the quality of life of diabetic patients after lower extremity amputation in Poland. This question has not been fully elucidated.

The aim of the study was to investigate the relationship between quality of life, the level of acceptance of the illness and nutritional status in diabetics who had undergone lower limb amputation.

Methods

The inclusion criteria: critical limb ischemia due to diabetes mellitus and disqualified from vascular surgery; age > 18 years; patient's consent to participate; understanding of all questionnaire items.

The exclusion criteria: lack of critical limb ischemia due to diabetes mellitus or lack of disqualification from vascular surgery; age < 18 years; lack of consent to participate; cognitive impairment interfering with completion of the questionnaire.

Out of 116 patients who met the inclusion criteria, 17 respondents had not completed the questionnaires correctly, or refused the participation in the study without giving any reason. Ninety nine patients, including 23 men and 76 women, were finally enrolled into the study. They had all undergone diabetes-related lower limb amputation in the Department of General and Oncological Surgery at the University Hospital in Wrocław between September 2017 and January 2019. The main causes of diabetes-related lower limb amputations were: gangrene (61 cases) and neuropathic ulcer (39 cases). There were 58 major amputations (20 above knee and 38 below knee), and 42 minor (digital) amputations.

The following questionnaires were used: the WHO Quality of Life-BREF (WHOQOL-BREF), the Mini-Nutritional Assessment (MNA), the Acceptance of Illness Scale (AIS) and the anonymous specific socio-

demographic characteristics questionnaire. The questionnaires were filled in personally by patients six months after amputation.

The WHO Quality of Life-BREF (WHOQOL-BREF) has been translated into Polish [11]. It consists of four basic domains: physical and mental states, social relationships, and the environment. The tool also contains two final questions: the self-assessment of the patient's quality of life (question 1), and the individual perception of their own state of health (question 2). Scores in each domain range from 4 to 20 points, and the higher the score, the better the QoL [12].

The Mini-Nutritional Assessment (MNA) questionnaire was validated in 1994 by Guigoz [13]. An MNA score from 24 to 30 identifies patients with a good nutritional status, and results from 17 to 23.5 – point to patients at risk of malnutrition. If the MNA score is less than 17, the patient has protein-calorie malnutrition [14].

The Acceptance of Illness Scale (AIS), adapted for Polish respondents by Juczynski, consists of 8 statements focusing on the patient's attitude towards his/her health. There are three groups: low acceptance (8–19 points), moderate acceptance (19–29 points), and good acceptance (30–40 points) [15, 16].

Bioethics section

The protocol of the study was approved by the Local Bioethics Committee of the Wrocław Medical University (approval No KB – 195/2017), and written informed consent was obtained from all the participants. The study was conducted in accordance with the Revised Declaration of Helsinki.

Statistical analysis section

Calculations were made using the IBM SPSS® (Statistical Package for Social Sciences) software. We used contingency tables (crosstabs) and chi-squared tests to find the associations between nominal variables or between nominal and ordinal (categorical) variables. In case of the quantitative variables, descriptive statistics groups were applied and the results divided into groups. The statistical differences between groups were determined using the non-parametric Mann–Whitney test for comparing two groups and the Kruskal–Wallis test for comparing three or more groups. The Spearman's correlation coefficients were calculated. The significance threshold of p-value less than 0.05 was used.

Results

The clinical and demographic data was retrospectively analysed and presented in Table 1. It should be pointed out that women were approximately 10 years older than men, and that women had lower BMI than men.

Table 1
The socio-clinical data of the study group

Variable	Study group (n = 99)	Women (n = 76)	Men (n = 23)
Age	72.1 (range 55–90)	74.4 (range 60–90)	64.3 (range 55–77)
Marital status			
single	4 (4%)	2 (2.6%)	2 (8.7%)
married	62 (62.6%)	45 (59.2%)	17 (73.9%)
divorced	17 (17.2%)	16 (21.1%)	1 (4.3%)
widowed	16 (16.2%)	13 (17.1%)	3 (13.1%)
Place of living			
city	83 (83.8%)	62 (81.6%)	21 (91.3%)
country	16 (16.2%)	14 (18.4%)	2 (8.7%)
Education			
higher	38 (38.4%)	30 (39.5%)	8 (34.8%)
secondary	48 (48.5%)	37 (48.7%)	11 (47.8%)
vocational	13 (13.1%)	9 (11.8%)	4 (17.4%)
Diabetes mellitus			
Type I	26 (26.2%)	19 (25%)	7 (30.4%)
Type II	73 (73.7%)	57 (75%)	16 (69.6%)
Treatment			
insulin only	73 (73.7%)	57 (75%)	26 (69.6%)
oral antidiabetics	22 (22.2%)	16 (21.2%)	6 (26.1%)
both medications	4 (4.1%)	3 (3.9%)	1 (4.3%)
Smoking			
smokers	21 (21.2%)	18 (23.7%)	3 (13%)
non-smokers	78 (78.8%)	58 (76.3%)	20 (87%)
BMI [kg/m ²]	26.68 (17.58–56.89)	26.16	28.43

The association between gender and QoL, MNA, AIS

The study group responses showed: a higher QoL in the social domain, an intermediate QoL in the environmental domain and the mental domain, and a lower QoL in the physical (somatic) domain. The women's responses revealed a lower QoL than the men's in the somatic, mental and environmental domains, and a higher QoL in the social domain. However, there was no statistical correlation between gender and all the domains of QoL ($p > 0.05$).

The study group patients were at risk of malnutrition. 38.4% of the patients (34.2% women and 52.2% men) had scores indicating a normal nutritional status. 56.6% of the respondents (59.2% women and 47.8% men) were at risk of malnutrition, and 5.1% of the respondents (6.6% women and 0% men) were suffering from malnutrition. The women had a worse nutritional status than the men. There were statistical differences between both women and men as regards nutritional status ($p = 0.034$).

The respondents moderately accepted their disease. The men, in comparison to the women, accepted the disease to a greater degree. However, there was no statistical correlations between gender and acceptance of the disease ($p = 0.288$) (Table 2).

Table 2

The association between gender and nutritional status, acceptance of illness and the domains of the quality of life.

	Nutritional status (MNA)	Acceptance of illness (AIS)	QoL somatic domain	QoL - mental domain	QoL social domain	QoL environmental domain
women	22.31 ± 3.01	27.09 ± 8.6	52.78 ± 19.1	58.86 ± 15.2	64.75 ± 22.9	62.11 ± 16.3
men	23.83 ± 2.4	29.48 ± 7.1	61 ± 16.8	62.09 ± 11.6	63.61 ± 21.6	66.13 ± 10.7
mean	22.66 ± 3.0	27.65 ± 8.3	54.69 ± 18.8	59.61 ± 14.4	64.48 ± 22.5	63.04 ± 15.2
U Mann-Whitney	618,000	746,000	664,000	784,500	855,000	760,500
W Wilcoxon	3544,000	3672,000	3590,000	3710,500	1131,000	3686,500
Z	-2,126	-1,062	-1,743	-0,746	-0,159	-0,943
p	0.034	0.288	0.081	0.456	0.874	0.346

The association between age and QoL, MNA, AIS

There was no statistical correlation between age and QoL ($p > 0.05$), in the somatic domain ($p = 0.182$); in the mental domain ($p = 0.101$); in the social domain ($p = 0.420$); in the environmental domain ($p = 0.549$).

There were statistical differences between age and nutritional status ($p < 0.05$). Spearman's correlation coefficient (ρ) was negative, which means that the older the patient was, the more malnourished he/she

was.

There was a statistical correlation between age and acceptance of illness ($p = 0.044$). Spearman's correlation coefficient (ρ) was negative. The older the patient was, the less he/she accepted the disease (Table 3).

Table 3
The association between age and nutritional status, acceptance of illness and the domains of the quality of life.

Spearman's correlation (ρ)	Age	
Acceptance of illness (AIS)	ρ	-0.202
	p	0.044
Nutritional status (MNA)	ρ	-0.248
	p	0.013
QoL somatic domain	ρ	-0.135
	p	0.182
QoL mental domain	ρ	-0.166
	p	0.101
QoL social domain	ρ	0.082
	p	0.420
QoL environmental domain	ρ	-0.061
	p	0.549

The association between place of living and QoL, MNA, AIS

P value is greater than 0.05, i.e.: somatic QoL ($p = 0.901$), mental QoL ($p = 0.400$), social QoL ($p = 0.526$), environmental QoL ($p = 0.386$), AIS ($p = 0.981$) and MNA ($p = 0.815$), so the "place of living" is not statistically significant variable. It means that the "place of living" does not influence QoL, AIS or MNA.

The association between education and QoL, MNA, AIS

P value is greater than 0.05, i.e.: somatic QoL ($p = 0.441$), mental QoL ($p = 0.289$), social QoL ($p = 0.827$), environmental QoL ($p = 0.445$), AIS ($p = 0.387$) and MNA ($p = 0.948$), so the "education" is not significant variable. It means that the "education" does not influence QoL, AIS and MNA.

The association between marital status and QoL, MNA, AIS

P value is greater than 0.05, i.e.: somatic QoL ($p = 0.561$), mental QoL ($p = 0.527$), social QoL ($p = 0.910$), environmental QoL ($p = 0.644$), AIS ($p = 0.881$) and MNA ($p = 0.578$), so the "marital status" is not

significant variable. It means that the “marital status” does not influence QoL, AIS and MNA.

The association between AIS and QoL.

There were statistical differences between all the domains of quality of life and the acceptance of the disease ($p < 0.05$), in the somatic domain ($p = 0.000$); in the mental domain ($p = 0.000$); in the social domain ($p = 0.002$); in the environmental domain ($p = 0.002$). Spearman’s correlation coefficient (ρ) was positive, which means that the better quality of life in all the domains was, the better the acceptance of the illness was (Table 4).

Table 4
The association between quality of life and acceptance of illness.

Spearman’s correlation (ρ)	QoL somatic domain		QoL mental domain		QoL social domain		QoL environmental domain	
	ρ	p	ρ	p	ρ	p	ρ	p
Acceptance of illness (AIS)	0.555	0.000	0.466	0.000	0.305	0.002	0.314	0.002

The association between MNA and QoL

There were statistical differences between the nutritional status and all the domains of quality of life ($p < 0.05$), in the somatic domain ($p = 0.000$); in the mental domain ($p = 0.000$); in the social domain ($p = 0.006$); in the environmental domain ($p = 0.000$). Spearman’s correlation coefficient (ρ) was positive, which means that the less malnourished the patient was, the better the quality of life in all the domains was (Table 5).

Table 5
The association between the nutritional status and the quality of life.

Spearman’s correlation (ρ)	QoL somatic domain		QoL mental domain		QoL social domain		QoL environmental domain	
	ρ	p	ρ	p	ρ	p	ρ	p
Nutritional status (MNA)	0.495	0.000	0.380	0.000	0.272	0.006	0.385	0.000

The association between MNA and AIS

There was no statistical correlation between the nutritional status and the acceptance of the disease ($p = 0.062$) (Table 6).

Table 6
The association between the nutritional status and the acceptance of illness.

Spearman's correlation (rho)	Nutritional status (MNA)	
Acceptance of illness (AIS)	rho	0.188
	p	0.062

Discussion

This paper discusses the quality of life, the level of acceptance of the illness, and the nutritional status of patients after amputation due to diabetic foot. In 2016 Gau et al assessed the nutritional status of the patients after amputation due to diabetic foot and concluded that the mean MNA score was 20.6 ± 3.4 , which corresponded to the group of patients "at risk of malnutrition" [17]. Their results were similar to ours, which was 22.66 ± 3.0 , and also meant being - at risk of malnutrition. According to Gau et al's research, age was an independent factor influencing nutritional status ($p = 0.015$). In the current study age also proved to be significantly associated with nutritional status ($p = 0.013$). The older the patient was, the more malnourished they were.

Cwajda-Białasik et al revealed that patients with lower limb ulcerations of a mainly vascular (venous, arterial or mixed – arteriovenous) etiology, including diabetic foot, moderately accepted their disease (the mean AIS score was 23.5 ± 8.15) [18]. Yet in comparison the mean AIS score was 27.65 ± 8.3 in our study. What is more, Cwajda-Białasik et al showed that men (score 29.48 ± 7.11) accepted the disease better than women (score 27.09 ± 8.59), which is in line with the results of the current study. Cwajda-Białasik et al also showed that other socio-demographic factors, such as: age, place of living, marital status or education, did not significantly influence the acceptance of the illness. However, in the current study it was proved that there was a statistical correlation between age and acceptance of illness.

In our paper p-value of the association between gender and somatic domain of QoL was 0.081, so it had a tendency to statistical significance. We believe it could reach statistical significance with a larger sample.

Many researchers have shown that the quality of life of diabetic amputees in the physical domain is worse than QoL in the social domain. Using the SF-36 questionnaire Aprile et al showed that QoL in the physical domain (mean value was 39.5) was worse in comparison with QoL in the social domain (mean value was 52.5) [19]. In the current study QoL (in the social domain) was 64.48 compared to 54.69 for QoL (in the physical domain). Using the SF-36 questionnaire, Boutoille et al revealed that QoL in the physical domain (mean score was 55) was worse than QoL in the mental domain (mean score was 61) [20]. The respondents reported the highest QoL in the environmental domain (score 69). Similarly, in the present study the QoL in the physical domain (mean value 54.69) was worse than QoL in the mental domain (mean value 59.61) or QoL in the environmental domain (mean value 63.04).

Ribu et al found that the QoL in the mental domain was significantly worse in women than in men ($p < 0.05$) [21]. In the current study, the mean score of QoL in the mental domain for women (mean score 58.86) was worse than that for men (mean score 62.09). However, there was not statistical correlation between gender and all the domains of QoL ($p > 0.05$). On the contrary, Cox et al found that females were more likely to cope and function better with the disability than males [22]. De Godoy et al. compared the QoL between amputees and control normal subjects and have found that the amputees were worse in six out of the eight domains, suggesting an unsatisfactory QoL of these patients [23]. This study confirms how much the mutilation affects the QoL of these patients. Patel et al demonstrated that minor amputation did not impact the physical or mental QoL [24]. The authors concluded that QoL is comparable with a normalized population if limb salvage is successful and QoL is decreased significantly when failure to walk occurs. Quigley et al indicated that amputation, regardless of level, appeared to have little impact upon QoL, and QoL was negatively affected by the long-term complications associated with diabetes [25].

In 2012 Kurpas et al examined the level of acceptance of illness in a group of diabetic patients, including diabetic amputees, and revealed a mean AIS score of 29 [26]. In the current study, the mean AIS score was 27.65 ± 8.3 . What is more, Kurpas et al proved the correlation between the acceptance of illness and quality of life. Similarly to our study, the better the acceptance of illness was, the better the quality of life was in all the domains.

In our paper p-value of the association between the nutritional status and the acceptance of the disease was 0.062, so it had a tendency to statistical significance. We believe it could reach statistical significance with a larger sample.

In the literature there are no papers focusing of the connection between acceptance of illness and nutritional status nor the connection between nutritional status and quality of life in diabetic amputees. Therefore, there is still a need to conduct the further studies. Diabetes and its complications, such as diabetic foot and the threatened consequent amputation, constitute a real challenge which lowers the quality of life of patients.

STUDY LIMITATIONS. The study group was not numerous. The study was a single-center analysis that did not reflect the general Polish population. The impact of some variables (e.g. muscle strength, daily activity, NYHA grades, or co-morbidities) on QoL, AIS and MNA was not evaluated. Future randomized and large studies should focus on quality of life after lower limb amputations.

Conclusions

The better the quality of life was in all the domains, the better the acceptance of illness was. The less malnourished the patient was, the better quality of life in all the domains was.

Abbreviations

WHOQOL–BREF - WHO Quality of Life-BREF,

MNA - Mini Nutritional Assessment,

AIS - Acceptance of Illness Scale,

SPSS - Statistical Package for Social Sciences,

BMI - body mass index

NYHA - *New York Heart Association*

Declarations

1. Ethics approval and consent to participate.

The study was approved by the Local Bioethical Commission at Wroclaw Medical University (No KB - 195/2017).

2. Consent for publication.

All the patients gave written formal consent to participate.

3. Competing interests.

The authors declare that they have no competing interests.

4. Funding.

The authors received no financial support for this research and the authorship of this article.

5. Author contributions.

All the authors contributed equally to this work.

6. Acknowledgements.

Not applicable.

7. Availability of data and materials.

The datasets analyzed during the current study are included in this published article.

References

1. Akha O, Kashi Z, Makhloogh A. Correlation between amputation of diabetic foot and nephropathy IJKD. 2010;4:27–31.
2. Beyaz S, Guler UO, Bagir GS. Factors affecting lifespan following below-knee amputation in diabetic patients. *Acta Orthop Traumatol Turc.* 2017;51(5):393–7.
3. Singh N, Armstrong DG, Lipsky BA. Preventing foot ulcers in patients with diabetes. *JAMA.* 2005;293:217–28.
4. Czeleko T, Sliwczynski A, Nawrot I, Karnafel W. The incidence of major, nontraumatic lower amputations in patients without diabetes mellitus in Poland during 2009–2012, based on Polish National Health Fund data. *Acta Angiol.* 2014;20(3):124–31.
5. Levy N, Gillibrand W, Kola-Palmer S. Minor amputation and QoL: is it time to give the patient a voice? *The Diabetic Foot Journal.* 2017;20(4):228–34.
6. Carrington AL, Mawdsley SK, Morley M, Kincey J, Boulton AJ. Psychological status of diabetic people with or without lower limb disability. *Diabetes Res Clin Pract.* 1996;32(1–2):19–25.
7. Peters EJ, Childs MR, Wunderlich RP, Harkless LB, Armstrong DG, Lavery LA. Functional status of persons with diabetes-related lower-extremity amputations. *Diabetes Care.* 2001;24(10):1799–804.
8. Palomo-López P, Losa-Iglesias ME, Becerro-de-Bengoa-Vallejo R, López-López D, Rodríguez-Sanz D, Romero-Morales C, Calvo-Lobo C. Specific foot health-related quality of life impairment in patients with type II versus type I diabetes. *Int Wound J.* 2019;16(1):47–51.
9. López-López D, García-Mira R, Palomo-López P, Sánchez-Gómez R, Ramos-Galván J, Tovaruela-Carrión N, et al. Attitude and knowledge about foot health: a Spanish view. *Rev Latino-Am Enfermagem.* 2017;25:e2855.
10. López-López D, Becerro-de-Bengoa-Vallejo R, Losa-Iglesias ME, Palomo-López P, Rodríguez-Sanz D, Brandariz-Pereira JM, Calvo-Lobo C. Evaluation of foot health related quality of life in individuals with foot problems by gender: a cross-sectional comparative analysis study. *BMJ Open.* 2018;8:e023980.
11. Cieślík A. Quality of life in medical science. *Medical Studies.* 2010;19:49–53.
12. Uchmanowicz I. Health-related quality of life (HRQOL) of diabetic patients – measurements methods. *Nursing Topics.* 2013;21(2):266–70.
13. Guigoz Y, Vellas B, Garry PJ. Assessing the nutritional status of the elderly: The Mini Nutritional Assessment as part of the geriatric evaluation. *Nutr Rev* 1996;54(1 Pt 2):S59-S65.
14. Vellas B, Villars H, Abellan G, Soto ME, Rolland Y, Guigoz Y, Morley JE, Chumlea W, Rubenstein RZ, Garry P. Overview of the MNA—Its history and challenges. *J Nutr Health Aging.* 2006;10(6):456–63.
15. Juczyński Z. [Measurement tools in the promotion and psychoobcology of health]. Warsaw: Pracownia Testów Psychologicznych; 2009. [In Polish].
16. Mazurek J, Lurbiecki J. Acceptance of illness scale and its clinical impact. *Pol Merk Lek.* 2014;36(212):106–8.

17. Gau BR, Chen HY, Hung SY, Yang HM, Yeh JT, Huang CH, Sun JH, Huang YY. The impact of nutritional status on treatment outcomes of patients with limb-threatening diabetic foot ulcers. *J Diabetes Complications*. 2016;30(1):138–40.
18. Cwajda-Białasiak J, Szewczyk MT, Mościcka P, Jawień A, Ślusarz R. Influence of ulceration etiology on the global quality of life and its specific dimensions, including the control of pain, in patients with lower limb vascular insufficiency. *Adv Dermatol Allergol*. 2017;34(5):471–7.
19. Aprile I, Galli M, Pitocco D, Di Sipio E, Simbolotti C, Germanotta M, Bordieri C, Padua L, Ferrarin M. Does First Ray Amputation in Diabetic Patients Influence Gait and Quality of Life? *J Foot Ankle Surg*. 2018;57(1):44–51.
20. Boutoille D, Féraille A, Maulaz D, Krempf M. Quality of life with diabetes-associated foot complications: comparison between lower-limb amputation and chronic foot ulceration. *Foot Ankle Int*. 2008;29(11):1074–8.
21. Ribu L, Hanestad BR, Moum T, Birkeland K, Rustoen T. Health-related quality of life among patients with diabetes and foot ulcers: association with demographic and clinical characteristics. *J Diabetes Complications*. 2007;21(4):227–36.
22. Cox PS, Williams SK, Weaver SR. Life after lower extremity amputation in diabetics. *West Indian Med J*. 2011;60(5):536–40.
23. De Godoy JMP, Braile DM, Buzatto SHG, Longo O, Fontes OA. Quality of life after amputation. *Psychology Health Medicine*. 2002;7(4):397–400.
24. Patel KM, Economides JM, Franklin B, Sosin M, Attinger C, Ducuc I. Correlating patient-reported outcomes and ambulation success following microsurgical lower extremity reconstruction in comorbid patients. *Microsurgery*. 2014;34(1):1–4.
25. Quigley M, Dillon MP, Duke EJ. Comparison of quality of life in people with partial foot and transtibial amputation: a pilot study. *Prosthet Orthot Int*. 2016;40(4):467–74.
26. Kurpas D, Czech T, Mroczek B. Illness acceptance in patients with diabetes and its influence on the quality of life and the subjective assessment of health. *Fam Med Prim Care Rev*. 2012;14(3):383–8.