ORIGINAL ARTICLE

Relationships among social support, coping style, self-stigma, and quality of life in patients with diabetic foot ulcer: A multicentre, cross-sectional study

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Abstract

Patients with diabetic foot ulcer have a significantly lower quality of life. Quality of life could be connected to other psychological or social processes. The purpose of this study was to examine the relationships between social support, decision regret, self-stigma, and quality of life in patients with diabetic foot ulcers. The sample of the study consisted of 229 diabetic foot ulcer patients. Data were collected from September 2019 to March 2020. The demographic and clinical information, the Stigma Scale for Chronic Illness, Medical Coping Scale, Social Support Scale, and Quality of Life scale were used to assess the quality life for diabetic foot ulcer. Pearson correlation coefficient and structural equation modelling were used for data analysis. The quality of life was negatively correlated with self-stigma, positively correlated with social support, giving up coping, and not significantly correlated with confrontation coping and avoidance coping. Self-stigma has significant indirect effects on quality of life through social support and coping style. Further clinical intervention strategies for decreasing self-stigma as well as strengthening social support and positive coping styles are needed to inform diabetic foot ulcer patients, thus improving their quality of life.

KEYWORDS
coping style, diabetic foot ulcer, quality of life, self-stigma, social support

Key Messages

- Diabetic foot ulcer is the main cause of the highest rates of morbidity, mortality, hospital admissions and high amputation risk in diabetes mellitus patients, significantly affecting patients' health and socioeconomic status, as well as the quality of life.
- Previous studies have founded that social support, coping style, and self-stigma are the three major variables affecting quality of life. However, few

studies have addressed the associations in social support, coping style, self-stigma and quality of life among diabetic foot ulcer patients.
- The aim of this study was to examine the relationships among social support, decision regret, self-stigma and quality of life in patients with diabetic foot ulcer.
- Further intervention strategies for decreasing the self-stigma, as well as strengthening the social support and positive coping style are needed to inform diabetic foot ulcer patients, thus improving their quality of life.

1 | INTRODUCTION

Diabetes mellitus (DM) is a global public health challenge, which has been rising sharply in prevalence in recent years. The global DM prevalence in 2019 is estimated to be 9.3% (463 million), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. At a country level, China has the highest number of people living with diabetes in 2019, where there are 116 million diabetes patients. In 2030 and 2045, China will remain at the top of the list with 140 and 147 million people with diabetes, respectively.[1] Evidence shows that poorly managed diabetes leads to serious vascular complications.[2]

Among the complications, the most deleterious are foot ulcers. Diabetic foot ulcer is a full-thickness wound that is present at a level distal to the ankle in DM patients. One out of every six patients with diabetes experiences an ulcer during their lifetime in developed countries, and a higher risk in developing nations.[3] Diabetic foot ulcer is the main cause of the highest rates of morbidity, mortality, hospital admissions, and high amputation risk in these patients.[4] These diabetic foot ulcers significantly affect the health and socio-economic status, as well as the quality of life of the patient.[5] In addition, the care of diabetic foot ulcer is a tremendous financial burden on society and their families, consuming up to 20% of health care resources in developed countries and 40% in developing countries.[6]

Quality of life is an important measure to determine the health benefits of treatment and care. Diabetic foot ulcer patients report poor quality of life, which deteriorates if the ulcer recurs or does not heal and is affected by advanced age, weight, educational status, foot self-care practice, and peripheral neuropathy, which is also positively associated with physical exercise and beneficial social support, but negatively associated with comorbidity and self-stigma.[7-9] Although we have recognised DM as a major public health problem in China, data concerning quality of life of diabetic foot ulcer patients are very limited. Therefore, this study aimed to estimate the quality of life and its associated risk factors and the effects of self-stigma, social support, and coping style on quality of life in Chinese diabetic foot ulcer patients.

Quality of life could be connected to other psychological or social processes. Patients with diabetic foot ulcer have a significantly lower quality of life.[10] Likewise, the diabetic foot is associated with a severely impaired quality of life in both physical and mental health aspects.[11] One of the most important is self-stigma.[12-14] Self-stigma is a phenomenon in which the patient accepts negative prejudice and stereotypes about psychiatric disorders, which are based on social preconceptions because of the psychiatric disorder. Patients experience self-stigma after being diagnosed with a diabetic foot ulcer.[15] Previous research showed that the self-stigma of diabetic patients affected their social support seeking, healthy diet, psychological distress, and quality of life seriously.[16,17] The study also found that self-stigma can reduce the level of self-management, social relations, and treatment compliance of diabetic patients.[17] Participatory action may reduce the self-stigma of patients with diabetes.[18]

Coping is an individual's characteristic behaviour for responding to stress, including confrontation coping, giving up coping, and avoidance coping. Studies demonstrated that confrontation coping and accommodation coping benefits quality of life, while avoidance coping will experience more negative outcomes.[19] The quality of life was positively correlated with avoidance coping, and negatively correlated with confrontation coping.[20]

In addition, some studies have revealed that social support can directly influence the quality of life[21] and coping style[22] among DM patients. Therefore, based on the previous studies, we founded that social support, coping style, and self-stigma are the three major variables affecting quality of life. However, to the best of our knowledge, previous published studies investigated the relationship between two variables. Few studies have addressed the associations between social support, coping style, self-stigma, and quality of life among diabetic foot ulcer patients. Such knowledge is crucial for practitioners to develop interventions for improving self-stigma, social support, and coping style, so as to improving quality of life. Hence, the purpose of this study was to investigate the
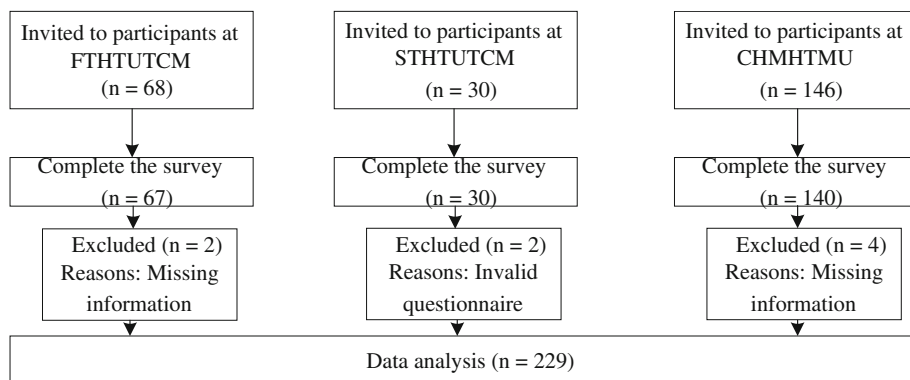
FIGURE 1 Flow chart of the recruitment process. CHMHTMU, Chu Hsien-I Memorial Hospital (Metabolic Diseases Hospital) of Tianjin Medical University; FTHTUTCM, First Teaching Hospital of Tianjin University of Traditional Chinese Medicine; STHTUTCM, Second Teaching Hospital of Tianjin University of Traditional Chinese Medicine

impact of self-stigma on quality of life and further clarify the role of social support and coping style as mediators of effects among Chinese diabetic foot ulcer patients.

2 | MATERIALS AND METHODS

2.1 | Study population

Eligible participants were enrolled from three tertiary hospitals in Tianjin, China. All questionnaires were independently completed by patients between September 2019 and March 2020. Patients were enrolled if the following inclusion criteria were met: (a) diabetic foot ulcer diagnosed by the World Health Organization (WHO) definition of diabetic foot ulcer diagnosis criteria; (b) adults patients (18 years or older) who have independent ability of reading, understanding, and writing; and (c) volunteered to join the study. We excluded patients with serious mental disorders, cognitive impairments, absolutely bedridden, and consciousness disorders from this study. We calculated sample size according to the principle of minimum numbers needed to perform structural equation modelling (SEM). Finally, a total of 244 diabetic foot ulcer patients were recruited and 229 questionnaires were considered to meet the criteria of analysis, with an effective response rate of 93.85%. The process of participants' selection is shown in Figure 1.

2.2 | Data variables

Social-demographic and clinical information were collected, including age, gender, occupation, marital status, the course of diabetic foot ulcer, amputation, and other complications of diabetes, etc.

2.3 | Measuring stigma

The Stigma Scale for Chronic Illness was translated into Chinese version by Deng et al.[23] There are 13 items in the scale, divided into two dimensions: internal stigma (13 items) and

external stigma (11 items). Likert 5 was used for each item. The total score of the scale was 24 to 120 points. The higher the score is, the stronger the sense of stigma is. In this study, The Cronbach's α of the total score was .837.

2.4 | Measuring social support

We used the 10-item social support scale developed by Xiao[24] to measure the level of social support from three aspects, including objective support (three items), subjective support (four items), and utilisation of support (three items). The higher the score of each dimension, the better the social support. The Cronbach's α of the total score was .826 in this study.

2.5 | Measuring medical coping style

We used a 20-item Chinese version of the Medical Coping Modes Questionnaire, which was rated on a four-point Likert scale in this study.[25] The coping style questionnaire was divided into three subscales, including confrontation coping, avoidance coping, and giving up coping. The total score is 20 to 80 points. Finally, the score of each subscale was calculated, and the higher score indicated that individual is more likely to adopt the corresponding coping style. Cronbach's α for each of the three subscales was higher than .65, except for avoidance coping (.60). In the current study, Cronbach's α coefficients were .665, .644, and .791 for confrontation coping, avoidance coping, and giving up coping, respectively.

2.6 | Measuring quality of life

For the assessment of quality of life in diabetic foot ulcer patients, a diabetes quality of life scale designed and compiled by Liao et al[26] was used. It consists of 27 items, which are grouped into four dimensions: physiological

TABLE 1 Social-demographic and clinical characteristics of diabetic foot ulcer patients (n = 229)

Demographic/clinical variables	Groups	n (%)
Age	≤50	24 (10.48%)
	51 ~ 64	70 (30.57%)
	≥65	135 (58.95%)
Gender	Male	133 (58.08%)
	Female	96 (41.92%)
Occupational situation	Employed	25 (10.92%)
	Retire	127 (55.46%)
	Others	77 (33.62%)
Educational	Primary school and below	59 (25.76%)
	Junior high school	95 (41.48%)
	High school	53 (23.15%)
	Undergraduate or above	22 (9.61%)
Marital status	Single	8 (3.49%)
	Married	173 (75.55%)
	Divorced/separated	10 (4.37%)
	Bereavement	38 (16.59%)
Monthly household income per capita	≤1000	23 (10.04%)
	1001-2000	35 (15.29%)
	2001-3000	98 (42.79%)
	≥3001	73 (31.88%)
Main sources of medical expenses	Public expense	5 (2.18%)
	Own expense	7 (3.06%)
	Urban medical insurance	156 (68.12%)
	New rural cooperative medical system	59 (25.77%)
	Commercial insurance	2 (0.87%)
The course of diabetic foot (month)	≤1	76 (33.19%)
	1.01-3	58 (25.33%)
	3.01-12	75 (32.75%)
	≥12.01	20 (8.73%)
Amputation	Yes	28 (12.23%)
	No	201 (87.77%)
Combined nephropathy	Yes	46 (20.09%)
	No	183 (79.91%)
Combined osteomyelitis	Yes	30 (13.10%)
	No	139 (86.90%)
Foot infection	Yes	33 (14.41%)
	No	196 (85.59%)

(Continues)

TABLE 1 (Continued)

Demographic/clinical variables	Groups	n (%)
Diabetic foot ulcer disease involving body side	Left foot	84 (36.68%)
	Right foot	113 (49.35%)
	Biped	32 (13.97%)
The number of ulcer	≤2	133 (58.08%)
	3-4	56 (24.45%)
	≥5	40 (17.47%)

function (12 items), psychology/mental (8 items), social relationships (4 items), and treatment effect (3 items). Each item is graded with a Likert 5. The higher the score, the lower the quality of life. Among them, the total score ≥80 indicates a low level of quality of life; 40-80 indicates a medium level of quality of life; and ≤40 indicates a high level of quality of life. In this study, the Cronbach's α of the quality of life scale was .894.

2.7 | Data collection procedure

Paper questionnaire surveys were used for the data collection. With the help of the head nurse, we obtained relevant medical data to determine the qualified participants. After completing the treatment on that day, a questionnaire was sent to the patients. For patients who are unwell or interrupted during the filling of the questionnaire, we find an appropriate time to dictate and explain the subjects one by one, and truly reflect their answers in the questionnaire according to the subjects' responses. After completing the questionnaire, we checked the integrity of the questionnaire in detail, and made records for missing answers, multiple answers, and suspicious answers timely.

2.8 | Ethical considerations

This study was approved by the Medical Research Ethics Committee and the three participants' hospitals. All participants were voluntarily and anonymously selected, and their informed consent was obtained by signing the consent form. This study was also in accordance with the Declaration of Helsinki (1989) of the World Medical Association.

2.9 | Data analysis

Statistical Package for Social Sciences (Chicago, Illinois) version 23.0 for Mac and Analysis of Moment Structures

TABLE 2 Descriptive statistics of the stigma, social support, coping style, and quality of life

Variables	Mean	SD
Stigma	61.17	12.83
Internal stigma	36.37	7.85
External stigma	25.80	6.59
Social support	36.23	11.01
Objective support	10.72	4.32
Subjective support	18.90	5.80
Utilisation of support	6.61	2.76
Coping scale	—	—
Confrontation coping	17.76	4.32
Avoidance coping	15.24	2.79
Giving up coping	11.72	2.89
Quality of life	72.56	12.72
Physiological function	32.91	6.95
Psychology/mental	22.25	4.39
Social relationship	10.57	2.49
Treatment effect	6.83	1.56

(Chicago, Illinois) were used to analyse the data. Participants' sociodemographic and clinical variables were summarised by descriptive statistics. Continuous variables are presented by median and interquartile range, and categorical variables are presented by frequencies (percentages). The Pearson correlation coefficient was used to test the association between quality of life and social support, coping style, and self-stigma. SEM was performed to estimate the effect of social support, coping style, and self-stigma on the patients' quality of life. The level of statistical significance was set to $\alpha = .05$.

3 | RESULTS

3.1 | Participants' characteristics

Table 1 shows the characteristics of the participants. For all 229 participants, they had a mean age of 63.00 years (SD = 11.36). One hundred thirty-three of them were male (58.08%); 151 of them lived in cities (65.94%); 173 of them were married (75.55%); 127 of them retired (55.64%); approximately 32.75% of the participants had been diagnosed with diabetic foot ulcer for 3 to 12 months; most participants did not receive amputation (87.77%).

Overall, the average confrontation coping, avoidance coping, and giving up coping was 17.76 (SD = 4.32), 15.24 (SD = 2.79), and 11.72 (SD = 2.89). The mean score

of self-stigma, social support, and quality of life was 61.67 (SD = 12.83), 36.23 (SD = 11.01), and 72.56 (SD = 12.72), respectively (Table 2).

3.2 | Relationships among self-stigma, social support, coping style, and quality of life for participants

Table 3 documents the results of correlation analyses of self-stigma, social support, coping style including confrontation coping, avoidance coping, and giving up coping, and quality of life. The results of the Pearson's rank correlation analyses showed that all dimensions of variables showed significant correlations ($r = -.542–.624$) except social support and confrontation coping. Because the quality of life scale has opposite scoring, the self-stigma was negatively correlated with quality of life ($r = .481$), social support ($r = -.340$), and confrontation coping ($r = -.132$). Moreover, There were positive correlations between quality of life and social support ($r = .542$), giving up coping ($r = .564$), and avoidance coping ($r = .278$).

3.3 | The mediating effect of coping style and social support on the relationship between self-stigma and quality of life

SEM with maximum likelihood was used to analyse the path correlations, which are presented in Table 4 and Figure 2. The results showed a better fitness between the construct model and the data ($\chi^2/df = 2.052$, GFI = 0.951, AGFI = 0.906, CFI = 0.968, IFI = 0.969, NFI = 0.941, RMSEA = 0.068). The parameters of the model were statistically significant ($P < .05$).

As illustrated, self-stigma had significant direct effects on social support ($\beta = -.20$, $P < .05$), giving up coping ($\beta = .64$, $P < .05$), and quality of life ($\beta = -.23$, $P = .02$) among diabetic foot ulcer patients. The direct pathways from self-stigma to social support ($\beta = -.20$, $P < .05$), giving up coping ($\beta = -.38$, $P < .05$), and quality of life ($\beta = .41$, $P < .05$) were all statistically significant. Meanwhile, the direct pathway from self-stigma to giving up coping ($\beta = .64$, $P < .05$) and quality of life ($\beta = .30$, $P < .05$) was also statistically significant.

4 | DISCUSSION

This study evaluated the impact of self-stigma on quality of life among Chinese diabetic foot ulcer patients and determined whether social support and coping style

TABLE 3 Correlation of stigma, social support, coping style, and quality of life in diabetic foot ulcer patients (n = 229)

	Quality of life	Stigma	Social support	Giving up coping	Avoidance coping	Confrontation coping
Quality of life	1					
Stigma	−0.481**	1				
Social support	0.542**	−0.340**	1			
Giving up coping	0.564**	0.624**	−0.345**	1		
Avoidance coping	0.278**	0.316**	−0.164*	0.411**	1	
Confrontation coping	0.119	−0.132*	0.117	−0.140*	0.283**	1

*$P < .05$ (both sides). **$P < .01$ (both sides).

TABLE 4 Decomposition of standardised effects from the path model

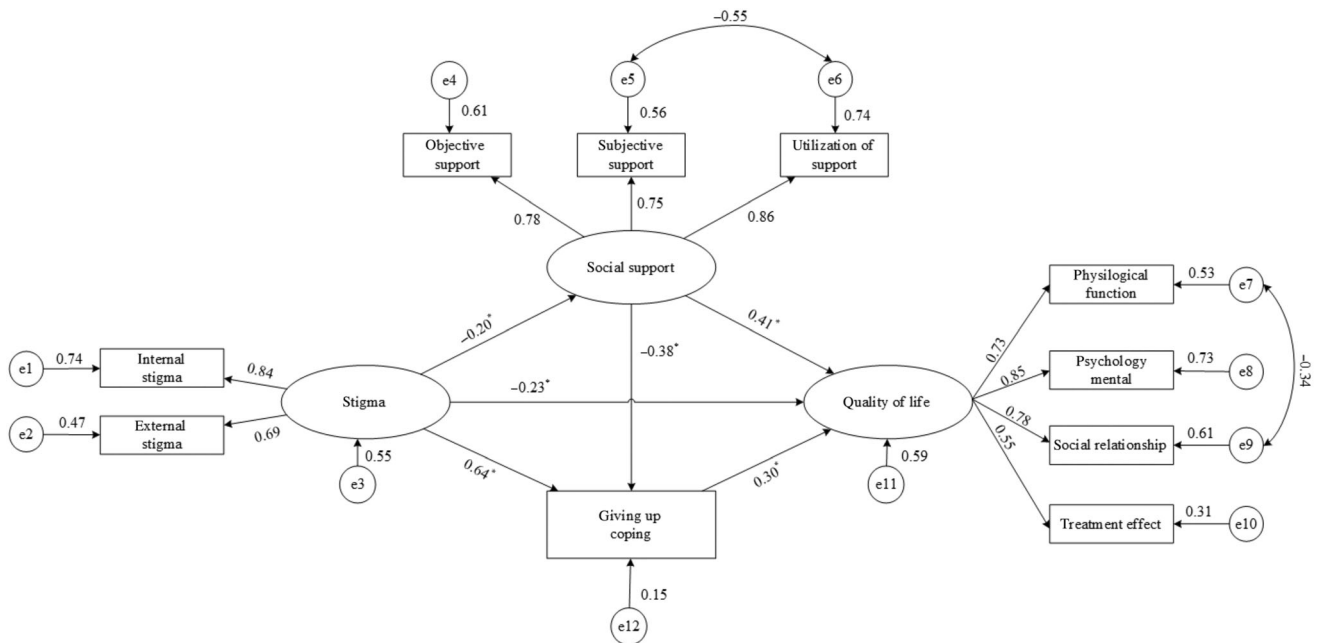|	Self-stigma			Social support		Giving up coping
Variable of effect	Social support	Giving up coping	Quality of life	Giving up coping	Quality of life	Quality of life
Total effect	−0.20	0.64	−0.10	−0.38	0.30	0.30
Direct effects	−0.20	0.64	−0.23	−0.38	0.41	0.30
Indirect effects	0.00	0.00	0.13	0.00	−0.11	0.00

FIGURE 2 The research model with standardised paths coefficients. *$P < .05$

mediate the association between self-stigma and quality of life. In this study, the overall quality of life of diabetes foot ulcer patients is at a medium low level, which is consistent with a previous study.[27] Among the four dimensions, the psychological/spiritual score is the highest, that is, the psychological level is the most serious damage to the quality of life. The reason is that diabetes foot ulcer is

one of the serious and long-term complications of diabetes, which makes the patients lack support and help from their families and friends, resulting in certain negative emotions, such as anxiety and depression. Diabetic foot ulcer patients often believe that they are treated differently from strangers, and then have a sense of shame, which has a great impact on the psychological

dimension. In addition, foot diseases occur repeatedly and cannot be cured. The huge medical expenses brought by treatment also bring heavy psychological pressure on patients. Clinical medical staff should pay attention to the physiological and psychological changes of diabetes foot ulcer patients, take timely interventions to reduce the psychological burden of patients, and help them alleviate the psychological damage so as to improve their quality of life.

Quality of life is negatively correlated with self-stigma, which is in agreement with previous studies.[13,14] It seems that patients who feel more socially excluded because of stigma experience a lower quality of life to a greater extent. Patients with a certain degree of stigma will reduce their seeking for help and their medical behaviour, which will aggravate the symptoms of patients' disease and affect the disease's recovery, thus affecting the quality of life of patients.[28] Li et al[29,30] pointed out that patients with a high sense of stigma cannot correctly understand the public's views on themselves and have inferiority complex in the process of interpersonal communication, resulting in behaviours such as escape or retreat, which has a great impact on the quality of life.

Coping style is an important person's characteristic strategy to maintain or achieve healthy psychological status through improving environmental adaptability when patients experience difficulties.[31] Different coping styles, including confrontation coping, giving up coping, and avoidance coping, have an impact on individual's emotional and mental health status.[32] A positive approach to life may cause a promising effect on quality of life in connection with a positive coping style, whereas emotion-focused coping reduces both psychological and physical quality of life.[33] In this study, there were negative correlations between quality of life and giving up coping and avoidance coping among diabetic foot ulcer patients, and not correlated with confrontation coping, which is consistent with previous studies.[34,35] Medical coping style can affect stress events and patients' physical and mental reactions, disease control, and disease treatment process.[36] Relevant research showed that effective positive coping style can help patients relieve stress, promote disease outcome and quality of life.[37] On the contrary, a negative coping style can aggravate patients' terrible emotions and disease. We studied the relationship between coping style and quality of life, because long-term treatment of diabetic foot ulcer increases patients' pressure, so the patients are more willing to adopt the negative coping style to face life events.

In this study, social support in diabetic foot ulcer patients was positively correlated with quality of life, which is consistent with Hong et al.[38] Social support refers to the various social relations on patients' subjective and objective influence, including material support and spiritual support. Social support can reduce patients' stress response, significantly improve patients' social and psychological conditions, keep patients in good mood, and effectively improve their quality of life.[29,30] In addition, social support is one of the most potential resources in the process of disease treatment, which is conducive to ensuring the compliance of patients, and improving their quality of life of patients. In this study, for diabetic foot ulcer patients, the more social support they obtain from family, friends, and other people, the higher their quality of life of the patients. The higher the utilisation of social support, the better the overall living conditions of the patients can be effectively improved. Therefore, professional and non-professional social supports should be provided for diabetic foot ulcer patients for the purpose of improving the quality of life.

In addition, we also found that social support and giving up coping partially mediated the relationship between self-stigma and quality of life. Interestingly, a study investigating the relationship between self-stigma, coping style, and quality of life in the neurotic spectrum demonstrated our hypothesis.[39] Hence, it is critical to emphasise the role of enhancing the level of social support and an active coping style to enhance the protective effects of self-stigma on quality of life.

5 | CONCLUSION

The quality of life of diabetic foot ulcer patients is at the middle level. Chinese diabetic foot ulcer patients experienced self-stigma at a clinically significant level. Social support and giving up coping mediated the negative effects of self-stigma on quality of life.

6 | LIMITATIONS OF THE STUDY

Although several valuable findings were identified in the study, we still have some limitations. First, convenience sampling methods were used to enrol participants, so random sampling method and multicentre research should be designed to be representative in the future. Second, the cross-sectional survey design could only establish a mechanism between the variables at one point in time; thus, longitudinal design will be necessary to prospectively clear the mechanism of self-stigma in buffering the adverse results from quality of life over time. Third, self-stigma, social support, coping style, and perceived stress using self-reported were assessed by questionnaires in the present study. Hence, the results may be inflated due to

subjective bias from participants and investigators—additional studies consider physiological assessment.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Saeedi P, Petersohn I, Salpea P, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: results from the International Diabetes Federation Diabetes Atlas, 9th edition. *Diabetes Res Clin Pract*. 2019;157:107843. doi:10.1016/j.diabres.2019.107843
2. Robert AA, Al Dawish MA. The worrying trend of diabetes mellitus in Saudi Arabia: an urgent call to action. *Curr Diabetes Rev*. 2020;16(3):204-210. doi:10.2174/1573399815666190531093735
3. Al-Rubeaan K, Almashouq MK, Youssef AM, et al. All-cause mortality among diabetic foot patients and related risk factors in Saudi Arabia. *PLoS One*. 2017;12(11):e0188097. doi:10.1371/journal.pone.0188097
4. 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):165-179. doi:10.1177/1534734619900415
5. Al-Busaidi IS, Abdulhadi NN, Coppell KJ. Diabetic foot disease research in gulf cooperation council countries: a bibliometric analysis. *Sultan Qaboos Univ Med J*. 2018;18(3):e338-e343. doi:10.18295/squmj.2018
6. Yekta Z, Pourali R, Nezhadrahim R, et al. Clinical and behavioral factors associated with management outcome in hospitalized patients with diabetic foot ulcer. *Diabetes Metab Syndr Obes*. 2011;4:371-375. doi:10.2147/DMSO.S25309
7. Amin N, Doupis J. Diabetic foot disease: from the evaluation of the "foot at risk" to the novel diabetic ulcer treatment modalities. *World J Diabetes*. 2016;7(7):153-164. doi:10.4239/wjd.v7.i7.153

8. Zhuang H, Wang L, Yu X, et al. Effects of decisional conflict, decision regret and self-stigma on quality of life for breast cancer survivors: a cross-sectional, multisite study in China. *J Adv Nurs*. 2022. [online ahead of print]. doi:10.1111/jan.15250
9. Macioch T, Sobol E, Krakowiecki A, Mrozikiewicz-Rakowska B, Kasprowicz M, Hermanowski T. Health related quality of life in patients with diabetic foot ulceration – translation and Polish adaptation of Diabetic Foot Ulcer Scale short form. *Health Qual Life Outcomes*. 2017;15(1):15. doi:10.1186/s12955-017-0587-y
10. 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):1413-1427. doi:10.1007/s11136-018-2082-2
11. Sekhar MS, Thomas RR, Unnikrishnan MK, Vijayanarayana K, Rodrigues GS. Impact of diabetic foot ulcer on health-related quality of life: a cross-sectional study. *Semin Vasc Surg*. 2015;28(3-4):165-171. doi:10.1053/j.semvascsurg.2015.12.001
12. Holubova M, Prasko J, Matousek S, et al. Comparison of self-stigma and quality of life in patients with depressive disorders and schizophrenia spectrum disorders-a cross-sectional study. *Neuropsychiatr Dis Treat*. 2016;12:3021-3030. doi:10.2147/NDT.S121556
13. Vrbova K, Prasko J, Ociskova M, Holubova M. Comorbidity of schizophrenia and social phobia-impact on quality of life, hope, and personality traits: a cross sectional study. *Neuropsychiatr Dis Treat*. 2017a;13:2073-2083. doi:10.2147/NDT.S141749
14. Vrbova K, Prasko J, Ociskova M, et al. Quality of life, self-stigma, and hope in schizophrenia spectrum disorders: a cross-sectional study. *Neuropsychiatr Dis Treat*. 2017b;13:567-576. doi:10.2147/NDT.S122483
15. Asrat B, Ayenalem AE, Yimer T. Internalized stigma among patients with mental illness attending psychiatric follow-up at Dilla University referral hospital, Southern Ethiopia. *Psychiatry J*. 2018;2018:1987581. doi:10.1155/2018/1987581
16. Balfe M, Doyle F, Smith D, et al. What's distressing about having type 1 diabetes? A qualitative study of young adults' perspectives. *BMC Endocr Disord*. 2013;13:25. doi:10.1186/1472-6823-13-25
17. Kato A, Fujimaki Y, Fujimori S, et al. Association between self-stigma and self-care behaviors in patients with type 2 diabetes: a cross-sectional study. *BMJ Open Diabetes Res Care*. 2016;4(1):e000156. doi:10.1136/bmjdrc-2015-000156
18. Doosti-irani M, Abdoli S, Parvizy S, et al. Overcoming diabetes-related stigma in Iran: a participatory action research. *Appl Nurs Res*. 2017;36:115-121. doi:10.1016/j.apnr.2017.06.008
19. Dettling-Ihnenfeldt DS, Beelen A, Nollet F. Coping style and quality of life in Dutch intensive care unit survivors. *Rehabil Psychol*. 2016;61(2):165-172. doi:10.1037/rep0000084
20. Shakeri J, Kamangar M, Ebrahimi E, et al. Association of coping styles with quality of life in cancer patients. *Indian J Palliat Care*. 2015;21(3):298-304. doi:10.4103/0973-1075.164890
21. Cassarino-Perez L, Dell'Aglio DD. Health-related quality of life and social support in adolescents with type 1 diabetes. *Span J Psychol*. 2015;17:E108. doi:10.1017/sjp.2014.101
22. Ramkisson S, Pillay BJ, Sibanda W. Social support and coping in adults with type 2 diabetes. *Afr J Prim Health Care Fam Med*. 2017;9(1):e1-e8. doi:10.4102/phcfm.v9i1.1405

23. Deng CY, Lu Q, Zhao Y. Development of the Chinese version of stigma scale for chronic illness and test of its reliability and validity in stroke patients. *Chin Gen Pract.* 2017;20(34):4304-4309. doi:10.3969/j.issn.1007-9572.2017.34.018

24. Xiao SY. Theoretical basis and research application of social support rating scale. *J Clin Psychiatry.* 1994;2:98-100.

25. Jiang QJ, Shen XH. Medical coping modes questionnaire (MCMQ). *Chin J Behav Med Sci.* 2000;9(1):18-20.

26. Liao ZH, Liang YQ, Zhou FQ. Quality of life is an important index to evaluate the treatment of diabetes mellitus. *Chin J Diabetes.* 2000;8(5):304-305.

27. Burke LE, Thompson DR, Roos S, HCL V, Troe E. Global cardiovascular disease prevention: a call to action for nursing: multilevel policies. *J Cardiovasc Nurs.* 2011;26(4 suppl):S15-S21. doi:10.1097/JCN.0b013e318213efb3

28. Carter-Harris L, Hermann CP, Schreiber J, Weaver MT, Rawl SM. Lung cancer stigma predicts timing of medical help-seeking behavior. *Oncol Nurs Forum.* 2014;41(3):E203-E210. doi:10.1188/14.ONF.E203-E210

29. Li SM, Wang QY, Shan CJ, et al. Inspirations to chronic diseases prevention in China from disease preventive system in Australian. *Chin J PHM.* 2016a;32(4):468-470. doi:10.19568/j.cnki.23-1318.2016.04.014

30. Li R, Li GQ, Yan R, et al. Influencing factors of disease stigma among cervical cancer patients. *Mod Clin Nurs.* 2016b;15(4):1-5. doi:10.3969/j.issn.1671-8283.2016.04.001

31. Danhauer SC, Case LD, Tedeschi R, et al. Predictors of post-traumatic growth in women with breast cancer. *Psychooncology.* 2013;22(12):2676-2683. doi:10.1002/pon.3298

32. Liu Y, Cao C. The relationship between family history of cancer, coping style and psychological distress. *Pak J Med Sci.* 2014;30(3):507-510. doi:10.12669/pjms.303.4634

33. Gattino S, Rollero C, Piccoli N. The influence of coping strategies on quality of life from a gender perspective. *Appl Res Qual Life.* 2015;10(4):689-701. doi:10.1007/s11482-014-9348-9

34. Du SZ, Hu LL, Bai YM, et al. Quality of life in patients with chronic low back pain and its relationship with coping style. *Nurs J Chin PLA.* 2018;35(23):6-11. doi:10.3969/ji.sn.1008-9993.2018.23.002

35. Luo D, Dai RJ, Chen J, et al. Correlation among coping mode, symptom burden and quality of life in maintenance hemodialysis patients. *Nurs J Chin PLA.* 2018;35(19):12-16. doi:10.3969/ji.sn.1008-9993.2018.19.002

36. Guo T, Ding PJ, Sun XF, Wang CM. Investigation and analysis of coping style and influencing factors of elderly patients with chronic pain in community. *Chin J Pract Nurs.* 2014;30(6):25-28.

37. Ge L, Lin B, Tian R. Study on the quality of life of patients and its influencing factors of elderly inflammatory enteropathy. *Chin J Gerontol.* 2014;34(12):3416-3418. doi:10.3969/j.issn.1005-9202.2014.12.095

38. Hong YQ, Lu XC, Xie ZM. Correlative research between the quality of life and social support of patients with HIV/AIDS complicated with TB. *Chin Nurs Res.* 2018;32(4):638-640. doi:10.3969/j.issn.1009-6493.2018.04045

39. Holubova M, Prasko J, Ociskova M, et al. Quality of life, self-stigma, and coping strategies in patients with neurotic spectrum disorders: a cross-sectional study. *Psychol Res Behav Manag.* 2019;12:81-95. doi:10.2147/PRBM.S179838