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ORIGINAL RESEARCH

The Relationship Between Psychosocial Behavior and the Quality of Life of Male Gout Patients in Southwest China: A Cross-Sectional Study Based on an Information-Motivation-Behavioral Skills Model

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Purpose: Gout is more severe in men, leading to a poor quality of life. Previous studies did not sufficiently pay attention to the quality of life and related factors in gout patients in Southwest China. This study aimed to investigate the quality of life of men with gout in Southwest China and explore the relationship between psychosocial factors and health-related quality of life from the perspective of an information-motivation-behavioral skill model.

Patients and Methods: This was a cross-sectional study conducted in the West China Hospital of Sichuan University located in Southwest China. In total, 230 male patients with gout were enrolled. The health-related quality of life of patients was assessed using the gout impact scale. The gout knowledge questionnaire was used to assess patients' information. The positive psycap questionnaire was used to assess motivation. The gout patients' self-management assessment scale was used to assess behavioral skills. Multiple linear regression was used to identify the factors associated with the health-related quality of life of patients.

Results: The overall mean gout impact scale score was 52.7±15.3 (maximum possible = 100). Factors associated with the total gout impact scale score were tophi (β=0.138, P=0.050), pain (β=0.255, P<0.001), and resiliency (β=−0.282, P<0.001). In addition, demographic characteristics (educational level, smoking and marital status), clinical characteristics (tophi, pain, number of attacks over half a year, and number of affected joints) and psychosocial behavior variables (resiliency, hope, disease treatment management, diet management) were associated with several dimensions of the gout impact scale.

Conclusion: The health-related quality of life of male patients with gout in Southwest China was at a medium level. We found that demographic characteristics, clinical characteristics, and psychosocial factors were associated with health-related quality of life of patients with gout. These findings can be used as a reference to improve health-related quality of life of patients with gout.

Keywords: gout impact scale, gout knowledge level, positive psycap, self-management

Introduction

Gout is a metabolic rheumatic disease caused by the deposition of urate crystals in the joints, tendons and other tissues due to continuously increasing serum uric acid levels.[1] Worldwide, the prevalence of gout ranges from <1% to 6.8% and is increasing annually.[1] Since 1990, the age-standardized disability-adjusted life years (DALY) rate, prevalence and incidence of gout have gradually increased in China.[2] The DALY of gout in men was higher than that in women. The global male prevalence and incidence of gout increased by 5.81% and 4.52%, respectively. In the meantime, the prevalence and incidence of gout among men in China increased by 7.07% and 6.46%, respectively.[2] Chinese men are

Received: 27 September 2023
Accepted: 5 December 2023
Published: 21 December 2023

more vulnerable to the effects of gout, which negatively affects their physical, psychological, and social life,[3] and leads to poor health-related quality of life (HRQoL).[3–5]

The promotion of a good quality of life is important for everyone, and the first urgent task is to explore the factors associated with the quality of life in patients with gout and to implement an intervention for the variable factors involved. Recent studies have focused on the quality of life associated with demographic and clinical characteristics and unhealthy emotions,[3–5] it provides some references for improving the health-related quality of life of gout patients. Some studies have reported on other factors associated with the chronic disease quality of life, such as the level of disease knowledge, self-efficacy, resilience, confidence, self-management, etc.[6–11] However, we do not yet know whether these factors are also associated with HRQOL in patients with gout. In addition, Previous studies on the HRQOL in gout patients have focused on South and East China,[4,5,12] while southwest China has unique geographical characteristics and food culture, but the current research in this region is still insufficient.

The information-motivation-behavioral skills model (IMB) is the classical theory of behavior change. The IMB indicates that information, motivation and behavioral skills are core elements of behavior building, and that the establishment of health behaviors and change in health outcomes needs to be based on disease-related knowledge or information as a theoretical ale, individual positive psychology and motivation to generate positive attitudes and maintain established positive behaviors.[13] Recent studies have confirmed that IMB-based interventions can improve HRQoL in chronic conditions, such as diabetes,[14] osteoarthritis,[15] etc. Doherty et al also reported improved HRQoL of gout patients by providing information support interventions.[16] Understanding HRQoL in patients with gout and whether it is associated with factors such as information, motivation, and behavioral skills is necessary to improve health outcomes. This study is based on IMB, we used the level of gout knowledge, positive psychological capital (PsyCap), information on self-management, motivation, and behavior, and analyzed whether these factors are associated with HRQoL of male patients with gout in Southwest China from the perspective of IMB (Figure 1).

Materials and Methods

Study Design and Participants

This study was a cross-sectional survey, following the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) principle.

The male gout participants were recruited from the outpatient department of West China Hospital of Sichuan University, a general hospital located in southwest China, between February and December 2021. Participants were included if (1) they were aged ≥18 years and fulfilled the 2015 Gout classification criteria suggested by the American College of Rheumatology/European League Against Rheumatism collaborative initiative;[17,18] (2) they understood their disease status and volunteered to participate in this study; and (3) they were able to understand and complete the questionnaire. Participants who had other diseases, such as cognitive dysfunction or mental illness, were excluded from the study.

This study complied with the ethical guidelines of the 1975 Declaration of Helsinki, and ethical approval was obtained from the Medical Ethics Committee of the West China Hospital in 2020 (ID: 2020898). All participants were

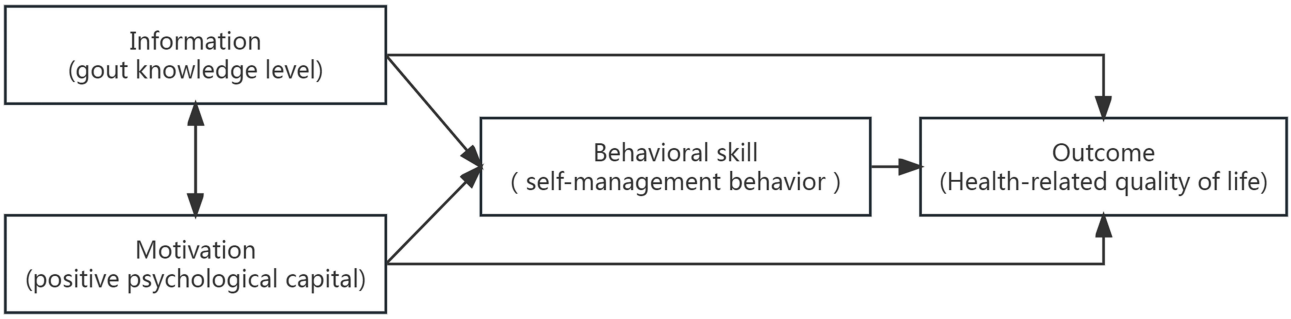

Figure 1 The research framework based on the information-motivation-behavioral skills model.

referred by two rheumatologists to participate in a 24-week self-management research project for patients with gout. Participants were first verbally informed about the research project, and if they showed interest, trained researchers informed participants of the purpose and the voluntary, anonymous nature of the study. All participants signed an informed consent form and they were asked to complete the questionnaire independently and were encouraged to seek help when needed.

The sample size of this study was estimated to be 5–10 times the number of variables according to the Kendall principle.[19] There were 27 independent variables and dimensions in this study, and considering that 20% of the invalid questionnaires were included, the estimated sample size required was 169–338 cases.

Data Collection

Health-Related Quality of Life

The gout impact scale (GIS) was used to assess the HRQoL of the participants. The GIS compiled by Hirsch et al,[20] and sinicized by Li et al in 2019 and its reliability and validity verified for use to assess HRQoL in patients with acute and chronic gout, and the Cronbach's α coefficient of the total questionnaire was 0.928.[21] The Chinese version of the GIS consists of 3 subscales, with 24 entries. It includes five dimensions, as follows: gout concern overall, gout medication side effects, unmet gout treatment requirements, gout concern during attacks, and well-being during attacks.[21] The total scale is the average score of each item, with a full score of 100. Higher scores indicate a greater influence of disease and lower HRQoL.[21] The Cronbach's α of the GIS in this study was 0.900.

Questionnaire Based on the Three-Elements Questionnaire of IMB

The gout knowledge questionnaire (GKQ) was used to collect participants' Information.[22] The GKQ was developed by Zhang et al in 2011 and included 10 test questions with a total score of 0 to 10 points.[22] Higher scores indicate a higher level of knowledge about the disease. The GKQ's Flesch–Kincaid grade level is 4.7, and the Flesch reading ease is 81.4%.[22]

In this study, we measured the participants' motivation with a positive psycap questionnaire (PPQ). It includes four dimensions, namely, self-efficacy, resiliency, optimism and hope.[23] The PPQ was developed by Luthans et al in 2007.[24] Zhang et al standardized and verified the questionnaire, and the Cronbach's α coefficient of the total questionnaire was 0.90.[23] The scores ranged from 26 to 182, with higher scores representing more positive psychology.[23] The Cronbach's α of the PPQ in this study was 0.942.

The gout patient self-management assessment scale (GPSAS) was used to assess the participants' behavioral skills. The GPSAS was developed by Yao et al in 2020, based on Lorig's self-management theory.[25] A Cronbach's α coefficient of 0.962 and a content validity index of 0.905 were verified in China.[25] The scale includes the four dimensions: disease treatment management, diet management, lifestyle management, and psychosocial management.[25] The total GPSAS score was 41 to 205, with higher scores indicating better self-management behavior.[25] The Cronbach's α of the GPSAS in this study was 0.923.

Demographic and Clinical Characteristics of the Participants

Demographic variables that were assessed included age, body mass index (BMI), marital status, educational level, employment status, per capita monthly family income, gout-related expenses in the past year, and smoking and drinking status. Clinical characteristics included duration of symptoms, family history of gout, comorbidities, serum uric acid (SUA) levels in the most recent month, urate-lowering therapy (ULT), tophi, and pain [measured by a 10 cm horizontal visual analog scale (VAS) with a higher score indicating a higher level of pain], number of attacks over half a year and the number of affected joints.

Statistical Analysis

Data analysis was conducted using SPSS (version 25.0, IBM Corp). Suspicious errors, missing values, and outliers were filtered. The frequency and composition ratio of the categorical variables were selected, and the continuous variables underwent descriptive statistical analysis by using the median (interquartile range, IQR) or the mean ± standard deviation

(SD). Independent sample *t*-tests, one-way ANOVA and correlation were used to analyze the relationship of GIS or dimensions with other variables. Variables with P <0.1 in univariate analysis were selected for multiple linear regression of factors associated with GIS or dimensions. The two-sided test level was α=0.05, with P≤0.05 indicating statistical significance.

Results

The demographic and clinical characteristics of the patients are listed in Table 1. We recruited 230 participants, and 225 (97.8%) validated questionnaires were included in the analysis. They aged between 18 and 75 years, mean 40.4±12.6 years. The mean BMI was 26.1±3.3 kg/m^{2,} and SUA was 480.5±129.4 μmol/L. The average pain score was 5 points. Among the participants, 76.4% were married, 80.4% were in employment, 26.7% had tophi, and 46.7% had comorbidities.

The total GIS score was between 14.6 and 94.8, with an average of 52.7±15.3, and each dimension score from high to low were Gout concern overall (81.4±17.3), Gout medication side effects (66.6±21.3), Gout concern during attack (61.8 ±21.1), Unmet gout treatment needs (46.8±16.1), and Well-being during attack (38.1±23.4). The average GKQ score of the participants was 6.1±2.1. The PPQ and its four dimensions were scored as 133.0±23.6, 35.6±7.1, 33.3±7.7, 32.0±6.2, and 32.1±6.5, respectively. The GPSAS and its four dimensions scored were 144.9±26.9, 49.1±10.8, 41.8±9.2, 28.1±7.9, and 25.9±5.8, respectively.

The association between the GIS or scores in each dimension and demographic and clinical characteristics and levels of GKQ, PPQ, GPSAS are shown in Table 1 and Table 2. Factors associated with the total GIS score included age (*P*=0.008), marital status (*P*=0.028), educational level (*P*=0.038), BMI (*P*=0.031), SUA (*P*=0.042), symptom duration (*P*=0.010), number of attacks over half a year (*P*=0.003), number of affected joints (*P*=0.013), pain intensity (*P*<0.001), tophi (*P*=0.006), resiliency (*P*<0.001), diet management (*P*=0.035), lifestyle management (*P*=0.005) and psychosocial management (*P*=0.007). The following factors were associated with one or more of the five dimensions of the GIS. Demographic factors included age, marital status, employment status, BMI, smoking, and drinking. Clinical factors included symptom duration, SUA, number of attacks over half a year, number of affected joints, ULT, tophi, and pain intensity. Psychological behavioral characteristics included resiliency, hope, diet management, lifestyle management and psychosocial management. However, no relationships were found between per capita monthly family income, gout-related expenses in the past year, comorbidity, family history or GKQ scores with GIS or each GIS dimension score.

The results of the univariate analysis affecting the GIS or scores in each dimension are shown in Table 1 and Table 2. Factors associated with the total GIS score included age (*P*=0.008), BMI (*P*=0.031), marital status (*P*=0.028), educational level (*P*=0.038), symptom duration (*P*=0.010), SUA (*P*=0.042), tophi (*P*=0.006), pain (*P*<0.001), number of attacks over half a year (*P*=0.003), number of affected joints (*P*=0.013), resiliency (P<0.001), diet management (*P*=0.035), lifestyle management (*P*=0.005),and psychosocial management (*P*=0.007). The following factors were associated with one or more of the five dimensions of the GIS. Demographic factors included age, BMI, marital status, employment status, smoking, and drinking. Clinical factors included symptom duration, SUA, ULT, tophi, pain, number of attacks over half a year, and number of affected joints. Psychological behavioral characteristics included resiliency, hope, diet management, lifestyle management and psychosocial management. However, no relationships were found between per capita monthly family income, gout-related expenses in the past year, comorbidity, family history or GKQ scores with GIS or each GIS dimension score.

The results of multiple linear regression analysis are shown in Table 3. Pain intensity (β=0.255) with tophi (β=0.138) were positively correlated with the total GIS score, whereas resiliency (β=−0.282) was negatively associated with the total GIS score (R^2=0.312, indicating that approximately 31.2% of the changes in the GIS could be explained by these variables). Tophi (β=0.178) and hope (β=0.198) were positively correlated with the dimension of gout concern overall, while the resiliency (β=−0.219) score was negatively associated with this dimension (R^2= 0.191, indicating that an approximately 19.1% change in this dimension score can be explained by these variables). Pain (β=0.142) was positively correlated with the dimension of gout medication side effects, while resiliency (β=−0.220) was negatively correlated with it (R^2=0.101, indicating that approximately 10.1% of the change in this dimension score can be explained by these variables). Educational level (β=0.235), number of attacks over half a year (β=0.155), number of affected joints

Table 1 Demographic and Clinical Characteristics of the Participants, and Univariate Analysis of GIS or Each GIS Dimension (N=225)

Variables	Description	Total GIS, Mean ±SD	r/t/F	*P*	Gout Concern Overall, Mean ±SD	r/t/F	*P*	Gout Medication Side Effects, Mean ±SD	r/t/F	*P*	Unmet Gout Treatment Needs, Mean ±SD	r/t/F	*P*	Gout Concern During Attack, Mean ±SD	r/t/F	*P*	Well-being during attack, Mean ±SD	r/t/F	*P*
Age (years), mean ±SD	40.4±12.6	52.7±15.3	−0.176[a]	0.008	81.4±17.3	−0.204[a]	0.002	66.6±21.3	0.004[a]	0.953	46.8±16.1	−0.077[a]	0.250	61.8±21.1	−0.093[a]	0.163	38.1±23.4	−0.151[a]	0.024
BMI (kg/m2), mean±SD	26.1±3.3		0.144[a]	0.031		0.140[a]	0.037		0.067[a]	0.315		0.067[a]	0.321		0.084[a]	0.209		0.116[a]	0.084
Marital status, N (%)			2.210[b]	0.028		0.656[b]	0.512		−0.386[b]	0.700		−0.344[b]	0.731		2.664[b]	0.008		2.229[b]	0.027
Single	53 (23.6)	56.8±16.2			82.8±19.5			65.6±22.1			46.1±13.7	−0.344	0.731	68.4±21.6	2.664	0.008	44.3±24.3		
Married	172 (76.4)	51.5±14.8			81.0±16.6			66.9±21.1			47.0±16.8			59.7±20.5			36.2±22.8		
Educational level, N (%)			2.407[c]	0.038		0.331[c]	0.894		1.591[c]	0.164		2.097[c]	0.067		2.065[c]	0.071		1.861[c]	0.102
Primary school	13 (5.8)	46.2±17.7			82.7±20.3			62.5±22.8			39.7±19.3			55.3±24.3			28.5±24.1		
Middle school	37 (16.4)	50.2±16.8			78.9±16.2			64.9±23.5			43.0±16.8			63.7±20.9			34.2±24.4		
High school	37 (16.4)	58.2±15.1			83.1±17.3			74.7±18.0			49.1±19.1			66.6±19.5			45.5±24.7		
Junior college	43 (19.1)	53.8±16.0			81.8±17.6			64.2±23.2			44.8±15.8			65.1±24.1			40.0±24.1		
College	74 (32.9)	53.5±13.9			82.0±17.1			66.9±20.2			50.5±13.6			60.6±20.0			39.0±21.9		
Postgraduate and above	21 (9.3)	46.8±11.3			79.2±19.0			61.3±19.7			44.8±13.3			51.2±15.1			31.3±19.7		
Employment status, N (%)			1.153[b]	0.250		2.340[b]	0.020		−0.958[b]	0.339		2.025[b]	0.044		0.734[b]	0.464		0.558[b]	0.577
Employed	181 (80.4)	53.3±15.1			82.7±16.5			65.9±21.2			47.9±15.6			62.3±21.5			38.6±23.2		
Unemployed	44 (19.6)	50.4±15.9			76.0±19.6			69.3±21.6			42.4±17.6			59.7±19.4			36.4±24.4		
Per capita monthly family income (¥, yuan), N (%)			1.201[c]	0.303		0.360[c]	0.698		0.753[c]	0.472		1.678[c]	0.189		1.683[c]	0.188		0.725[c]	0.486
<4000	67 (29.8)	54.4±16.2			81.5±17.6			69.2±22.3			46.5±18.4			65.7±19.9			39.9±23.8		
4000–7999	70 (31.1)	53.6±15.1			82.7±15.5			65.7±20.4			49.5±13.7			60.5±21.7			39.4±23.5		
≥8000	88 (39.1)	50.8±14.7			80.3±18.6			65.2±21.3			44.8±15.8			59.8±21.2			35.8±23.1		
Gout-related expenses in the past year (¥, yuan), N (%)			0.768[c]	0.513		0.076[c]	0.973		0.309[c]	0.819		1.047[c]	0.373		1.209[c]	0.307		1.306[c]	0.273
<2000	120 (53.3)	51.4±15.1			81.5±17.1			67.6±21.3			48.5±15.6			59.3±21.5			35.4±22.9		
2000–3999	28 (12.4)	53.1±16.1			80.1±16.4			63.8±19.1			46.1±15.6			64.3±21.6			39.1±24.2		
4000–5999	31 (13.8)	55.0±15.6			82.3±17.2			66.9±24.9			44.6±16.6			64.1±19.0			42.5±23.4		
≥6000	46 (20.4)	54.5±15.3			81.5±18.9			65.2±20.4			44.2±17.3			65.1±20.6			41.8±23.9		
Smoking status, N (%)			−1.916[b]	0.057		−1.937[b]	0.054		1.153[b]	0.250		1.896[b]	0.059		−3.026[b]	0.003		−1.771[b]	0.078
No	148 (65.8)	51.3±15.2			79.8±17.7			67.7±20.0			48.3±15.5			58.7±20.6			36.2±23.9		
Yes	77 (34.2)	55.4±15.1			84.5±16.2			64.3±23.6			44.0±16.9			67.5±20.9			41.9±22.0		
Drinking status, N (%)			0.248[b]	0.804		0.579[b]	0.563		0.077[b]	0.939		−2.033[b]	0.043		0.369[b]	0.712		0.448[b]	0.654
No	111 (49.3)	53.0±16.3			82.1±16.5			66.7±22.2			44.6±17.1			62.3±21.4			38.8±24.7		
Yes	114 (50.7)	52.5±14.3			80.8±18.1			66.5±20.5			48.9±14.7			61.2±20.8			37.4±22.1		
Symptom duration (months), M [IQR]	57 (24,120)		0.172[d]	0.010		−0.039[d]	0.562		0.177[d]	0.008		0.024[d]	0.716		0.109[d]	0.103		0.162[d]	0.015
Family history of gout, N (%)			−1.288[b]	0.199		−0.941[b]	0.348		−0.903[b]	0.368		−0.121[b]	0.904		−0.855[b]	0.393		−1.127[b]	0.261
No	172 (76.4)	52.0±14.8			80.8±16.7			65.8±21.1			46.7±15.9			61.1±20.1			37.2±23.6		
Yes	53 (23.6)	55.1±16.8			83.4±19.2			68.9±22.0			47.0±16.9			63.9±23.9			41.3±22.7		

(*Continued*)

https://doi.org/10.2147/PPA.S434875

Table 1 (Continued).

Variables	Description	Total GIS, Mean ±SD	r/t/F	P	Gout Concern Overall, Mean ±SD	r/t/F	P	Gout Medication Side Effects, Mean ±SD	r/t/F	P	Unmet Gout Treatment Needs, Mean ±SD	r/t/F	P	Gout Concern During Attack, Mean ±SD	r/t/F	P	Well-being during attack, Mean ±SD	r/t/F	P
Comorbidity, N (%)			1.798[b]	0.074		1.344[b]	0.180		−0.073[b]	0.942		0.382[b]	0.703		0.889[b]	0.375		1.849[b]	0.066
No	120 (53.3)	54.4±15.2			82.9±16.6			66.5±20.3			47.2±16.8			62.9±21.6			40.8±23.8		
Yes	105 (46.7)	50.8±15.3			79.8±18.0			66.7±22.5			46.4±15.3			60.4±20.5			35.1±22.6		
SUA (umol/l), Mean±SD	480.5±129.4		0.135[a]	0.042		0.144[a]	0.031		0.020[a]	0.761		0.135[a]	0.043		0.053[a]	0.432		0.108[a]	0.107
ULT, N (%)			0.088[b]	0.930		−0.253[b]	0.801		0.465[b]	0.642		2.621[b]	0.010		−0.984[b]	0.326		0.029[b]	0.977
No	44 (19.6)	52.9±16.6			80.8±18.6			67.9±19.7			51.5±12.4			59.0±22.2			38.2±24.3		
Yes	181 (80.4)	52.7±15.0			81.6±17.0			66.2±21.7			45.7±16.7			62.4±20.8			38.1±23.2		
Tophi, N (%)			−2.784[b]	0.006		−2.557[b]	0.011		−0.754[b]	0.452		0.688[b]	0.492		−2.687[b]	0.008		−2.387[b]	0.018
No	165 (73.3)	51.1±14.9			79.7±17.7			65.9±20.2			47.2±15.2			59.5±20.8			35.9±22.6		
Yes	60 (26.7)	57.4±15.5			86.3±15.2			68.3±24.3			45.6±18.3			67.9±20.7			44.2±24.5		
Pain(VAS),M [IQR]	5 (2,7)		0.354[d]	<0.001		0.224[d]	0.001		0.152[d]	0.023		0.059[d]	0.382		0.266[d]	<0.001		0.339[d]	<0.001
Number of attacks over half a year, N (%)			4.053[c]	0.003		2.336[c]	0.056		0.805[c]	0.523		2.099[c]	0.082		4.158[c]	0.003		2.169[c]	0.073
0	43 (19.1)	46.8±14.5			76.0±18.4			63.7±20.6			41.7±16.0			57.0±16.3			30.7±23.4		
1	52 (23.1)	50.0±14.7			78.9±18.7			64.9±20.7			46.5±13.6			56.1±20.6			35.6±22.1		
2	37 (16.4)	54.8±15.1			84.0±16.8			70.6±17.7			46.0±15.9			60.8±21.8			41.5±23.9		
3	24 (10.7)	52.7±15.8			82.6±16.1			64.1±19.6			46.9±20.1			61.2±22.0			38.3±24.8		
>3	69 (30.7)	57.4±14.8			85.0±15.5			68.3±24.4			50.6±15.9			69.7±21.5			42.8±22.8		
Number of affected joints, N (%)			3.223[c]	0.013		2.650[c]	0.034		1.582[c]	0.180		4.776[c]	0.001		1.194[c]	0.314		1.965[c]	0.101
0	16 (7.1)	49.3±15.6			78.1±23.6			66.4±16.3			35.4±15.1			65.6±22.6			33.5±25.2		
1	73 (32.4)	51.1±14.7			81.3±16.5			66.8±21.3			45.0±14.2			59.3±20.3			35.9±23.8		
2	55 (24.4)	49.1±15.2			76.5±17.8			60.9±22.7			45.0±16.6			58.9±24.1			34.6±22.0		
3	30 (13.3)	58.5±14.5			83.3±13.7			70.4±22.4			53.1±14.8			64.0±18.5			46.8±24.3		
>3	51 (22.7)	56.7±15.2			86.8±16.5			70.1±20.0			51.2±16.8			65.8±19.2			41.5±22.3		

Notes: [a]Pearson's correlation test, [b]Independent sample *t*-test, [c]Analysis of variance, [d]Spearman correlation test.

Abbreviations: N, number; M, median; SD, standard deviation; IQR, interquartile range; P, P-value; GIS, gout impact scale; BMI, body mass index; SUA, serum uric acid; ULT, urate-lowering therapy; VAS, visual analog scale.

Table 2 Levels of GKQ, PPQ, GPSAS, and Univariate Analysis of GIS or Each GIS Dimension (N=225)

Variables	Description Mean±SD	Total GIS		Gout Concern Overall		Gout Medication Side Effects		Unmet gout Treatment Needs		Gout Concern During Attack		Well-being During Attack	
		r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*
GKQ	6.1±2.1	0.05	0.480	0.10	0.143	0.05	0.449	0.05	0.449	−0.03	0.679	0.03	0.693
PPQ	133.0±23.6	−0.16	0.018	0.04	0.570	−0.16	0.014	−0.16	0.014	−0.07	0.323	−0.19	0.004
Self efficacy	35.6±7.1	−0.09	0.177	0.04	0.586	−0.11	0.090	−0.11	0.090	−0.08	0.209	−0.10	0.143
Resiliency	33.3±7.7	−0.33	<0.001	−0.11	0.090	−0.24	<0.001	−0.24	<0.001	−0.19	0.005	−0.33	<0.001
Optimism	32.0±6.2	−0.03	0.674	0.10	0.132	−0.06	0.377	−0.06	0.377	0.06	0.412	−0.08	0.208
Hope	32.1±6.5	−0.06	0.398	0.14	0.040	−0.13	0.048	−0.13	0.048	0.02	0.753	−0.11	0.095
GPSAS	144.9±26.9	−0.16	0.014	0.04	0.561	−0.09	0.181	−0.09	0.181	−0.03	0.666	−0.18	0.006
Disease treatment management	49.1±10.8	−0.06	0.399	0.13	0.062	−0.07	0.289	−0.07	0.289	0.07	0.308	−0.09	0.175
Diet management	41.8±9.2	−0.14	0.035	0.02	0.739	−0.10	0.120	−0.10	0.120	−0.05	0.499	−0.14	0.034
Lifestyle management	28.1±7.9	−0.19	0.005	−0.08	0.216	0.04	0.571	0.04	0.571	−0.12	0.085	−0.19	0.004
Psychosocial management	25.9±5.8	−0.18	0.007	0.03	0.686	−0.17	0.010	−0.17	0.010	−0.03	0.631	−0.20	0.003

Note: r Pearson's correlation test.

Abbreviations: GIS, gout impact scale; GKQ, gout knowledge questionnaire; PPQ, positive psycap questionnaire; GPSAS, gout patient self-management assessment scale; SD, standard deviation; P, P-value.

https://doi.org/10.2147/PPA.S434875

Table 3 Multiple Linear Regression of Factors Associated with GIS and GIS Dimension Scores

Predictor	*B*	SEE	*Standardized Coefficients (β)*	t	*p*	*95% CI*	R^2	Adjusted R^2	*F/P*
GIS total									
Pain (VAS)	1.294	0.327	0.255	3.957	<0.001	0.653 ~ 1.935	0.312	0.259	*F=5.894*
Tophi	4.746	2.408	0.138	1.971	0.050	0.026 ~ 9.467			*p<0.001*
Resiliency	−0.559	0.135	−0.282	−4.135	<0.001	−0.824 ~ −0.294			
Gout concern overall									
Tophi	6.965	2.689	0.178	2.590	0.010	1.694 ~ 12.236	0.191	0.149	*F*=4.568
Resiliency	−0.491	0.175	−0.219	−2.801	0.006	−0.834 ~ −0.147			*p*<0.001
Hope	0.532	0.225	0.198	2.363	0.019	0.091 ~ 0.973			
Gout medication side effects									
Pain (VAS)	1.005	0.460	0.142	2.187	0.030	0.104 ~ 1.906	0.101	0.071	*F*=3.464
Resiliency	−0.608	0.230	−0.220	−2.647	0.009	−1.058 ~ −0.158			*p*=0.002
Unmet gout treatment needs									
Educational level	2.657	0.734	0.235	3.622	<0.001	1.211~4.103	0.171	0.152	*F*=9.050
Smoking status	−6.024	2.135	−0.178	−2.822	0.005	−10.231~-1.817			*p*<0.001
Number of attacks over half a year	1.629	0.721	0.155	2.260	0.025	0.208~3.050			
Number of affected joints	3.007	0.881	0.240	3.413	0.001	1.271~4.744			
Disease treatment management	−0.265	0.095	−0.178	−2.799	0.006	−0.452~-0.079			
Gout concern during attack									
Marital status	−8.318	3.186	−0.168	−2.610	0.010	−14.599~-2.038	0.178	0.155	*F*=7.848
Smoking status	5.792	2.785	0.131	2.080	0.039	0.303~11.282			*p*<0.001
Number of attacks over half a year	2.010	0.955	0.146	2.104	0.037	0.127~3.893			
Tophi	6.649	3.084	0.140	2.156	0.032	0.570~12.728			
Pain (VAS)	0.989	0.469	0.141	2.110	0.036	0.065~1.912			
Diet management	−0.377	0.171	−0.138	−2.210	0.028	−0.714~-0.041			
Well-being during attack									
Pain (VAS)	2.108	0.502	0.271	4.202	<0.001	1.125 ~ 3.092	0.283	0.235	*F*=5.924
Resiliency	−0.984	0.238	−0.325	−4.130	<0.001	−1.451 ~ −0.517			*p*<0.001

Notes: Variables included in the analysis: GIS total: age, marital status, educational level, smoking status, body mass index, serum uric acid, symptom duration, number of attacks over half a year, number of affected joints, pain, tophi, comorbidity, diet management, lifestyle management, psychosocial management, resiliency; Gout concern overall: age, employment status, smoking status, body mass index, serum uric acid, number of attacks over half a year, number of affected joints, pain, tophi, disease treatment management, resiliency, hope; Gout medication side effects: symptom duration, pain, psychosocial management, self efficacy, resiliency, hope; Unmet gout treatment: educational level, employment status, smoking status, drinking status, serum uric acid, number of attacks over half a year, number of affected joints, urate-lowering therapy, disease treatment management, diet management, psychosocial management; Gout concern during attack: marital status, educational level, smoking status, number of attacks over half a year, pain, tophi, diet management, lifestyle management, resiliency; Well-being during attack: age, marital status, smoking status, body mass index, symptom duration, number of attacks over half a year, pain, tophi, comorbidity, diet management, lifestyle management, psychosocial management, resiliency, hope.
Abbreviations: GIS, gout impact scale; β, standardized coefficients; SEE, standard errors of estimation; P, P-value; VAS, visual analog scale.

(β=0.240), were all positively correlated with the dimension of unmet gout treatment needs, while smoking (β=−0.178) and disease treatment management (β=−0.178) were negatively correlated with this (R^2=0.171, indicating that an approximately 17.1% change in this dimension score can be explained by these variables). Smoking status (β=0.131), number of attacks over half a year (β=0.146), tophi (β=0.140), and pain (β=0.141) were all positively associated with the dimension of gout concern during attacks, and marital status (β=−0.168) and diet management (β=−0.138) were negatively associated (R^2=0.178, indicating that a 17.8% change in this dimension score can be explained by these variables). Finally, pain was positively correlated with the dimension of well-being during attacks (β=0.271), while resiliency (β= −0.325) was negatively correlated (R^2=0.283, indicating that an approximately 28.3% change in this dimension score can be explained by these variables.

Discussion

In this study, we assessed the HRQoL in 225 Chinese male gout patients using the GIS. The participants had a GIS score of 52.7±15.3, which represents a moderate level, slightly better than in the previous study of Zhou et al in North China (56.79±15.45).[12] It may be relevant for explaining this difference that the participants had different regional and demographic characteristics.[12] The dimension with the highest participant score was gout concern overall (81.4±17.3), meaning that this dimension was the most influential, whereas the least influential dimension was well-being during attacks (38.1±23.4). The ranking of the five dimensions found here is consistent with that reported by Zhou et al.[12] We found that among the total GIS score and the five GIS dimensions, meaningful demographic variables included marital status, educational level, and smoking; clinical characteristics included the number of attacks over half a year, number of affected joints, pain and tophi; and finally, social and behavioral variables included resiliency and hope, disease treatment management and diet management.

Previous studies reported that the effect of marital status on HRQoL in gout patients is inconsistent.[3,5,12] Chandratre et al found that married people had better HRQoL than single people.[3] However, this was not the case for Chinese gout patients.[5,12] No statistical significance was found concerning marital status and GIS total score in this study, but further analysis suggested that married people had lower scores for gout concern during attacks than singles (β=−0.168), ie single people have more concerns during gout attacks than married people. During gout attacks, patients not only need to endure severe pain but also face changes in physical movement barriers, medical treatment, work, life and social interaction.[26,27] Patients with gout have an increased need for family and intimate relationship support,[26] while these needs in single people are less likely to be met. Therefore, healthcare providers should focus on single patients and assist them in predesigning responses to attacks of gout to mitigate their impact.

Although previous studies have not found an association between educational level and HRQoL in gout patients, it is evident that such an association exists in other chronic diseases[27,28] Interestingly, the present study found that the educational level of gout patients did have a significant impact on the GIS dimension of unmet gout treatment needs (β=0.235). This finding is not in agreement with some other studies.[28,29] A possible reason for this is that people with high educational levels may have access to better health-related knowledge and skills,[30,31] while information may have a negative impact on healthcare utilization.[32] Therefore, healthcare providers are advised to guide gout patients to correctly access and utilize information resources to best meet their treatment needs.

The relationship between smoking and gout is also inconclusive.[33,34] Here, we found that smokers scored higher for the GIS dimension of gout concern during attacks (β=0.131) but lower in the dimension of unmet gout treatment needs (β=−0.178). Studies have shown that the effect of smoking on quality of life is related to the number of cigarettes smoked,[35] duration of the habit,[36] and age of the smokers.[37] Currently, the effect of smoking on HRQoL and its mechanisms in gout patients still needs further investigation.

The correlation between clinical characteristics and HRQoL in gout patients has received more attention. The findings in this study had similar results to previous studies.[5,38,39] Clinical features associated with the total GIS score included tophi (β=0.138) and pain intensity (β=0.255). In addition, tophi was associated with two GIS dimensions including gout concern overall (β =0.178) and gout concern during attacks (β =0.140).Tophi is a specific sign of chronic gout, which not only causes changes in body structure and joint movement restrictions, but also exerts negative effects on psychological and social participation, and increases the burden to healthcare systems.[38,40] Treatment to target (T2T) is an effective way to prevent and reduce tophi.[41] Therefore, the implementation of standard treatment should be considered in the management of gout patients.

Studies found that pain was a predictor of low HRQoL in the Chinese gout population.[4,5] The correlation of pain with GIS and its different dimensions was also reported by Pao et al.[42] Our study focused on the effect of the intensity of pain on gout patients. We found that pain intensity affected the total GIS score (β=0.255) and the three dimensions including gout medication side effects (β=0.142), gout concern during attacks (β=0.141), and well-being during attacks (β=0.271). As one of the indicators of the patient-reported outcome (PRO) of gout,[43] pain is the main symptom in acute gout attacks, it is also an important feature of chronic gout, which is also the most direct impact and the main cause of seeking medical

treatment in gout patients.[43] Moreover, pain carries a burden of treatment, decreased mobility, productivity and mood.[44] Therefore, healthcare providers should take measures to actively control inflammation to reduce pain.

The two variables, the number of gout attacks and the number of affected joints, were not significantly associated with the GIS total score but were associated with some GIS dimensions. Gout attacks are one of the main reasons why patients seek medical treatment,[44] and they often present with severe joint swelling and pain, having serious impacts on daily life.[26,44] Frequent attacks and more joints affected mean that treatment is not satisfactory. While actively controlling acute attacks, medical staff should also pay attention to the standard treatment and T2T of gout to reduce the number of acute attacks and the number of affected joints and reduce the impact of the disease.

Resiliency is the ability of individuals to adapt to change in an appropriate and lasting manner, and their ability to choose the best way to address challenges in the face of adversity to maintain physical and mental health.[45] Previous studies have found that psychological capital plays a protective role in maintaining the quality of life.[46] We found that in all dimensions of the PPQ, psychological resiliency was negatively correlated with the total GIS score (β= −0.282), gout concern overall (β= −0.219), gout medication side effects (β= −0.220), and well-being during attacks (β= −0.325). This implies people with high resiliency have a more positive adaptation and more willpower to more effectively accept and adapt to psychological impairment and manage the effects of the disease.[45,46] Therefore, it is recommended that healthcare personnel conduct active psychological interventions to improve the level of resilience of gout patients to help them improve their quality of life. Hope refers to the individual's belief in achieving the goal and the power to adjust the path accordingly.[46] Hope is an important psychological and spiritual resource that can protect against perceived stress, and people with higher hope levels can adopt a more positive coping approach.[47,48] We found that hope was positively correlated with the score for the GIS dimension Gout concern overall (β=0.198), meaning that hope has a negative impact on the quality of life of this dimension. This result differs from previous studies,[10,47] and the reasons for this phenomenon need to be further investigated.

Studies have confirmed the benefit of self-management interventions in improving the quality of life of patients with chronic diseases.[11,49] The present study found that in all GPSAS dimensions, only disease treatment management was negatively correlated with unmet gout treatment needs (β= −0.178), and diet management was negatively correlated with gout concern during attacks (β= −0.138). This implies that active disease treatment and diet management can help to improve the HRQoL in gout patients. Such results are similar to those of Quon et al.[11] Hence, the present study supports a relationship between self-management behaviors and the HRQoL of gout patients, suggesting that the HRQoL can be improved through aggressive self-management interventions.

Although existing studies confirm that the level of disease knowledge is closely related to quality of life,[6] this study did not confirm this association, which requires further investigation.

This study has some deficiencies. First, it is a cross-sectional study that may be limited in explaining causality. Second, we did not recruit healthy controls synchronously, weakening the strength of the conclusions. This study only analyzed the relationship of the three elements of the IMB model with HRQoL, and did not further analyze the mediating role of self-management behaviors. Finally, we did not distinguish the degree of diagnosis in gout patients, which may be detrimental to the practical application of the findings.

Conclusion

In this study, we adopted the IMB model and investigated the relationship of psychosocial behavior with HRQoL in patients with gout. We found that HRQoL in patients with gout in Southwest China was not only associated with demographic factors and clinical characteristics but also associated with resilience, hope, disease treatment management behaviors, and diet management behaviors. The results indicated that healthcare providers should choose intervention strategies with variable factors, actively monitor clinical symptoms, and pay more attention to psychosocial factors to improve the quality of life of patients with gout.

Acknowledgments

The authors acknowledge gout patients who were involved in this study for providing feedback and data. The authors would like to express their gratitude to EditSprings for the expert linguistic services provided.

Funding

This study was supported by the SCST (Science and Technology of Sichuan Province) (Grant No.2018FZ0110).

Disclosure

The authors report no conflicts of interest in this work.

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