Am J Transl Res 2024;16(7):3427-3436
www.ajtr.org /ISSN:1943-8141/AJTR0157244

Original Article

Factors influencing quality of life in early-stage upper gastrointestinal cancer patients in Nanchong city: a qualitative study

Chunhui Xi, Cong Yuan, Juan Liu, Jun Wang, Ying Ling

Digestive System Department, Affiliated Hospital of North Sichuan Medical College, Nanchong 637000, Sichuan, China

Received April 17, 2024; Accepted June 6, 2024; Epub July 25, 2024; Published July 30, 2024

Abstract: Objectives: To identify the determinants of quality of life (QoL) among early-stage upper gastrointestinal cancer (UGIC) patients in Nanchong City to inform the development of targeted treatment plans. Methods: In this retrospective study, 642 patients diagnosed with UGIC were included. A phenomenological approach was employed, involving in-depth face-to-face interviews to explore patients' real-life experiences with QoL, with an emphasis on spiritual and psychological aspects. Data analysis followed Colaizzi's seven-step method. Statistical analyses included one-way Analysis of Variance (ANOVA), t-tests, binary logistic regression, and Pearson correlation tests. Results: QoL was significantly reduced in patients with early-stage GI cancer (P<0.001), with prevalent symptoms of anxiety and depression necessitating focused psychological interventions and enhanced medical care. Influential factors on QoL included income, health insurance coverage, illness duration, and levels of anxiety and depression (P<0.001). A strong negative correlation was observed between QoL scores and both the Hamilton Anxiety Scale (r=-0.7808, P<0.001) and the Hamilton Depression Rating Scale (r=-0.7493, P<0.001). Conclusion: This study underscores the substantial impact of anxiety and depression on the QoL of patients with early-stage UGIC. The findings provide a theoretical basis for implementing comprehensive long-term care strategies.

Keywords: Upper gastrointestinal cancers, quality of life, anxiety, depression, qualitative study

Introduction

Upper gastrointestinal cancer (UGIC) encompasses malignant tumors. UGIC is responsible for approximately 1.606 million new cancer cases and 1.292 million deaths globally, with over half of these cases and deaths occurring in China [1]. This prevalence places a significant medical and economic burden on areas like Nanchong, seriously threatening public health [2, 3]. The prognosis and survival rates of UGIC patients are heavily dependent on the cancer's stage at diagnosis. Thus, early detection, diagnosis, and treatment are paramount for effective cancer management. In 2019, the Affiliated Hospital of North Sichuan Medical College joined the "Early Diagnosis and Treatment of UGIC Project in Sichuan Province". By September 2020, the hospital had screened 4,026 individuals, achieving a detection rate of 4.57% and an early diagnosis rate of 38.04% [4]. For its efforts, the hospital received commendation as an excellent unit in the 2019 summary review of the project. Symptoms of UGIC can include difficulty swallowing, chest pain, indigestion, weight loss, vomiting, and black stool [5]. Regular medical checkups and screenings are essential for early diagnosis and effective treatment.

Despite these measures, quality of life (QoL) among early UGIC patients in Nanchong City has significantly deteriorated. Research shows that psychological factors like anxiety and depression substantially impact cancer patients' QoL and are linked to survival rates [6-8]. Given the global and local lack of research on QoL in early-stage UGIC patients, this study aims to fill this gap by exploring the determinants of QoL in this group in Nanchong City. Our goal is to identify influencing factors and develop tailored interventions to improve patients'

https://doi.org/10.62347/EZON6207

physical and psychological well-being, thereby promoting holistic health and establishing a high-quality, humanistic healthcare service.

Methods

Study subjects

This retrospective study employed a convenience sampling strategy to enroll 642 patients diagnosed with early-stage UGIC, as part of a screening program at the Affiliated Hospital of North Sichuan Medical College from June 2020 to June 2023. Inclusion criteria: 1) Age between 40 and 69 years, diagnosed with UGIC, including high-grade intraepithelial neoplasia or carcinoma in situ [9]. 2) Adequate visual and auditory capabilities, literacy, and no barriers to language communication. 3) Voluntary agreement to participate in the study. Exclusion criteria: 1) Presence of severe comorbidities affecting major organs or current pregnancy. 2) Cognitive impairments, a history of psychiatric conditions, or recent use of anti-anxiety or antidepressant medications. 3) Substance abuse disorders, including chronic alcoholism or drug dependence.

Research methods

(1) Questionnaire Survey: The study engaged two residents from the Department of Gastroenterology at the Affiliated Hospital of North Sichuan Medical College to collect general information from 642 patients. These patients were instructed to complete the World Health Organization Quality of Life-BREF (WHOQOL-BREF) self-assessment questionnaire, which achieved a 100% collection rate. Additionally, two attending physicians assessed all patients using the Hamilton Depression Rating Scale (HAMD) and Hamilton Anxiety Scale (HAMA) after undergoing rigorous consistency training. All assessments were conducted in a separate, quiet, and well-lit room. The General Information Questionnaire, a self-administered tool, gathered demographic data (gender, age, education level, personal monthly income, health insurance status, occupation, ethnicity, marital status, living area) and disease-related information (lesion location, illness duration, and primary symptoms like epigastric discomfort, abdominal pain, and acid reflux).

(2) Data Collection by Interview: Interviews were conducted with all sampled patients following a thorough explanation of the study's purpose, assurance of data confidentiality, and acquisition of signed informed consent. Adhering to the principle of "information saturation", the study selected patients who best reflected the research questions for semi-structured, face-to-face interviews lasting 30 to 60 minutes. Interviews were scheduled in quiet, comfortable, and private settings, audio-recorded, and transcribed verbatim. During the interviews, the interviewer paid close attention to the interviewees' facial expressions, body language, tone, and emotions to capture comprehensive qualitative data.

The WHOQOL-BREF is a self-assessment tool comprising 26 items spanning four domains: physical, psychological, social relationships, and environmental. Each item is rated on a scale from 1 (very dissatisfied) to 5 (very satisfied), with the total score ranging from 26 to 130 (Supplementary Table 1). Higher scores indicate better QoL. A total score of ≥60% is considered satisfactory. An item score of ≥3 is deemed satisfactory, while <3 indicates dissatisfaction. The overall score divides patients into two categories: a failing group (26-71 points) and a passing group (72-130 points) [10].

From the QoL assessments of 642 patients, analysis revealed two predominant themes related to negative emotions: mental and somatic emotions. Mental emotions are further subdivided into tension [11], anxiety [12], fear [13, 14], and depression [15, 16]. Somatic emotions are categorized into sub-themes corresponding to seven different systems: muscular [17], sensory [18, 19], cardiovascular [20], respiratory [21-23], digestive [24, 25], urinary [26, 27], and nervous systems [28].

The HAMA is recognized for its effectiveness in quantifying the severity of anxiety symptoms [29]. It utilizes a five-point scale (0-4 points) for each item with the following criteria: (0 point) asymptomatic, (1 point) mild, (2 points) moderate, (3 points) severe, and (4 points) very severe. The total score is used to evaluate a patient's anxiety severity and to assess the efficacy of pharmacological and psychological interventions. Conversational assessment and observation are conducted, with two people rating independently, scoring at the conclusion of each interview. According to our scale collaborative group, a total HAMA score above 14 indicates clinically significant anxiety. The scale

divides symptoms into two major categories - somatic and psychiatric - to reflect the patient's psychopathology and evaluate treatment outcomes for specific symptom clusters.

Analysis of results: 0-7 points: Normal, 7-14 points: Possible anxiety, 14-21 points: Definite anxiety, 21-29 points: Significantly marked anxiety, 29 points or more: Possible severe anxiety disorder.

This structured approach allows for a precise evaluation of anxiety levels, aiding in the tailored management of the condition.

(3) The HAMD is extensively used to assess clinical depression [30]. Scoring is interpreted as follows: 0-8 points indicate a normal range, 9-19 points suggest possible depression, 20-34 points indicate definite depression, and scores above 35 suggest severe depression. Both anxiety and depression scales were administered by two trained physicians.

(4) Data Analysis Method: The audio recordings from interviews were transcribed into text within 24 hours of completion. These data were then analyzed using Colaizzi's 7-step analysis method [31], which includes: 1) transcription of audio recordings into text; 2) thorough reading of the text; 3) extraction of significant information; 4) coding of recurrent themes; 5) synthesis of themes from coded data; 6) meticulous documentation to ensure no data are overlooked; and 7) validation of findings by returning to participants for confirmation.

(5) Ethical Requirements: Prior to each interview, the purpose and methodology of the study were thoroughly explained to the participants, who were also informed about the confidentiality of the data collected. It was assured that all voice recordings would be used solely for this study and would be destroyed after transcription.

Ethics Statement: This research received approval from the Ethics Committee of the Affiliated Hospital of North Sichuan Medical College. All participants provided informed consent, adhering strictly to ethical guidelines, which included:

1) Informed Consent: The purpose, processes, risks, and benefits of the study were clearly communicated to all participants, either orally or in written form. Participants were informed of their right to voluntarily participate and could withdraw from the study at any time.

2) Data Confidentiality and Privacy Protection: Effective measures were implemented to safeguard the privacy of participants' personal information. Any information that could lead to participant identification was not disclosed, and all participant data in the study report was anonymized.

3) Potential Risk Assessment and Management: Potential risks associated with the study were evaluated during the design phase, with strategies developed to mitigate or manage these risks. It was ensured that participation would not result in any physical or psychological harm.

4) Use of Research Data: Adherence to principles of legality and transparency in data usage was maintained to ensure accurate use and interpretation of research data, minimizing potential data misinterpretation or misuse.

Statistical analysis

Data were analyzed using SPSS 22 (IBM Corp., Armonk, NY, USA) and GraphPad Prism 9 (Dotmatics, Boston, MA, USA). General descriptive statistics described the dataset. Statistical tests included variance and chi-squared tests for normally distributed data; t-tests for two-group comparisons; one-way Analysis of Variance (ANOVA) for multiple group comparisons; binary logistic regression for significant factors; and Pearson Correlation Tests for correlations, with $P<0.05$ considered statistically significant.

Results

Qualitative interviews: general information of 642 respondents

The socio-demographic and clinicopathologic characteristics of the 642 respondents are presented in **Tables 1** and **2**, respectively. Demographic data included gender, age, education level, personal monthly income, health insurance status, occupation, ethnicity, marital status, and residential area. Disease-related data encompassed tumor location and primary clinical symptoms such as epigastric discomfort, abdominal pain, and acid reflux.

Table 1. Socio-demographic characteristics of the 642 respondents

Factors		Number	Quality of life score	t/F	*p* value
Sexuality	Man	327	77.43±7.337	0.021	0.984
	Woman	315	77.42±7.416		
Age	40≤ Age ≤50	242	77.52±7.064	1.356	1.356
	50< Age ≤60	218	77.92±7.583		
	60< Age ≤69	182	76.71±7.496		
Degree of education	Illiterate	163	77.96±7.070	2.353	0.053
	Primary school	126	76.60±7.403		
	Junior middle school	128	77.03±7.270		
	Senior school	144	76.83±7.985		
	University	81	79.36±6.649		
Level of income	>5 thousand	487	77.56±7.372	0.793	0.429
	≤5 thousand	155	77.02±7.375		
Medical insurance situation	Possess	427	77.41±7.577	0.116	0.908
	No possess	215	77.47±6.959		
Career situation	Be unemployed	64	76.69±7.235	0.505	0.604
	Retirement	244	77.70±7.300		
	Incumbency	334	77.37±7.458		
Nationality	Han ethnic group	481	77.40±7.450	0.177	0.860
	Other ethnic minorities	161	77.52±7.149		
Marital status	Unmarried	50	78.86±8.239	0.973	0.405
	Married	470	77.41±7.266		
	Divorcee	63	77.35±6.851		
	Widowed	59	76.46±7.951		
Living area	Town	333	77.55±7.274	0.443	0.658
	Rural area	309	77.29±7.482		

Table 2. Clinicopathological characteristics of the 642 patients

Elements		Number	Quality of life score	t/F	*p* value
Lesion site	Stomach	345	77.40±7.450	0.031	0.970
	Esophagus	241	77.51±7.208		
	Other	56	77.27±1.029		
Main clinical symptoms	D	241	77.51±7.208	0.220	0.826
	F	401	77.38±7.475		
Course of disease	≤3 months	465	77.51±7.394	0.455	0.650
	>3 months	177	77.21±7.326		

Note: D: dysphagia, retrosternal burning sensation, and progressive emaciation; F: gastric pain, which is severe and intolerable, and in some cases, there will be blood in the stool, vomiting of blood, loss of appetite, and emaciation.

Results of the QoL interview for 642 patients

Following the inclusion and exclusion criteria, 642 patients aged 40-69 years participated in the QoL interviews. The WHOQOL-BREF scores among these patients ranged from 49.84% to 70.72%. The lowest score (49.84%) was noted for the item "Do you need to rely on medical help for daily life?", while the highest score (70.72%) was for "Are you satisfied with the conditions of your place of residence?" Patients were categorized into passing (scores 72-100) and failing (scores 56-71) groups based on their QoL scores, with a statistically significant difference between these groups (P<0.001). For further details, refer to **Figure 1**.

Analysis of factors influencing patients' QoL

A univariate analysis was performed to identify factors influencing the QoL of patients with ear-

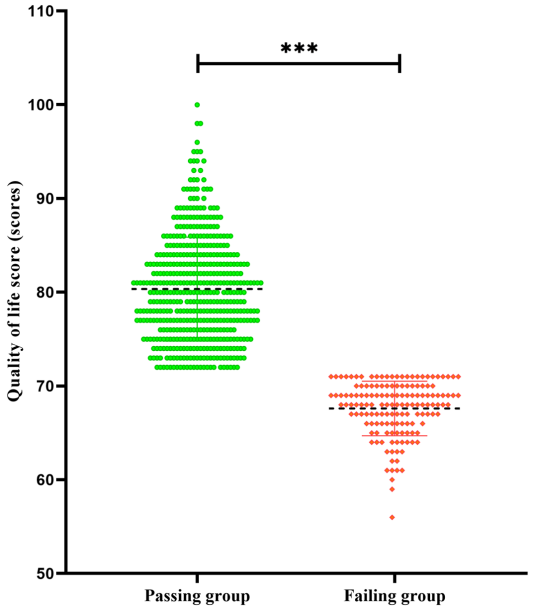

Figure 1. Distribution of quality of life scores in the passing and failing groups (n=642, points). ***P<0.001.

ly-stage UGIC in Nanchong. The analysis indicated that sex, age, and education level did not significantly affect QoL. In contrast, income level, health insurance status, illness duration, and levels of anxiety and depression were found to significantly impact the QoL scores (P<0.001). Detailed results can be found in **Table 3**.

Independent influence factor analysis of UGIC QoL levels of Nanchong area residents

An independent influence factor analysis was conducted using the factors identified in the univariate analysis. The variables were assessed using binary logistic regression, as detailed in **Table 4**. The analysis revealed that income status, health insurance status, and illness duration were not independent factors influencing the QoL scores of patients. However, scores from the HAMA and HAMD were significant independent factors (P<0.05) affecting patient QoL. For detailed results, refer to **Table 5**.

Correlation of anxiety and depression scores with patients' QoL

Given that anxiety and depression were identified as independent factors impacting QoL, a correlation analysis was performed to assess their relationship with QoL. This analysis showed that QoL in patients with early-stage UGICs decreased as levels of depression and anxiety increased (**Figure 2A** and **2B**). A strong negative correlation was found between QoL and both HAMA and HAMD scores, with statistically significant differences (P<0.001).

Discussion

UGIC includes malignant tumors in the esophagus, stomach, and gastroesophageal junction, including the cardia [1]. In 2022, the combined incidence of esophageal and gastric cancers was reported as 447,900 cases [32]. Esophageal carcinoma is primarily classified into squamous cell carcinoma and adenocarcinoma based on the cell type of origin [33]. Gastric cancer is categorized into diffuse and intestinal types, with the diffuse type noted for being more challenging to treat [34].

Previous studies have indicated that the incidence of UGIC is influenced by a combination of genetic, dietary, and lifestyle factors [35]. It is hypothesized that risk factors such as tobacco and alcohol use contribute to esophageal cancer by inducing DNA damage in the cells lining the esophagus [36].

Diagnosis of early UGIC predominantly relies on endoscopy and histopathology [37]. Early symptoms of UGIC are often subtle and can be easily overlooked, which significantly affects treatment outcomes. In clinical settings, esophageal cancer may present with symptoms such as difficulty swallowing, chest pain, weight loss, hoarseness, chronic cough, and vomiting [38]. Stomach cancer symptoms may include poor appetite, unintentional weight loss, abdominal pain, vague discomfort, heartburn or indigestion, nausea, vomiting (possibly with blood), abdominal swelling, blood in the stool, and fatigue [39]. Clinical diagnoses have shown that varying tumor locations correlate with distinct symptom presentations, as detailed in **Table 2**.

Post-diagnosis, patients often experience a decline in QoL, as evidenced in **Table 6** and **Figure 1**. Current treatment modalities for cancer include surgery, chemotherapy, targeted therapies, immunotherapy, and radiation therapy [40]. Treatment approaches may vary by cancer stage and patient-specific factors, and

Table 3. Analysis of factors affecting life quality for patients

Elements		Number	Passing group (n=495)	Failing group (n=147)	t/F value	*p* value
Sexuality	Man	327	261 (52.73)	66 (44.90)	6.382e-005	0.994
	Woman	315	234 (47.27)	81 (55.10)		
Age	40≤ Age ≤50	242	181 (36.57)	61 (41.50)	0.448	0.800
	50< Age ≤60	218	173 (34.95)	45 (30.61)		
	60< Age ≤69	182	141 (28.48)	41 (27.89)		
Degree of education	Illiterate	163	122 (24.65)	41 (27.89)	2.895	0.576
	Primary school	126	93 (18.79)	33 (24.45)		
	Junior middle school	128	95 (19.19)	33 (24.45)		
	Senior school	144	121 (24.44)	23 (15.65)		
	University	81	64 (12.93)	17 (11.56)		
Level of income	>5 thousand	487	475 (95.96)	12 (8.16)	153.200	*P*<0.001
	≤5 thousand	155	20 (4.04)	135 (91.84)		
Medical insurance situation	Possess	427	400 (80.81)	27 (18.37)	79.300	*P*<0.001
	No possess	215	95 (19.19)	120 (81.63)		
Course of disease	>3	177	44 (8.89)	133 (90.48)	131.200	*P*<0.001
	≤3	465	451 (91.11)	14 (9.52)		
HAMA	≥14	206	83 (16.77)	123 (83.67)	89.790	*P*<0.001
	<14	436	412 (83.23)	24 (16.33)		
HAMD	≥20	135	19 (3.84)	116 (78.91)	115.800	*P*<0.001
	<20	507	476 (96.16)	31 (21.09)		

Note: HAMA = Hamilton Anxiety Scale; HAMD = Hamilton Depression Rating Scale.

Table 4. Assignment table

Factors	Divisor	Assignment
Level of income	X1	Monthly profit >5 thousand =1, Monthly profit ≤5 thousand =2
Course of disease	X2	≤3 months =1, >3 months =2
Medical insurance situation	X3	Have medical insurance =1, No medical insurance =2
HAMA	X4	Mark ≥14=1, Mark <14=2
HAMD	X5	Mark ≥20=1, Mark <20=2
Quality of life score	X6	Pass ≥72=1, Fail <72=2

Note: HAMA = Hamilton Anxiety Scale; HAMD = Hamilton Depression Rating Scale.

Table 5. Analysis of independent influencing factors on the quality of life of patients with upper gastrointestinal tract cancer in Nanchong area

Factors	*β*	*SE*	*Wals*	*p*	*OR* (95% *CI*)
Level of income	0.184	0.501	0.134	0.714	1.202 (0.45-3.211)
Medical insurance situation	-2.389	0.327	2.296	0.130	1.775 (0.845-3.727)
Course of disease	-3.931	0.345	0.963	0.326	0.625 (0.244-1.598)
HAMA grade	-3.931	0.345	53.382	0.001	0.092 (0.048-0.174)
HAMD grade	0.574	0.379	129.846	0.001	0.02 (0.01-0.039)

Note: HAMA = Hamilton Anxiety Scale; HAMD = Hamilton Depression Rating Scale.

may involve combinations or sequences of different therapies. Beyond direct treatment, improving patient QoL has been identified as crucial for alleviating disease impact [41, 42].

Our study sought to identify factors influencing QoL by analyzing physical, psychological, social, and environmental aspects of patients' lives. Patients were categorized into two groups

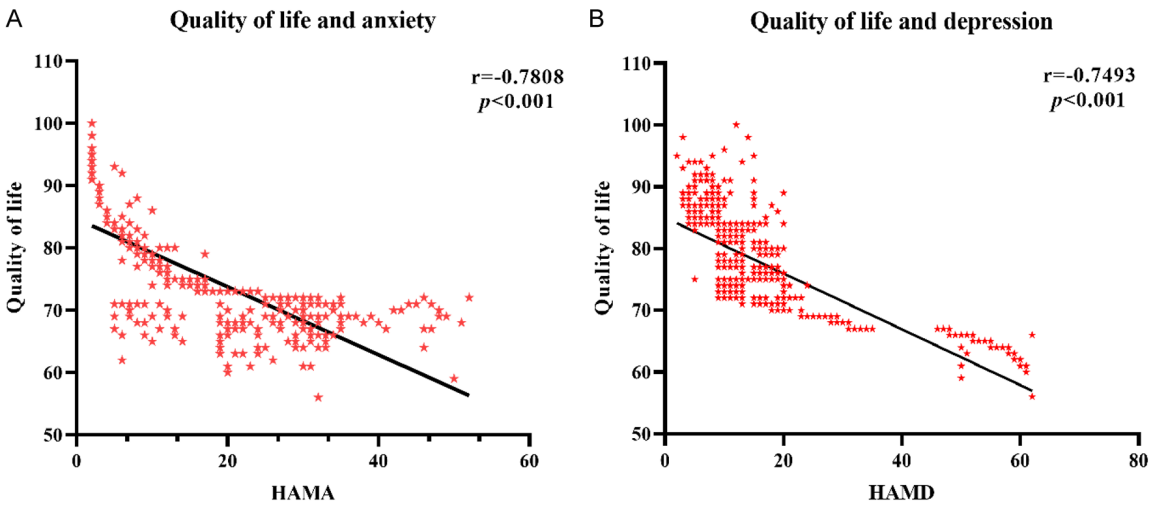

Figure 2. Correlation of quality of survival with anxiety and depression. A: Quality of survival was negatively correlated with anxiety; B: Quality of survival was negatively correlated with depression (n=642; P<0.001). HAMA = Hamilton Anxiety Scale; HAMD = Hamilton Depression Rating Scale.

Table 6. Results of the survey on the quality of life level of residents with UGIC in the Nanchong area (n=642)

Cognitive dimension	Questions	Passing number (person)	Passing rate (%)
Physical	Q3: Do you feel that pain prevents you from doing what you need to do?	326	50.78
	Q10: Do you have enough energy to cope with daily life?	446	69.47
	Q16: Are you satisfied with your sleep?	350	54.52
	Q15: What is your ability to act?	342	53.27
	Q17: Are you satisfied with your ability to do everyday things?	336	52.34
	Q4: Do you need to rely on medical help for daily living?	320	49.84
	Q18: Are you satisfied with your work ability?	333	51.87
Psychological	Q5: Do you find life fun?	321	50.00
	Q7: Are you able to concentrate?	365	56.85
	Q19: Are you satisfied with yourself?	334	52.02
	Q11: Do you think your appearance is passable?	451	70.25
	Q26: Do you have negative feelings? (e.g., low mood, despair, anxiety, depression)	450	70.09
	Q6: Do you find your life meaningful?	323	50.31
Social relationships	Q20: Are you satisfied with your relationships?	326	50.78
	Q22: Are you satisfied with the support you receive from your friends?	402	62.62
	Q21: Are you satisfied with your sex life?	367	57.17
	Q8: Do you feel safe in your daily life?	400	62.31
	Q23: Are you satisfied with the conditions where you live?	454	70.72
	Q12: Do you have enough money?	447	69.63
	Q24: How satisfied are you with the ease of getting health care services?	449	69.94
Environment	Q13: Do you have all the information you need in your daily life?	436	67.91
	Q14: Do you have access to leisure activities?	451	70.25
	Q9: Is your living environment good for your health?	452	70.40
	Q25: Are you satisfied with your transportation situation?	452	70.40
Total	Patients with a total score of ≥72 as a passing self-assessment of quality of life level	495	77.10

Note: UGIC = Upper gastrointestinal cancer.

based on their QoL scores. Our analysis examined variables such as gender, age, education, income, healthcare access, illness duration, and levels of anxiety and depression. Findings indicated that income, health insurance, illness duration, and psychological factors such as anxiety and depression significantly affected QoL, aligning with previous studies [43]. An independent factor analysis verified anxiety and depression as significant independent factors impacting QoL in the Nanchong area. The analysis revealed a strong negative correlation between QoL and both HAMA and HAMD scores, suggesting that interventions addressing anxiety and depression post-diagnosis could markedly enhance patient QoL.

While this study sheds light on the influence of depression and anxiety on the QoL in patients with UGIC, it is imperative to conduct further research with more extensive clinical data to substantiate these findings. Future studies should particularly focus on targeted treatments for depression and anxiety to assess their efficacy in enhancing QoL. This area should be prioritized in upcoming research efforts.

This study presents novel insights into the prevalence of anxiety and depression among patients with early-stage UGIC, which significantly contributes to the deterioration of their QoL. There is a notable gap in the international literature concerning QoL, anxiety, and depression among early-stage cancer patients, especially in China. By integrating qualitative interviews with objective questionnaire data, this research provides a comprehensive understanding of the QoL challenges faced by early cancer patients. This approach not only enhances our knowledge but also supports the development of targeted interventions to improve patient well-being, embodying the humanistic ethos of medicine.

Our findings reveal that anxiety and depression markedly influence the QoL of patients with early-stage UGIC in Nanchong City. Univariate analysis identified a significant decrease in QoL associated with these emotional states. Further binary logistic regression analysis underscored anxiety and depression as independent factors adversely affecting QoL. A correlation analysis confirmed a strong negative relationship between QoL scores and the presence of anxiety and depression.

In conclusion, the psychological challenges faced by patients with early UGIC are widespread and stem from a variety of stressors, including disease awareness, social support, economic constraints, and spiritual health. Addressing these negative emotions is essential as they not only reduce QoL but may also adversely affect treatment outcomes.

Acknowledgements

This research was supported by Nanchong City Social Science Research “14th Five-Year Plan” 2021 Project, NC21B046.

Disclosure of conflict of interest

None.

Address correspondence to: Chunhui Xi, Digestive System Department, Affiliated Hospital of North Sichuan Medical College, No. 1 Maoyuan South Road, Nanchong 637000, Sichuan, China. E-mail: xi_chunhui@126.com

References

[1] Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA and Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2018; 68: 394-424.

[2] Toh Y, Morita M, Yamamoto M, Nakashima Y, Sugiyama M, Uehara H, Fujimoto Y, Shin Y, Shiokawa K, Ohnishi E, Shimagaki T, Mano Y and Sugimachi K. Health-related quality of life after esophagectomy in patients with esophageal cancer. Esophagus 2022; 19: 47-56.

[3] Polityńska B, Pokorska O, Wojtukiewicz AM, Sawicka M, Myśliwiec M, Honn KV, Tucker SC and Wojtukiewicz MZ. Is depression the missing link between inflammatory mediators and cancer? Pharmacol Ther 2022; 240: 108293.

[4] Jia S, Li H, Zeng H, Zheng R, Li J, Shi J, Yang Z, Cao M and Chen W. Association of cancer prevention awareness with esophageal cancer screening participation rates: results from a population-based cancer screening program in rural China. Chin J Cancer Res 2019; 31: 601-608.

[5] Al Zoubi M, Khidir N and Bashah M. Challenges in the diagnosis of leak after sleeve gastrectomy: clinical presentation, laboratory, and ra-

diological findings. Obes Surg 2021; 31: 612-616.
[6] Graser A. Antidepressants for the treatment of depression in people with cancer. Urologie 2024; 63: 488-491.
[7] Schilstra CE, Sansom-Daly UM, Ellis SJ, Anazodo AC, Trahair TN, Lindsay T, Amiruddin A, O'Dwyer C, Maguire F, Nevin S, Battisti R and Fardell JE. Social anxiety symptoms in adolescents and young adults recently diagnosed with cancer. J Adolesc Young Adult Oncol 2024; [Epub ahead of print].
[8] Wu Y, Zhang Y and Zou L. Effects of anxiety, depression, and fatigue on quality of life in early esophageal cancer patients following endoscopic submucosal dissection. Ann Palliat Med 2020; 9: 3766-3775.
[9] Lang GD and Konda VJ. Early diagnosis and management of esophageal and gastric cancer. Minerva Gastroenterol Dietol 2013; 59: 357-76.
[10] World Health Organization. Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. Psychol Med 1998; 28: 551-8.
[11] Christodoulidis G, Konstantinos-Eleftherios K and Marina-Nektaria K. Double role of depression in gastric cancer: as a causative factor and as consequence. World J Gastroenterol 2024; 30: 1266-1269.
[12] Nuzhath FJ, Patil NJ, Sheela SR and Manjunath GN. A randomized controlled trial on pranayama and Yoga Nidra for anxiety and depression in patients with cervical cancer undergoing standard of care. Cureus 2024; 16: e55871.
[13] Schapira L, Zheng Y, Gelber SI, Poorvu P, Ruddy KJ, Tamimi RM, Peppercorn J, Come SE, Borges VF, Partridge AH and Rosenberg SM. Trajectories of fear of cancer recurrence in young breast cancer survivors. Cancer 2022; 128: 335-343.
[14] Yang Y, Sun H, Luo X, Li W, Yang F, Xu W, Ding K, Zhou J, Liu W, Garg S, Jackson T, Chen Y and Xiang YT. Network connectivity between fear of cancer recurrence, anxiety, and depression in breast cancer patients. J Affect Disord 2022; 309: 358-367.
[15] Xia W, Ou M, Chen Y, Chen F, Yan M, Xiao Z and Xu X. Experiences of patients with advanced cancer coping with chronic pain: a qualitative analysis. BMC Palliat Care 2024; 23: 94.
[16] Bylsma LM. Emotion context insensitivity in depression: toward an integrated and contextualized approach. Psychophysiology 2021; 58: e13715.
[17] Rubenstein JH, Jiang L, Kurlander JE, Chen J, Metko V, Khodadost M, Nofz K and Raghunathan T. Incomplete response of gastroesophageal reflux symptoms poorly predicts erosive esophagitis or barrett's esophagus. Clin Gastroenterol Hepatol 2021; 19: 2284-2292, e2.
[18] Neuschütz KJ, Fourie L, Germann N, Pieters A, Däster S, Angehrn FV, Klasen JM, Müller-Stich BP, Steinemann DC and Bolli M. Long-term quality of life after hybrid robot-assisted and open Ivor Lewis esophagectomy for esophageal cancer in a single center: a comparative analysis. Langenbecks Arch Surg 2024; 409: 118.
[19] Eszlari N, Hullam G, Gal Z, Torok D, Nagy T, Millinghoffer A, Baksa D, Gonda X, Antal P, Bagdy G and Juhasz G. Olfactory genes affect major depression in highly educated, emotionally stable, lean women: a bridge between animal models and precision medicine. Transl Psychiatry 2024; 14: 182.
[20] Bikomeye JC, Beyer AM, Kwarteng JL and Beyer KMM. Greenspace, inflammation, cardiovascular health, and cancer: a review and conceptual framework for greenspace in cardio-oncology research. Int J Environ Res Public Health 2022; 19: 2426.
[21] Davey S, Halberstadt J and Bell E. Where is emotional feeling felt in the body? An integrative review. PLoS One 2021; 16: e0261685.
[22] Chan PS, Jhu YJ, Chang WP, Fang H, Shih HT and Davenport PW. Effects of emotional contexts on respiratory attention task performance. Respir Physiol Neurobiol 2023; 308: 103984.
[23] Homma I and Phillips AG. Critical roles for breathing in the genesis and modulation of emotional states. Handb Clin Neurol 2022; 188: 151-178.
[24] Benegal A, Friesen H, Schurman J, Colombo J and Friesen C. Meal related symptoms in youth with chronic abdominal pain: relationship to anxiety, depression, and sleep dysfunction. J Pediatr Gastroenterol Nutr 2024; 78: 1091-1097.
[25] Bonaz B, Lane RD, Oshinsky ML, Kenny PJ, Sinha R, Mayer EA and Critchley HD. Diseases, disorders, and comorbidities of interoception. Trends Neurosci 2021; 44: 39-51.
[26] Bolla SR, Odeluga N, Amraei R and Jetti R. Histology, Bladder. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024.
[27] Quaghebeur J, Petros P, Wyndaele JJ and De Wachter S. The innervation of the bladder, the pelvic floor, and emotion: a review. Auton Neurosci 2021; 235: 102868.
[28] Chikh S, Mguidich H, Souissi H and Watelain E. How does the central nervous system control forthcoming movement with different emotional stimuli? Percept Mot Skills 2022; 129: 217-231.
[29] Thompson E. Hamilton rating scale for anxiety (HAM-A). Occup Med (Lond) 2015; 65: 601.

[30] Leucht S, Fennema H, Engel R, Kaspers-Janssen M, Lepping P and Szegedi A. What does the HAMD mean? J Affect Disord 2013; 148: 243-8.
[31] Northall T, Chang E, Hatcher D and Nicholls D. The application and tailoring of Colaizzi's phenomenological approach in a hospital setting. Nurse Res 2020; 28: 20-25.
[32] Zheng RS, Chen R, Han BF, Wang SM, Li L, Sun KX, Zeng HM, Wei WW and He J. Cancer incidence and mortality in China, 2022. Zhonghua Zhong Liu Za Zhi 2024; 46: 221-231.
[33] Ku GY and Ilson DH. Chapter 71: cancer of the esophagus. In: Niederhuber JE, Armitage JO, Dorshow JH, Kastan MB, Tepper JE, editors. Abeloff's Clinical Oncology. 6th edition. Philadelphia, PA: Elsevier; 2020.
[34] Ku GY and Ilson DH. Chapter 72: cancer of the stomach. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, editors. Abeloff's Clinical Oncology. 6th edition. Philadelphia, PA: Elsevier; 2020.
[35] Schwartz SM. Epidemiology of cancer. Clin Chem 2024; 70: 140-149.
[36] Yuan S, Chen J, Ruan X, Sun Y, Zhang K, Wang X, Li X, Gill D, Burgess S, Giovannucci E and Larsson SC. Smoking, alcohol consumption, and 24 gastrointestinal diseases: mendelian randomization analysis. Elife 2023; 12: e84051.
[37] Saltzman JR and Gibson MK. Clinical manifestations, diagnosis, and staging of esophageal cancer. Howell DA and Goldberg RM, editors. UpToDate. Waltham, MA: UpToDate Inc. https://www.uptodate.com (Accessed on January 28, 2020).
[38] Goldberg RM. Pathology and molecular pathogenesis of gastric cancer. UpToDate. 2020. Accessed at https://www.uptodate.com/contents/pathology-and-molecular-pathogenesis-of-gastric-cancer on June 20, 2020.
[39] Franck C, Zimmermann N, Goni E, Lippert H, Ridwelski K, Kruschewski M, Kreuser N, Lingohr P, Schildberg C, Vassos N, Waidmann O, Peitz U, Lang H, Grmminger PP, Bruns C, Veits L, Vieth M, Moehler M, Lordick F, Gockel I, Schumacher J, Malfertheiner P and Venerito M. Different prevalence of alarm, dyspeptic and reflux symptoms in patients with cardia and non-cardia gastric cancer. J Gastrointestin Liver Dis 2021; 30: 431-437.
[40] Kaur R, Bhardwaj A and Gupta S. Cancer treatment therapies: traditional to modern approaches to combat cancers. Mol Biol Rep 2023; 50: 9663-9676.
[41] Gerhardt S, Benthien KS, Herling S, Leerhøy B, Jarlbaek L and Krarup PM. Associations between health-related quality of life and subsequent need for specialized palliative care and hospital utilization in patients with gastrointestinal cancer-a prospective single-center cohort study. Support Care Cancer 2024; 32: 311.
[42] Clausing D, Fowler ME, Harmon C, Tucker A, Outlaw D, Akce M, El-Rayes B, Giri S and Williams GR. Association of emotional support with quality of life, mental health, and survival in older adults with gastrointestinal malignancies-results from the CARE registry. Cancer Med 2023; 12: 19102-19111.
[43] Franzoi IG, Granieri A, Sauta MD, Agnesone M, Gonella M, Grimaldi C, Vallauri I, Boglione A, Vana F, Bergnolo P and Comandone A. The psychological impact of sarcoma on affected patients. Psychooncology 2023; 32: 1787-1797.

Supplementary Table 1. Quality of life scale interview topic setting sheet

Subjects	Subtopics	Related description	References
Spiritual Emotions and Quality of Life	Nervousness	Nervous about side effects, risks, and the effectiveness of the treatment process.	[11]
	Anxiety	May trigger anxiety about future quality of life, etc.	[12]
	Fear	Lack of specialized knowledge leads to fear and trepidation of patients about various possible future situations.	[13] [14]
	Depressive	A large gap can lead to self-doubt, or even negative feelings of resentment, loss of hobbies, and a lack of passion and interest in new things.	[15] [16]
Somatic emotions and quality of life	Musculation system	Affects the tension and activity level of the muscular system. Causes muscle pain, stiffness and discomfort, such as muscle soreness, inflexibility, muscle twitching, chattering of teeth, and shaky voices.	[17]
	Sensory system	Effects on the sensory system (e.g., vision, hearing, touch, taste, and smell) that affect sensitivity and perception of the sensory system. Examples include blurred vision, chills and fever, feelings of weakness, tingling in the body.	[18] [19]
	Cardiovascular system	Increases cardiovascular burden by causing increased heart rate, elevated blood pressure, and vasoconstriction. Manifests itself in the cardiovascular system as tachycardia, palpitations, chest pain, vasomotor sensation, fainting sensation, and cardio absorption.	[20]
	Respiratory system	Affects the depth, frequency and rhythm of breathing. Rapid and shallow breathing. Respiratory symptoms such as chest tightness, choking sensation, sighing and dyspnea.	[21] [22] [23]
	Alimentary system	Alteration of peristalsis, secretion and blood flow in the gastrointestinal tract, thus affecting digestion and absorption. Symptoms such as stomach upset, indigestion, and abdominal bloating. Difficulty swallowing, warmth, indigestion (abdominal pain after eating, burning sensation in the stomach. bloating, nausea, feeling of fullness in the stomach), bowel movements, bowel sounds, diarrhea, weight loss, constipation.	[24] [25]
	Urinary system	Frequent urination, dysuria, menopause, frigidity, premature ejaculation, erectile dysfunction, impotence.	[26] [27]
	Nervous system	Physical reactions such as flushing, paleness, easy sweating, “goose bumps”, tension headaches, and hair standing on end.	[28]

Note: Somatic emotions are the strong connection between physical sensations and emotions. This emotional experience usually manifests itself in physiological sensations or reactions such as rapid heartbeat, muscle tension, shortness of breath, upset stomach, etc., which do not arise from a physical illness or problem, but are associated with an emotional state [43]. Somatic emotions are one of the most important aspects of physical and mental health because of the bidirectional interplay between emotional and physiological responses. In cancer patients, their mood changes can easily lead to somatization.