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Social participation and its associated factors among head and neck cancer patients: a cross-sectional study

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Abstract

Background The special anatomical location and side effects of head and neck tumors (such as appearance change and dysphagia) can easily cause social isolation and psychological problems in patients. Social participation, as an important rehabilitation index that affects their quality of life and prognosis, is rarely studied in China, and the associated factors remain underexplored.

Objectives The purpose of this study is to evaluate the social participation level of patients with head and neck tumors and explore its associated factors, to provide a reference for formulating targeted intervention measures.

Methods Between September 2023 and July 2024, 176 patients with head and neck tumors from a tertiary hospital in Liaoning Province, China, participated in a cross-sectional study. The research instruments comprised the Demographic and Clinical Characteristics Questionnaire, the Social Dysfunction Screening Scale (SDSS), the Lubben Social Network Scale-6 (LSNS-6), and the Functional Assessment of Cancer Therapy-Head & Neck (FACT-H&N).

Results The defect rate of social participation in patients with head and neck tumors was 86.36%. Multivariable stepwise linear regression analysis showed that the total social participation score was negatively correlated with the total social network score ($\beta = -0.327$, $P < 0.001$), negatively correlated with the total quality of life score ($\beta = -0.201$, $P < 0.001$), negatively correlated with per capita monthly household income ($\beta = -0.193$, $P = 0.003$), positively correlated with divorce/widowhood ($\beta = 0.166$, $P = 0.011$) correlation, and positively correlated with radiotherapy ($\beta = 0.133$, $P = 0.035$).

Conclusions The degree of social participation of patients with head and neck cancer is low. It is suggested that medical staff should pay attention to the feelings of social participation of patients with head and neck cancer, focusing on patients who are unmarried, divorced or widowed, with low monthly family income and entering the radiotherapy stage, and take clinical nursing intervention measures to improve the social network of patients and pay attention to their quality of life, to improve the feelings of social participation of patients.

Keywords Head and neck tumors, Social participation, Social networks, Quality of life

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Introduction

With the global cancer burden gradually increasing, cancer has become a global public health problem. Head and neck cancer (HNC) are malignant tumors that occur in the oral and maxillofacial, pharyngeal, laryngeal, nasal, and sinus regions. According to the Global Cancer Statistics Report 2020 [1], there will be 19.29 million new cases of malignant tumors worldwide in 2020, including 930,000 cases of head and neck malignant tumors; China will have 4.57 million new cases of malignant tumors, including 142,000 cases of head and neck malignant tumors.

With the advancement of medical technology and the prolongation of patient survival, people not only want to relieve the disease and prolong life through treatment, but also to maximize the patient's participation and return to society [2]. However, the current level of social participation of cancer patients is not optimistic, and the disease has seriously hindered the normal life of cancer patients, in which the level of participation in household chores, work, and social activities is most common. A 6-month follow-up study showed that young and middle-aged patients with breast cancer after surgery had poorer social participation after surgery [3]. One of the most difficult tasks for patients with primary malignant bone tumors of the lower extremities includes heavy housework [4]. A Cochrane systematic review that included 1,835 cancer patients noted that the unemployment rate for cancer patients was 40% higher than for those who had never had cancer [5]. Schepers et al. [6] found that 32.9% of post-surgical patients with cerebrospinal tumors failed to return to pre-treatment work. Nikolić et al. [7] found that female breast cancer patients maintain their social activities more than their day-to-day activities more difficult. There is therefore an urgent need to further develop effective measures to increase the level of social participation of cancer survivors, with particular attention to their level of participation in household chores, work, or socialization, to maximize the restoration of their social roles.

Cancer rehabilitation research in China is still in its infancy, and there are fewer studies on the social participation of head and neck cancer patients. Domestic research on social participation mainly focuses on the review of foreign literature, and the research population mainly on patients with breast cancer, bladder Cancer, and other types of cancer [3, 8, 9], while there are fewer studies related to the population of head and neck cancer patients; the current research is mostly quantitative, mainly carrying out status quo surveys and conducting analysis of associated factors, but lacks the analysis of associated factors of social participation of head and neck cancer patients.

Currently, the definition of social participation has not been clearly defined. The World Health Organization International Classification of Functioning, Disability and Health (ICF) pointed out that social participation, which was proposed in ICF as an indicator of rehabilitation outcome assessment, refers to the involvement in a life situation, and the introduction of the concept of social participation indicates the transformation of rehabilitation outcome indicators from the physical level to the social level [10]. The ICF model emphasizes the dynamic interaction of various factors, in which "participation", as an important part of the ICF framework, is influenced by environmental, personal, as well as health factors, and has an important impact on people's functional status and quality of life [11]. Woodman et al. [12] regarded social participation as a marker of social-perceptual functioning, which plays an important role in influencing patients' physical and mental health, social functioning, and quality of life. Perceived functioning is a marker that plays an important role in influencing patients' physical and mental health, social functioning, and quality of life. Social participation in this study refers to the subjective experience and behavioral process in which individuals can integrate into the social environments and actively participate in social activities [13]. Nowadays, more and more studies have begun to gradually emphasize social participation as an important therapeutic goal in disease rehabilitation, while the concept of social participation has also been studied and valued in the field of oncology treatment and rehabilitation [14].

The treatment of head and neck tumors includes surgery, radiation therapy, and chemoradiation; however, the treatment also brings a series of side effects to patients [15]. These toxic side effects not only reduce patients' mobility and self-care ability, but also limit their normal social activities, leading to self-isolation in interpersonal interactions and poor interpersonal interactions, and patients may feel alienated, lonely, and exhibit social detachment problems away from their social groups [16], which makes it more difficult for patients to integrate into normal life. Patients are similarly subjected to economic, social, as well as psychological stress and experience varying degrees of poor psychological and social conditions, which in turn affect the quality of their survival [17] and are detrimental to their physical and mental health and level of social participation. Patients with HNC face unique challenges due to disfigurement and functional impairments (such as speech/swallowing disorders) caused by treatment. These changes not only cause physical disabilities, but also lead to severe psychological and social functional impairments, causing patients to face multidimensional difficulties such as stigmatization, social withdrawal, and employment

difficulties, ultimately leading to a significant reduction in their level of social participation.

Social networks, as a set of connections that function as sources of social support for individuals [18], are important environmental factors that influence social participation [19]. A social network is a set of connections in which an individual operates as a source of social support [18]. A meta-analysis study found that individuals with appropriate social connections were 50% more likely to survive compared to those with poor or inadequate social connections [20]. The degree of limited social participation has a deeper impact on all aspects of a patient's life and socialization and helping patients improve their social participation can help improve their quality of life. Social participation (such as returning to work and social activities) requires basic life skills. Studies have shown that poor nutrition, pain, communication barriers, and other quality-of-life issues experienced by patients with head and neck tumors are the core causes of their social isolation [21]. For example, patients with xerostomia after radiotherapy frequently drink water, which affects their participation in social activities, while patients who have undergone laryngectomy avoid public places due to language barriers [22]. Therefore, it is necessary to conduct in-depth research on the impact of social networks and quality-of-life on the social participation of patients with head and neck tumors.

Given that helping cancer patients integrate into normal life is one of the important goals of cancer rehabilitation [23], measuring how the quality of life and social networks affect social participation has been explored. Yet, little is known about the factors that influence social participation in head and neck cancer patients in the Chinese cultural context. Furthermore, few studies have examined the social participation of head and neck cancer patients.

Therefore, this study aimed to investigate the level of social engagement of head and neck cancer patients and identify possible associated factors to provide a theoretical basis for clinical nursing practice.

Methods

Design, sample, and data collection

A cross-sectional study was conducted between September 2023 and July 2024 at a tertiary hospital in Liaoning Province, China.

Patients were included according to the following criteria: (1) pathologically confirmed malignant head and neck tumors; (2) age > 18 years old; and (3) consent to participate in this study. Individuals with severe cognitive or psychiatric disorders or comorbidities with other malignancies or severe underlying diseases were excluded.

According to the statistical variable analysis Kendall's [24] sample size estimation method was calculated according to the sample size of at least 5–10 times the number of variables. Through the literature review, a total of 21 predictive influence variables were included in this study, including 14 general demographic variables and 7 variables involved in two scales. Considering the 20% invalid questionnaire recovery rate, the total sample size for this study ranges from 126 to 252 cases. The final sample size of this questionnaire was determined to be 176. A detailed methodology for sample size calculation was provided in the Supplementary Material. This study was reported using STROBE.

Ethical considerations

The study was approved by the Ethics Committee of Medical Science Research in the First Affiliated Hospital of China Medical University under ethical number [2024] 330. A researcher explained the purpose of the study and relevant details to eligible participants using a standardized guideline and distributed questionnaires after obtaining their informed consent.

Instruments

Demographic and clinical characteristics questionnaire

The self-designed questionnaire included a demographic and clinical characteristics questionnaire. Patients provided demographic information such as gender, age, education level, marital status, place of residence, per capita monthly income, etc., and the researcher collected clinical information based on the patient's medical records, such as the primary site of cancer, the length of time since the diagnosis of the disease, and whether radiotherapy was administered during the entry phase of radiotherapy.

Social dysfunction screening scale, SDSS

The SDSS scale was developed by WHO [25] to assess the degree of patients' social participation. The scale mainly includes 10 dimensions: occupation and work, social activities outside the family, marital function, social withdrawal, parental function, activities within the family, family function, interest and concern for the outside world, personal self-care, sense of responsibility, and plans for the future. 0 is divided into normal social participation, 1 is divided into partial limited social participation, and 2 is divided into limited social participation. The subjects with a total score of ≥ 2 were assessed as having limited social participation, with a minimum score of 0 and a maximum score of 20. The higher the score, the lower the degree of social participation. At present, scholars have used this scale to measure the social participation of cancer patients [26]. The re-tested Cronbach's alpha coefficient for this scale has been

measured as 0.888 in several studies [27]. In this study, the scale of Cronbach's coefficient was 0.668.

Lubben Social Network Scale-6, LSNS-6

The scale was developed by Lubben [28] in 1988. The LSNS-6 consists of 6 items with two dimensions: the family network dimension (items 1, 2, and 3) and the friend network dimension (items 4, 5, and 6), each item has 5 options, with the option scores ranging from 0 (none)–5 (nine or more), and the total score ranges from 0 to 30, with <12 being considered social isolation, and scores of less than 6 on each dimension being considered family or friend isolation. In 2018, Chinese researchers conducted reliability and validity tests on the Chinese version of the LSNS-6 [29]. The results showed that the structural validity of the family network dimension was 0.84–0.91, the structural validity of the friend network dimension was 0.91–0.96, and Cronbach's $\alpha = 0.83$. In this study, the scale of Cronbach's coefficient was 0.852.

Functional Assessment of Cancer Therapy-Head & Neck, FACT-H&N

The FACT-H&N was first designed by the U.S. Medical Center [30]. The scale contains five domains, namely, physical status (7 items), social/family status (7 items), affective status (6 items), functional status (7 items), and specificity module (11 items), with a total of 38 items. The FACT-H&N utilizes a 5-point Likert scale, ranging from 0 for “not at all”, 1 for “somewhat”, 2 for “somewhat”, and 3 for “not at all”. “Positive entries are scored directly from 0 to 4, and negative entries (i.e., the higher the value of the response option, the worse the quality of life) are scored inversely. The total score on the scale ranges from 0 to 144, with higher scores indicating a higher quality of life. In 2007, Luo Jiahong [31] et al. conducted a Chinese adaptation of the scale, which yielded a total Cronbach's α coefficient of 0.88, with an internal consistency of 0.58 for the specific module and a test-retest reliability of 0.96. In this study, the scale of Cronbach's coefficient was 0.891.

Data compilation

The researcher distributed the questionnaires using standardized instructions. The researcher checked the questionnaires on the spot and asked the research subjects to fill in any missing information. Invalid questionnaires were excluded. The environment was kept quiet, and patients were given sufficient time and space to fill out the questionnaires to ensure the accuracy of the data. After the data was collected, it was coded, entered, analyzed, and sealed for storage.

After the questionnaires were collected, the researcher personally reviewed the completed questionnaires to identify and confirm or exclude any that contained

obvious contradictions, logical inconsistencies, or missing key items that could affect subsequent analysis. The data was then double-entered and double-checked by the researcher and one trained research assistant (a master's student), who collaborated to complete the data entry, verification, and organization process to ensure data accuracy. When handling missing data, variables with more than 30% missing values in the original data were deleted, and the remaining data were imputed using multiple imputation methods.

Statistical analysis

SPSS26.0 statistical software was used for data analysis and processing treatment; measurement data conformed to normal distribution described by mean $\pm$ standard deviation, non-normal distribution described by inter-quartile spacing, median; count data described by frequency, percentage; in the one-way analysis, conforming to the normal distribution and chi-square, t-test, one-way ANOVA was used, and the non-normal distribution was used by non-parametric test Kruskal-Wallis H test, Mann-Whitney U test. Multiple stepwise regression analysis was used to analyze the main associated factors of social participation, and $P < 0.05$ indicated statistical significance; Pearson correlation analysis was used to analyze the correlation between social networks, quality of life, and social participation of patients with head and neck tumors.

Results

Participants' characteristics

A total of 180 questionnaires were distributed, and all were returned. Among them, 176 were valid, resulting in a valid response rate of 97.78%. As the data did not follow a normal distribution pattern, M (IQR) was used to describe the data, and the Mann-Whitney U test and Kruskal-Wallis H test were used for analysis. In terms of demographic data, the majority were male (76.1%), the participants were predominantly 41–60 years old (54.0%), and their education level was predominantly junior high school or below (55.1%). Regarding disease-related data, 52.3% of patients were diagnosed with stage IV cancer, and 55.7% of patients had been ill for less than 3 months. Other details are shown in Table 1.

Scores for social participation, social network, and quality of life

Current status of social participation of patients with head and neck tumors

In this study, there were 152 patients with head and neck cancer whose social participation score was ≥ 2 (with social participation defect), and the rate of social participation defect was 86.36%. See Table 2 for details of each item score.

Table 1 Sociodemographic and clinical characteristics (n = 176)

Patient characteristics	n (%)	Social participation M(IQR)	H/Z	P
Gender				
Male	134(76.1)	5.00(3.00 ~ 6.00)	-0.885	0.376
Female	42(23.9)	5.00(4.00 ~ 7.00)		
Age (years)				
≤ 40	11(6.3)	6.00(3.00 ~ 8.00)	2.704	0.295
41–60	95(54.0)	4.00(2.00 ~ 7.00)		
> 60	70(39.8)	5.00(3.00 ~ 6.00)		
Religious beliefs				
No	165(93.8)	4.00(3.00 ~ 6.00)	-2.318	0.020*
Yes	11(6.3)	7.00(5.00 ~ 7.00)		
Marital status				
Unmarried	9(5.1)	4.00(1.50 ~ 5.50)	9.574	0.008*
Married	151(85.8)	4.00(3.00 ~ 6.00)		
Divorced/widowed	16(9.1)	7.00(5.00 ~ 8.75)		
Residence				
Urban	100(56.8)	4.00(2.00 ~ 7.00)	-0.855	0.393
Rural	76(43.2)	5.00(4.00 ~ 6.75)		
Medical expense payment method				
Self-financed	2(1.1)	0(0 ~ 0)	6.013	0.049*
Medical insurance	119(67.6)	5.00(3.00 ~ 7.00)		
Employee medical insurance	55(31.3)	4.00(2.00 ~ 7.00)		
Education				
≤ Secondary and below	97(55.1)	5.00(4.00 ~ 7.00)	7.347	0.025*
High School	55(31.3)	4.00(2.00 ~ 6.00)		
≥ Junior college	24(13.6)	3.50(1.00 ~ 6.00)		
Income (RMB per capita monthly household)				
< 1000	39(22.2)	6.00(4.00 ~ 7.00)	20.659	< 0.001*
1000–2999	61(37.4)	4.00(3.00 ~ 6.00)		
3000–4999	56(31.8)	4.00(2.25 ~ 6.75)		
≥ 5000	20(11.4)	3.00(1.00 ~ 4.75)		
The primary site of cancer				
Nose and throat	131(77.4)	5.00(3.00 ~ 7.00)	0.045	0.978
Oral and maxillofacial	33(18.8)	5.00(3.50 ~ 6.50)		
Other	12(6.8)	4.50(1.50 ~ 8.50)		
Stage at diagnosis				
I	6(3.4)	5.00(3.00 ~ 6.00)	0.460	0.928
II	38(21.6)	5.00(2.25 ~ 7.00)		
III	40(22.7)	4.00(3.00 ~ 6.75)		
IV	92(52.3)	4.00(2.75 ~ 6.00)		
Duration of disease				
≤ 3 months	98(55.7)	5.00(4.00 ~ 9.00)	6.574	0.037*
4 ~ 6 months	31(17.6)	4.00(3.00 ~ 7.00)		
≥ 7 months	47(26.7)	5.00(3.00 ~ 6.00)		
With other diseases				
No	94(53.4)	5.00(4.00 ~ 7.00)	-2.510	0.012*
Yes	82(46.6)	4.00(2.00 ~ 6.25)		
Family history of tumors				
No	144(81.8)	5.00(3.00 ~ 6.75)	-0.556	0.578
Yes	32(18.2)	5.00(3.00 ~ 7.00)		
Radiotherapy phase				
No	43(24.2)	4.00(2.00 ~ 6.00)	-2.126	0.033*
Yes	133(75.6)	5.00(3.00 ~ 7.00)		

Abbreviations: M(IQR) Median (Inter Quartile Range)

*p < 0.05

Table 2 Scores for the SDSS scales ($n = 176$)

Items	0 points (%)	1 point (%)	2 points (%)
1. Occupation and work	74(42%)	77(43.8%)	25(14.2%)
2. Marital functions	127(72.2%)	43(24.4%)	6(3.4%)
3. Parental functions	119(67.6%)	48(27.3%)	9(5.1%)
4. Social interaction	89(50.6%)	78(44.3%)	9(5.1%)
5. Social activities outside the family	33(18.8%)	72(40.9%)	71(40.3%)
6. Activities within the family	101(57.4%)	68(38.6%)	7(4%)
7. Family functions	121(68.8%)	52(29.5%)	3(1.7%)
8. Personal self-sufficiency	145(82.4%)	30(17%)	1(0.6%)
9. Interest and concern for the outside world	116(65.9%)	57(32.4%)	3(1.7%)
10. Responsibility and planning	128(72.7%)	47(26.7%)	1(0.6%)
Total score of social participation	10(5.7%)	14(8.0%)	152(86.36%)

Table 3 Scores for the LSNS-6 and FACT-H&N scales ($n = 176$)

Scale	Items	Actual range	Mean $\pm$ SD	Item Mean $\pm$ SD
LSNS-6	6	6–25	6.87 $\pm$ 2.66	2.29 $\pm$ 0.89
Family network	3	3–14	16.58 $\pm$ 4.06	2.76 $\pm$ 0.68
Friend network	3	2–13	9.71 $\pm$ 1.88	3.24 $\pm$ 0.63
FACT-H&N	38	18–134	84.9 $\pm$ 18.8	2.23 $\pm$ 0.49
Physical condition	7	0–31	19.03 $\pm$ 5.71	2.72 $\pm$ 0.82
Social and family situation	7	4–28	16.57 $\pm$ 4.07	2.37 $\pm$ 0.58
Emotional situation	6	0–27	16.81 $\pm$ 4.24	2.80 $\pm$ 0.71
Functional status	7	0–28	13.14 $\pm$ 6.70	1.88 $\pm$ 0.96
Additional Concerns	11	7–34	19.35 $\pm$ 5.54	1.76 $\pm$ 0.50

Table 4 Correlations among the LSNS-6, FACT-H&N and SDSS ($n = 176$)

Item	SDSS	
	r_s	P
LSNS-6	−0.847**	< 0.001
Family network	−0.927**	< 0.001
Friend network	−0.487**	< 0.001
FACT-H&N	−0.368**	< 0.001
Physical condition	−0.327**	< 0.001
Social and family situation	−0.190*	0.012
Emotional situation	−0.276**	< 0.001
Functional status	−0.348**	< 0.001
Additional Concerns	−0.141	0.602

** $P < 0.01$ * $P < 0.05$ **Scores for network and quality of life**

Table 3 demonstrates the descriptive statistical analysis of the participants. The LSNS-6 mean scores indicated a slightly higher level of social networks. The mean scores of the five dimensions of quality of life were, in descending order, emotional status (2.80 ± 0.71), physical status (2.72 ± 0.82), social-family situation (2.37 ± 0.58),

functional status (1.88 ± 0.96), and additional concerns (1.76 ± 0.50), as detailed in Table 3.

Univariate analysis of factors associated with social participation

The univariate analysis showed that social participation was significantly related to religious beliefs, marital status, literacy, medical expense payment method, education, income, Duration of disease, and whether or not the patient entered the radiotherapy phase ($P < 0.05$). The differences were statistically significant and are shown in Table 1.

Correlations between LSNS-6, FACT-H&N and SDSS scores

Table 4 demonstrates the correlation coefficients among the LSNS-6, FACT-H&N, and SDSS scores. The SDSS total score was negatively correlated with the LSNS-6, FACT-H&N score ($r_s < 0$, $P < 0.05$).

Multiple stepwise linear regression analysis of the factors associated with social participation**Independent variable assignment**

Religious beliefs: No = 0, Yes = 1; Marital Status: Unmarried = 000, Married = 010, Divorced/Widowed = 001; Medical expense payment method: Self-financed = 000, Medical insurance = 010, Employee medical insurance = 001; Education: $\leq$ Secondary and below = 1, High school = 2, $\geq$ Junior college = 3; Income (RMB per capita monthly household): $< 1000 = 1$, $1000 - 2999 = 2$, $3000 - 4999 = 3$, $\geq 5000 = 4$; Duration of disease: ≤ 3 months = 1, 4 ~ 6 months = 2, ≥ 7 months = 3; With other disease: No = 0, Yes = 1; Radiotherapy stage: No = 0, Yes = 1;

Multivariate linear analysis of factors associated with social participation

A stepwise multiple linear regression analysis was performed to identify the variables associated with social participation, and variables with statistical significance in the univariate analysis were included in the stepwise multiple linear regression analysis. Table 5 reports that five factors, namely, social networks, quality of life, income, divorced/widowed, and entering the radiotherapy phase, were entered into the regression equation and accounted for 35.7% of the variance.

Discussion**Social participation in patients diagnosed with head and neck cancer**

In this study, there were 152 patients with head and neck cancer whose social participation score was ≥ 2 (with social participation defect), and the rate of social participation defect was 86.36%, which turned out to be higher than the results of the studies conducted by Zhou Miao [27] and Sun Qin [32]. The results proved that head

Table 5 Multivariate linear analysis of factors associated with social participation (n = 176)

B	SE	β	t	P	95% Confidence		Tolerance	VIF
					Lower limit	Upper limit		
11.730	1.106		10.609	0.000	9.548	13.913		
−0.230	0.048	−0.327	−4.774	0.000	−0.326	−0.135	0.805	1.242
−0.031	0.010	−0.201	−3.069	0.003	−0.050	−0.011	0.881	1.135
−0.583	0.195	−0.193	−2.996	0.003	−0.967	−0.199	0.911	1.098
1.641	0.636	0.166	2.580	0.011	0.385	2.896	0.917	1.090
0.883	0.415	0.133	2.129	0.035	0.064	1.701	0.966	1.035

$R = 0.597$, $R^2 = 0.357$, Adjusted $R^2 = 0.338$, $DW = 1.959$, $F = 18.859$
B unstandardized coefficient, SE Standard error, β standardized coefficient Beta, VIF Variance inflation factor, DW Durbin – Watson

and neck tumor patients in this study had low levels of social participation. Among the social participation of the study subjects, “marital function”, “parental function”, “social activities within the family”, “family function “personal care”, ‘interest and relations with the outside world’ and ‘responsibility and planning’ were normal in 57.4%–82.4% of the study subjects, which proves that the majority of the subjects had normal social participation. 82.4%, which proves that most of the patients can communicate with their spouses, take care of their children, perform their family functions well, pay attention to their hygiene, maintain good interests and relationships with the outside world, and be responsible and playful. However, there are different degrees of social participation limitations in “occupation and work”, “social interaction”, and “social activities outside the family”, which are manifested in the patient’s low efficiency and ability to work. The patient is unable to finish the work on schedule; the patient deliberately avoids communication with others and is unwilling to participate in a series of social activities; and does not take the initiative to participate in some social activities outside the family. The reason may be that patients with head and neck tumors will have many side effects after receiving treatment, such as radioactive oral mucositis, dysphagia, and dry mouth, which limit the patients’ behavioral activities to achieve their social roles and prevent them from returning to the social life as they did before the disease

Factors associated with social participation

Demographic factors

In this study, we found that family income, divorced/widowed, and entering the radiotherapy phase were strongly associated with social participation

Per capita monthly household income The results of regression analysis in this study showed that families with higher incomes had higher levels of social participation, which is consistent with the findings of Zhou Miao [27], suggesting that the level of social participation of the study population may be affected by economic conditions. Because patients face high medical costs during

long-term treatment, surgery, and rehabilitation, they may delay or forgo access to healthcare due to excessive financial pressure, thereby increasing the risk of health inequalities [33]. Socioeconomically disadvantaged groups are disproportionately affected by head and neck tumors, with patients with poor general and mental health often bearing the higher costs associated with diagnosis [34]. Moreover, patients may need to adjust their working hours or stop working altogether to cope with the physical and psychological challenges of the treatment process. This situation may reduce the patient’s source of income, decrease motivation to participate in family and social activities, and lead to limited social participation. In contrast, patients with better family financial status also have greater access to better healthcare resources, better quality of disease treatment, and, in turn, their health status and social participation in the long term.

Marital status The results of regression analysis in this study showed that there were differences in the social participation of head and neck tumor patients in terms of marital status. Specifically, married and unmarried patients had higher social participation than divorced or widowed patients, which may be because family support is the most important social support for cancer patients, and the presence of family members will provide patients with emotional and substantial support, reduce anxiety, depression, and loneliness [35], and encourage patients to participate in social activities. Marriage or intimate relationships may motivate people to be responsible for their families and partners, and may also motivate them to be more socially active and maintain social relationships, in contrast to divorced or widowed patients who may lose this sense of responsibility and purpose, and consequently become less socially engaged.

Radiotherapy The results of regression analysis in this study show that patients with head and neck tumors who have undergone radiotherapy have poor social participation, which may be because patients need a certain amount of time to undergo radiotherapy, leading to a reduction in their time for social participation, and radiotherapy will

bring patients symptoms such as oral mucositis, persistent dry mouth, dysphagia, and change in appearance and image [36], and these physical symptoms bring patients varying degrees of These physical symptoms to bring different degrees of psychological distress to patients, so that patients suffer from the double burden of physical and psychological, seriously affecting the quality of life and treatment compliance, not conducive to their mental health, and even more detrimental to the realization of the patient's better social return.

Social network

In the current study, the social network is an influential factor for the social participation of head and neck tumor patients, i.e., the higher the social network, the higher the degree of social participation of the patients. The reason for this: the larger the social network, the more favorable the individual has more opportunities to participate in social activities, increase communication and exchange with the outside world, and promote their integration into the family and social participation [37]. Patients with head and neck tumors may face social isolation due to their condition and treatment, and they may require frequent medical appointments or recovery, which can interfere with social activities and the performance of work duties. The larger the patient's social network, the more beneficial it may be for the patient's family to invest more time and resources in coping with the effects of the disease, which may further increase their participation in social activities; enhanced personal social connections may buffer the negative impact of the cancer experience on poor physical and mental functioning [38], and head and neck tumor treatments often result in serious physical side effects, such as oral mucositis, dysphagia speech disorders, etc., which may affect patients' social isolation and psychosocial distress [16], while psychological problems such as anxiety and depression may occur during treatment, making patients more inclined to avoid social situations [39], and maintaining a healthy social network contributes to positive lifestyle changes and optimal physical and mental health [40].

Quality of life

In the current study, quality of life was an influential factor in the social participation of patients with head and neck tumors, i.e., the higher the quality of life, the higher the social participation of the patients. This is similar to the findings of Thraen-Borowski [41] Analysis of the reasons: treatment of head and neck tumors may lead to significant changes in facial appearance, such as facial deformities and incision scarring, which may cause patients to feel self-conscious and shy, and reluctance to show up in public to interact with others is reduced. Head and neck cancer disease itself and treatment often

cause patients' facial disfigurement and impaired functions such as speech, opening mouth, swallowing, chewing, and breathing, leading to decreased quality of life, impaired communication with others, and limited daily activities, reducing patients' willingness and ability to communicate with others, patients may feel that there is a gap between themselves and others, which has a great impact on their positive social interaction; Physical discomfort and psychological stress may also make patients more inclined to face problems alone, resulting in less interaction with others.

Limitations

This study had several limitations. Firstly, as this study only investigated 176 head and neck tumor patients in a tertiary-level hospital, there are some limitations and a large-sample, multicenter study can be conducted in the future to further explore the associated factors of head and neck tumor patients of social participation; Secondly, This study is a cross-sectional design, and it is impossible to infer the causal relationship between variables. In the future, qualitative interviews and multi-center or longitudinal follow-up can be conducted to study the level of social participation and its associated factors in patients with HNC. Finally, the variables in the general data, social networks, and quality of life in this study collectively explain 35.7% of the total variance in social participation. Therefore, further research is needed to explore other factors associated with social participation in head and neck cancer patients, such as whether patients have undergone surgery, reconstruction, or swallowing dysfunction. More importantly, this study did not examine the impact of symptom-related distress on patients' social participation. In the future, it is necessary to statistically assess the impact of cancer-related symptoms (such as pain, oral mucositis, malnutrition, anxiety, and depression) on patients' social participation.

Clinical implications

To increase social participation among head and neck cancer patients, healthcare professionals worldwide need to focus on the stability of their family structures (especially in family-centered cultures) and invest in reducing the financial burden on low-income patients - high healthcare costs are a global barrier, especially in countries with high out-of-pocket payments or weak welfare systems. Healthcare policymakers and rehabilitation teams should consider financial assistance as a key intervention point. At the same time, healthcare professionals need to pay special attention to patients' psychological adjustment during and after radiotherapy, providing appearance management, speech/swallowing rehabilitation, and psychosocial support to mitigate the negative impact of side effects on social participation.

Social network and higher quality of life are protective factors to enhance social participation. Strengthening patients' social support system (family, friends) and managing their quality of life in a holistic manner (physical, emotional, functional, social) are the cornerstones to facilitate their successful reintegration into the community. Encourage patients to maintain a healthy social network to enhance confidence, alleviate anxiety and depression, and promote interpersonal interactions. Helping patients adapt to their illness through multiple levels of communication (family, friends, healthcare professionals) reduces negative emotions, improves psychological well-being, increases access to rehabilitation knowledge, and ultimately improves quality of life and facilitates successful social reintegration.

Conclusion

The level of social participation of head and neck tumor patients is low, and marital status, monthly family income, radiotherapy, social network, and quality of life are the key associated factors of social participation of head and neck tumor patients, suggesting that medical personnel should pay attention to the feelings of social participation of patients undergoing with head and neck cancer, focusing on patients who are unmarried, divorced or widowed, with low monthly family income and entering the radiotherapy stage, and adopting clinical nursing interventions to improve the patient's social network and pay attention to the quality of their emotional life to improve the level of patients' feelings of social participation.

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

SYL: Writing–review & editing, Writing–original draft, Investigation, Visualization, Software, Methodology, Conceptualization. ZRG: Writing–review & editing, Methodology. YZCX: Writing–review & editing, Methodology. MZ: Writing–review & editing, Methodology. JJW: Writing–review & editing, Methodology. XHB: Writing–review & editing, Methodology, Conceptualization. All authors reviewed the manuscript.

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Data availability

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Medical Science Research in the First Hospital of China Medical University, under ethical number [2024] 330. A researcher explained the purpose of the study and relevant details to eligible participants using a standardized guideline and distributed questionnaires after obtaining their informed consent. The guidelines of the Declaration of Helsinki (World Medical Association, 2013) were followed throughout this study. Written informed consent was obtained from all of the included participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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