

Original article: Prevalence and Contributing Factors of Anxiety and Depression in Head and Neck Cancer Patients Undergoing Radiotherapy and Chemotherapy



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ABSTRACT



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Introduction: Head and neck cancer (HNC) poses numerous challenges for patients, impacting essential structures in the head and neck area and leading to considerable physical and emotional distress. This study aimed to assess the frequency of anxiety and depression in head and neck cancer patients receiving radiotherapy and chemotherapy, as well as to identify the factors that contribute to these psychological issues.

Materials and Methods: This cross-sectional analytical study was conducted on 80 patients with clinical and histological confirmation of HNC who visited the oncology clinics for radiotherapy and chemotherapy (2017, Rasht, Iran). A questionnaire that included demographic information and the Hospital Anxiety and Depression Scale (HADS) of patients was completed. The data were analyzed using SPSS version 18 ($\alpha = 0.05$)

Results: Among the patients with head and neck cancer, 26.2% reported experiencing anxiety, 25.0% of patients had borderline anxiety while 18.8% reported experiencing depression and 16.2% of patients had borderline depression. Significant associations were identified between anxiety levels and the duration since cancer diagnosis ($P = 0.010$). Depression was more prevalent among patients living in rural areas and those in advanced stages of the illness ($P = 0.046$).

Conclusions: The frequency of anxiety and depression was relatively high among patients with head and neck cancer. Considering the impact of this cancer type on quality of life, assessing the frequency of anxiety and depression in these patients can help guide psychological interventions to improve the patients' well-being.

1. Introduction

Head and neck cancer (HNC) is a complex and debilitating disease that affects vital structures in the head and neck region, including the oral cavity, throat, larynx, and salivary glands (1). Head and neck cancer patients often face a myriad of stressors throughout their treatment journey. The diagnosis of cancer itself can lead to heightened anxiety, as patients grapple with the uncertainties surrounding their prognosis, treatment

outcomes, and long-term survival (2). The invasive nature of treatment, which may involve surgeries, radiation therapy, and chemotherapy, can cause physical discomfort and disfigurement, leading to body image concerns and self-esteem issues. The side effects of treatment, such as pain, fatigue, difficulty in swallowing, and changes in speech and appearance, further contribute to the emotional burden experienced by these patients (3). The treatment modalities of radiotherapy and chemotherapy are often employed to eradicate cancer

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cells, shrink tumors, and prevent disease progression. While these treatments are crucial for cancer management, they come with a range of physical and emotional side effects, including the development or exacerbation of anxiety and depression symptoms (4).

The experience of undergoing radiotherapy and chemotherapy can be emotionally challenging. Patients often face prolonged treatment durations and regular hospital visits, which disrupt their daily routines and social lives (5). The anticipation of treatment sessions and the associated physical and psychological discomfort can induce anxiety, making patients feel apprehensive and vulnerable. The cumulative impact of these factors can contribute to the development or exacerbation of anxiety and depression symptoms. Anxiety and depression are common psychological challenges experienced by patients with head and neck cancer who are undergoing radiotherapy and chemotherapy (6). These treatment modalities can have profound effects on patients' emotional well-being, exacerbating pre-existing psychological conditions or triggering the onset of new symptoms (7).

Anxiety and depression can have profound effects on the overall well-being and quality of life of head and neck cancer patients. Anxiety may manifest as excessive worry, restlessness, fear, apprehension, irritability, difficulty in concentrating, and sleep disturbances (8), whereas depression involves persistent feelings of sadness, hopelessness, and loss of interest. Both conditions can be debilitating and have a profound impact on patients' quality of life, treatment outcomes, and overall well-being (9).

Factors contributing to anxiety and depression in this context can be multifaceted, including demographic characteristics, disease-related factors, and psychosocial factors. Demographic variables such as age, gender, and socioeconomic status may influence the susceptibility and manifestation of anxiety and depression symptoms. Disease-related factors such as cancer stage, treatment intensity, and side effects can also play a role in exacerbating these psychological conditions. Furthermore, psychosocial factors such as social support, coping mechanisms, and previous mental health history can impact the development and severity of anxiety and depression in these patients (8, 10).

The prevalence of anxiety and depression in HNC patients is well-documented, with studies reporting varying rates due to different patient populations, assessment tools, and timing of evaluations. For instance, a study by Hong et al. (11, 12) found that approximately 6.0% of HNC patients experience anxiety, while depression affects around 66.0% during treatment.

Similarly, a systematic review by Krebber et al. (13) highlighted that the prevalence of depression in HNC patients can range from 3.0% to 31.0%, and another study (14) reported the prevalence of depression to be between 9.8% to 83.8%. So, the field of research on anxiety and depression in head and neck cancer (HNC) patients face significant gaps and challenges. One challenge is the variability in study designs and patient demographics, which can skew the prevalence rates of anxiety and depression and hinder the generalization of findings. Many studies are based on self-reported measures, which can be affected by patients' willingness to share their mental health status and the timing of assessments during treatment.

Since national planning for disease management is based on epidemiological studies, awareness of the prevalence of anxiety and depression in head and neck patients can provide valuable insights for healthcare professionals, enabling them to deliver personalized and comprehensive care, support, and interventions to improve the mental health and overall well-being of these patients. Even though many studies (7,15,30) have been conducted to determine the frequency of psychological disorders in cancer patients, but no research has been conducted on these disorders among head and neck cancer patients in Iran. Thus, this study aimed to evaluate the frequency of Anxiety and Depression in Patients with Head and Neck Cancer Undergoing Radiotherapy and Chemotherapy and their contributing Factors.

2. Materials and Methods

The cross-sectional analytical study was conducted in radiotherapy and chemotherapy clinics in Rasht city, Guilan province in 2017. This study was conducted on 80 out of 225 patients who visited the oncology clinics in Rasht for radiotherapy and chemotherapy. The patients had medical records with clinical and histological confirmation of HNC. Based on the study by Nikbakht et al (15), with a 95% confidence interval and using the following formula, the sample size was calculated to be 80.

$$p = 0/30 \quad q = 0/70 \quad d = 0/10 \quad \alpha = 0/05$$

$$n = \frac{z^2 p (1-p)}{d^2} = \frac{(1.96)^2 \times 0.3 \times 0.7}{(0.01)^2} = 80$$

The sampling method was carried out using a convenience (non-random) method. The patients who were alive, residents of Guilan province, and willing to participate were included to the study. They have no documented history of anxiety or depression prior to the cancer diagnosis. Patients who were not willing to participate in the study and those who had no address or

contact number in the medical records were excluded. The ethics code numbered (IR.GUMS.REC.1397.203) was adopted for the purpose of conducting this research. The objectives of the research were explained to the patients, and their consent to participate in this project was obtained through personal or phone conversations. The patients completed a questionnaire that included demographic information and the Hospital Anxiety and Depression Scale (HADS). The questionnaires were completed by making calls or through interviews with the patients based on ethical standards.

The HADS is a widely used tool for measuring psychological disorders in cancer patients. This questionnaire consists of 14 items divided into two subscales: depression and anxiety. Each subscale comprises seven items, with each item offering four response options ranging from 0 to 3, resulting in a maximum score of 21 for each subscale. Scores from 0 to 7 are considered normal, scores from 8 to 10 are borderline, and scores of 11 or higher are indicative of significant psychological complications. The HADS has been validated and shown to be reliable in various populations, including cancer patients. The instrument's validity and reliability have been documented in numerous studies (16-18), demonstrating its effectiveness in accurately measuring anxiety and depression levels. Persian version of the HADS was used in current study. The HADS scale and its anxiety and depression subscales have adequate validity, reliability, and internal consistency for use in Iranian society (16).

To investigate factors affecting anxiety and depression,

a comprehensive demographic Sociodemographic and disease related factors of the patient's questionnaire was utilized alongside the HADS. This included gender, domiciliary status, occupation, living status, education, marital status, tumor location, type of cancer, treatment, systemic disease, stage of HNC, grade of HNC. The data collected from these questionnaires were analyzed to identify potential correlations and contributing factors to anxiety and depression in the study population (17).

The data from the study were analyzed using descriptive statistics (mean and ratio), the chi-square test, and logistic regression. The results were processed with statistical software (SPSS version 18). The chi-square test was employed to assess the significant relationship between the independent variables and patients experiencing abnormal levels of anxiety and depression, with a significance level set at $P < 0.05$.

3. Results

In this study, 80 people were examined. The youngest patient was 22 years old, while the oldest was 88 years old. The average age of the patients was 56.91 ± 15.05 (Table 1).

In terms of type of HNC, Squamous cell carcinoma was the most prevalent cancer type (96.3%), followed by melanoma and sarcoma. In terms of cancer stage, most patients (61.3%) were in stage 3 of disease. A significant majority (80.0%) underwent surgical treatment combined with chemotherapy and radiotherapy (Table 2).

Table 1. Sociodemographic information of the patients

Variables	Type	Frequency(N) percentage (%)
Gender	Male	57(71.2)
	Female	23(28.8)
Domiciliary status	Rural	31(38.8)
	Urban	49(61.2)
Occupation	Yes	18(22.5)
	No	62(77.5)
Living status	Single	77(96.2)
	with family	3(3.8)
Education	High school	47(58.8)
	Diploma	24(30)
	Bachelor's degree	6(7.5)
	Master's degree	3(3.7)
Marital status	Married	73(91.2)
	Single	7(8.8)

Table 2. Disease related factors of the patients

Variables	Type	Frequency(N) percentage (%)
Tumor location	Larynx	24 (30.0)
	Hypopharynx	16 (20.0)
	Nasopharynx	19 (23.8)
	Alveolar ridge	6 (7.5)
	Salivary glands	4 (5.0)
	Paranasal sinus	1 (1.2)
	Neck	1 (1.2)
	Tongue	4 (5%)
	Lip	2 (2.5)
	Lymph node	2 (2.5)
	Tonsil	1 (1.2)
Type of cancer	SCC	77 (96.3)
	Melanoma	2 (2.5)
	Sarcoma	1 (1.2)
Treatment	Chemotherapy	4 (5.0)
	Radiotherapy	8 (10.0)
	Chemotherapy and Radiotherapy	3 (3.8)
	Surgery and Radiotherapy	1 (1.2)
	Surgery and Radiotherapy and Chemotherapy	64 (80)
Systemic disease	Yes	26 (32.5)
	No	54 (67.5)
Stage of HNC	1	2 (2.5)
	2	27 (33.8)
	3	49 (61.2)
	4	2 (2.5)
Grade of HNC	1	11 (13.8)
	2	32 (40)
	3	37 (46.2)
	4	0 (0)

Among the patients in terms of anxiety, 48.8% of people were in a normal state, 25.0% of people had borderline anxiety and 26.2% of people were anxious, in terms of depression, 65.8% of people were in a normal state, 16.2% of people had borderline depression and 18.8% are depressed.

There was no statistically significant relationship between the variables of gender, place of residence, employment, marital status, location of the tumor, type of treatment, presence of systemic disease, stage and grade of the disease, lifestyle and the anxiety of the patients ($P > 0.05$; Table 3).

Table 3. The frequency of depression and anxiety among patients with oral cancer and related causes (n=80)

Variables		Anxiety		p-value	Depression		p-value
		Abnormal N (%)	Normal N (%)		Abnormal N (%)	Normal N (%)	
Gender	Male	29(50.9)	28(49.1)	0.916	22(38.6)	35(61.4)	0.288
	Female	12(52.2)	11(47.8)		6(26.1)	17(73.9)	
Domiciliary status	Rural	19(61.3)	12(38.7)	0.153	15(48.4)	16(51.6)	0.046
	Urban	22(44.9)	27(55.1)		13(26.5)	36(73.5)	
Occupation	Yes	34(54.8)	28(45.2)	0.115	5(27.8)	13(72.2)	0.466
	No	7(38.9)	11(61.1)		23(37.1)	39(62.9)	
Marital status	Married	37(50.7)	36(49.3)	0.744	25(34.2)	48(65.8)	0.648
	Single	4(57.1)	3(42.9)				
Tumor location	Larynx	13(54.2)	11(45.8)	0.579	9(37.5)	15(62.5)	0.673
	Hypopharynx	7(43.8)	9(56.2)		5(31.2)	11(68.8)	
	Nasopharynx	8(42.1)	11(57.9)		7(36.8)	12(63.2)	
	Alveolar ridge	5(83.3)	1(16.7)		3(50.0)	3(50)	
	Salivary glands	2(50.0)	2(50.0)		2(50.0)	2(50.0)	
	Paranasal sinus	1(100)	0(0)		0(0)	1(100)	
	Neck	0(0)	1(100)		0(0)	1(100)	
	Tongue	2(50.0)	2(50.0)		0(0)	4(100)	
	Lip	2(50.0)	2(50.0)		0(0)	2(100)	
	Lymph node	2(100)	0(0)		1(50.0)	1(50.0)	

	Tonsil	1(100)	0(0)		1(100)	0(0)	
Type of cancer	SCC	40(51.9)	37(48.1)	0.586	27(35.1)	50(64.9)	0.692
	Melanoma	1(50.0)	1(50.0)		1(50.0)	1(50.0)	
	Sarcoma	0(0)	1(100)		0(0)	1(100)	
Treatment	Chemotherapy	3(75.0)	1(25.0)	0.303	1(25.0)	3(75.0)	0.476
	Radiotherapy	6(75.0)	2(25.0)		5(62.5)	3(37.5)	
	Chemotherapy and radiotherapy	2(66.7)	1(33.3)		1(33.3)	2(66.7)	
	Surgery and radiotherapy	1(100)	0(0)		0(0)	1(100)	
	Surgery and radiotherapy and chemotherapy	29(45.3)	35(54.7)		21(32.8)	43(67.2)	
Systemic disease	No	28(51.9)	26(48.1)	0.877	19(35.2)	35(64.8)	0.960
	Yes	13(50.0)	13(50.0)		9(34.6)	17(65.4)	
Stage	1	2(100)	0(0)	0.099	2(100)	0(0)	0.012
	2	10(37.0)	17(63.0)		5(18.5)	22(81.5)	
	3	27(55.1)	22(44.9)		19(38.8)	30(61.2)	
	4	2(100)	0(0)		2(100)	0(0)	
Grade	1	4(36.4)	7(63.6)	0.566	3(27.3)	8(72.7)	0.828
	2	17(53.1)	15(46.9)		12(37.5)	20(62.5)	
	3	20(54.1)	17(45.9)		13(35.1)	24(64.9)	
Lifestyle	Single	3(100)	0(0)	0.326	3(100)	0(0)	0.090
	With family	39(50.7)	38(49.3)		26(33.8)	51(66.2)	
Elapsed time	0-6 Mo	13(76.5)	4(23.5)	0.010	9(52.9)	8(47.1)	0.060
	7-12 Mo	18(72)	7(28.0)		12(48)	13(52)	
	13-18 Mo	4(44.4)	5(55.6)		2(22.2)	7(77.8)	
	19-24 Mo	1(16.7)	5(83.3)		1(16.7)	5(83.3)	
	>25 Mo	5(21.7)	18(78.3)		4(17.4)	19(82.6)	



Mo: Month

A significant relationship was observed between anxiety and the time passed since the cancer diagnosis ($P = 0.010$). Also, among the variables under investigation, only the place of residence and the stage of the disease had a statistically significant relationship with depression ($P < 0.05$; [Table 3](#)).

18.5% of people who were in stage II, 38.8% of people who were in stage III and 100% of people who were in stage IV of the disease were in an abnormal state from the point of view of depression. 48.4% of village residents and 26.0% of city residents were identified as being in an abnormal state regarding depression ([Table 3](#)).

4. Discussion

The current study evaluated the frequency of anxiety and depression symptoms in patients with HNC. The study found that the frequency of anxiety symptoms was about 26.0% in HNC patients and 25.0% of the patients had borderline anxiety. Previous research reported anxiety rates among cancer patients ranging from about 6.0% to 75.0% ([1, 8, 12, 18-20](#)). Different rates of anxiety could be attributed to several factors, including potential differences in cultural perceptions of mental health, the support systems available to patients, or variations in the stages of cancer at the time of assessment. Another possible explanation is the timing of the assessment

relative to treatment stages, as patients might have received adequate psychological support during their treatment, thereby reducing anxiety levels.

The frequency of depressive symptoms in this study was about 19.0% and 16.2% of people had borderline depression is similar to previous studies on cancer patients, which reported that the prevalence of depression among them ranges from 7.0% to 33.0% ([13, 21](#)) but lower than the 54.9% found in a meta-analysis of depression prevalence among Chinese adults with cancer ([22](#)). This discrepancy might be due to differences in the healthcare systems, cultural attitudes towards depression, and the effectiveness of psychological interventions available to patients in different regions.

A significant relationship was found between depression and living in a village, with about 50.0% of village residents and 26.0% of city residents exhibiting abnormal depression levels. This finding could be due to the additional social and economic challenges faced by rural patients, such as reduced access to healthcare services and social support. These findings align with [Tsaras et al. \(23\)](#) who reported a higher prevalence of depression in rural residents. This aspect has not been extensively investigated in most studies related to anxiety and depression in head and neck cancer patients, indicating a unique contribution of this research.

In this study depression was significantly more prevalent in HNC patients with higher stages of cancer. This can be attributed to the complications and psychological burden of dealing with advanced cancer stages, which is similar to previous findings (24, 25).

In present study as time passed since diagnosis of HNC, the frequency of anxiety among patients decreased. Approximately 75.0% of patients diagnosed within 6 months and around 70.0% of patients diagnosed between 7 and 12 months exhibited abnormal anxiety levels, which is consistent with findings from a prospective study by Yuan et al. (26). Acceptance of the disease, reduced treatment-related complications, and concerns related to treatment outcomes might contribute to this decline.

In this study, with an increase in disease stage, the frequency of depressed patients increased. This finding is consistent with the results of the study by Caruso et al. (27). The higher prevalence of depression among patients with advanced cancer stages may be due to the complications and effects of suffering from a serious illness in these patients. Facial deformity and dysfunction associated with oral cancer may contribute to increased anxiety and depression due to a loss of hope for the future and the meaning of life (28).

This research did not find a significant relationship between depression and various variables such as gender, age, employment status, systemic disease, education level, marital status, cancer location, and histopathological grade. This could be due to the relatively small sample size or differences in the patient population. The study results align with findings from Nikbakht et al. (15) and Malekian et al. (29) but differ from those of Musa Rezaei et al. (30). These differences might be influenced by the sample size, study methods, cancer types, and cultural factors (31).

This study's cross-sectional design limits the ability to establish causal relationships, highlighting the need for future longitudinal studies. Additionally, the sample size was relatively small, and larger multicenter studies are needed for better representativeness. Despite these limitations, the study provides theoretical and clinical implications, suggesting potential approaches to reduce depressive symptoms by addressing negative and positive factors. Given the limitations of this study, there is a need for further research.

References

1. Kumar K, Kumar S, Mehrotra D, Tiwari SC, Kumar V, Khandpur S, et al. Prospective evaluation of psychological burden in patients with oral cancer. *British Journal of Oral and Maxillofacial Surgery*. 2018;56(10):918-24. [\[DOI\]](#)

5. Conclusions

In conclusion, the frequency of anxiety and depression is relatively high among patients with head and neck cancer. Living in a rural area and having advanced-stage cancer were associated with higher depression rates, while the time passed since diagnosis affected anxiety levels. Considering the impact of this type of cancer on quality of life, assessing the frequency of anxiety and depression and identifying what factors lead to increased psychological disorders in these patients will allow us to witness an improvement in the quality of life in these patients by adopting appropriate psychosocial interventions.

Ethical Considerations

The study was approved by the ethical review board of the Guilan University of Medical Sciences (IR.GUMS.REC.1397.203).

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Authors' Contributions

Maryam Basirat: Conceptualization, Data curation, Funding Acquisition, Methodology, Resources, Supervision, Visualization, Writing-Original Draft
Hamid Saeidi Saedi: Funding Acquisition, Supervision
Faezeh Soleimani: Funding Acquisition, Supervision
Robabeh Soleimani: Funding Acquisition
Zahra Atrkarroshan: Supervision, Formal Analysis
Pouya Safarzadeh: Investigation, Project Administration, Software, Validation, Writing-Original Draft, Writing-Review & Editing

Conflict of Interests

The authors declare no conflict of Interests.

Availability of data and material

The datasets used during the current study are available from the corresponding author on responsible request.

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[10.1016/j.bjoms.2018.09.004](https://doi.org/10.1016/j.bjoms.2018.09.004) [PMID]

2. Chow LQM. Head and Neck Cancer. Longo DL, editor. *New England Journal of Medicine*. 2020 Jan 2;382(1):60-72. [\[DOI\]](#)

- [10.1056/NEJMra1715715](#) [PMID]
3. Pfister DG, Spencer S, Adelstein D, Adkins D, Anzai Y, Brizel DM, et al. Head and Neck Cancers, Version 2.2020, NCCN Clinical Practice Guidelines in Oncology. Journal of the National Comprehensive Cancer Network. 2020;18(7):873–98. [DOI: [10.6004/jnccn.2020.0031](#)] [PMID]
 4. Mody MD, Rocco JW, Yom SS, Haddad RI, Saba NF. Head and neck cancer. The Lancet. 2021;398(10318):2289–99. [DOI: [10.1016/S0140-6736\(21\)01550-6](#)] [PMID]
 5. Khandpur M, Kumar K, Kumar S, Mehrotra D, Mehra P. A single-blinded assessment of the effect of communication on psychological burden among oral cancer and oral potentially malignant disorder patients. Journal of Oral Biology and Craniofacial Research. 2022;12(4):427–30. [DOI: [10.1016/j.jobcr.2022.05.005](#)] [PMID]
 6. Pitman A, Suleman S, Hyde N, Hodgkiss A. Depression and anxiety in patients with cancer. BMJ. 2018 Apr 25;361(8150):k1415. [DOI: [10.1136/bmj.k1415](#)] [PMID]
 7. Darvishi N, Ghasemi H, Rahbaralam Z, Shahrjerdi P, Akbari H, Mohammadi M. The prevalence of depression and anxiety in patients with cancer in Iran: a systematic review and meta-analysis. Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer. 2022;30(12):10273–84. [DOI: [10.1007/s00520-022-07371-1](#)] [PMID]
 8. Yuan L, Pan B, Wang W, Wang L, Zhang X, Gao Y. Prevalence and predictors of anxiety and depressive symptoms among patients diagnosed with oral cancer in China: a cross-sectional study. BMC Psychiatry. 2020 Aug 5; 20(1):394. [DOI: [10.1186/s12888-020-02796-6](#)] [PMID]
 9. Khattak MI, Khan M, Khattak SI, Khan Z, Haq ZU, Saddki N. THE EXPERIENCES OF ORAL CANCER PATIENTS: A NARRATIVE REVIEW. Malaysian Journal of Public Health Medicine. 2021;21(2):168–77. [DOI: [10.37268/mjphm/vol.21/no.2/art.902](#)]
 10. Ehrsson YT, Fransson P, Einarsson S. Mapping Health-Related Quality of Life, Anxiety, and Depression in Patients with Head and Neck Cancer Diagnosed with Malnutrition Defined by GLIM. Nutrients. 2021;13(4):1167. [DOI: [10.3390/nu13041167](#)] [PMID]
 11. Hung CY, Hsu MH, Lee SH, Hsueh SW, Lu CH, Yeh KY, et al. Impact of pretreatment quality of life on tolerance and survival outcome in head and neck cancer patients undergoing definitive CCRT. Journal of the Formosan Medical Association. 2024;123(9):1010–7. [DOI: [10.1016/j.jfma.2024.01.022](#)] [PMID]
 12. Hong JS, Tian J. Prevalence of anxiety and depression and their risk factors in Chinese cancer patients. Supportive Care in Cancer. 2014;22(2):453–9. [DOI: [10.1007/s00520-013-1997-y](#)] [PMID]
 13. Krebber AMH, Buffart LM, Kleijn G, Riepma IC, de Bree R, Leemans CR, et al. Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. Psycho-Oncology. 2013;23(2):121–30. [DOI: [10.1002/pon.3409](#)] [PMID]
 14. Nayak S, Sharan K, Chakrabarty J, Devi E, Ravishankar N, George A. Psychosocial Distress of Head Neck Cancer (HNC) Patients Receiving Radiotherapy: A Systematic Review. Asian Pacific Journal of Cancer Prevention. 2022;23(6):1827–35. [DOI: [10.31557/APJCP.2022.23.6.1827](#)] [PMID]
 15. Aminisani N, Nikbakht H, Jafarabadi MA, Shamshirgaran SM. Depression, anxiety, and health related quality of life among colorectal cancer survivors. Journal of Gastrointestinal Oncology. 2017;8(1):81–8. [DOI: [10.21037/jgo.2017.01.12](#)] [PMID]
 16. Kaviani H, Seyfourian, Sharifi V, N. Ebrahimkhani. Reliability and validity of Anxiety and Depression Hospital Scales (HADS): Iranian patients with anxiety and depression disorders. Tehran University Medical Journal. 2009;67(5):379–85. [Link]
 17. Michopoulos I, Douzenis A, Kalkavoura C, Christodoulou C, Michalopoulou P, Kalemis G, et al. Hospital Anxiety and Depression Scale (HADS): validation in a Greek general hospital sample. Annals of General Psychiatry. 2008;7(1):4. [DOI: [10.1186/1744-859X-7-4](#)] [PMID]
 18. Mehrotra D, Kumar K, Kumar S, Tiwari S, Kumar V, Dwivedi R. Reliability and psychometric validity of Hindi version of Depression, Anxiety and Stress Scale-21 (DASS-21) for Hindi speaking Head Neck Cancer and Oral Potentially Malignant Disorders Patients. Journal of Cancer Research and Therapeutics. 2019;15(3):653–8. [DOI: [10.4103/jcrt.JCRT_281_17](#)] [PMID]
 19. Nayak S, Sharan K, Chakrabarty J, Devi E, Ravishankar N, George A. Psychosocial Distress of Head Neck Cancer (HNC) Patients Receiving Radiotherapy: A Systematic Review. Asian Pacific Journal of Cancer Prevention. 2022;23(6):1827–35. [DOI: [10.31557/APJCP.2022.23.6.1827](#)] [PMID]
 20. Shunmugasundaram C, Rutherford C, Butow PN, Sundaresan P, Dhillon HM. What are the optimal measures to identify anxiety and depression in people diagnosed with head and neck cancer (HNC): a systematic review. Journal of Patient-Reported Outcomes. 2020 23;4(1):26. [DOI: [10.1186/s41687-020-00189-7](#)] [PMID]
 21. Beauchemin M, Murray MT, Sung L, Hershman DL, Weng C, Schnall R. Clinical decision support for therapeutic decision-making in cancer: A systematic review. International Journal of Medical Informatics. 2019;130:103940. [DOI: [10.1016/j.ijmedinf.2019.07.019](#)] [PMID]
 22. Linden W, Vodermaier A, MacKenzie R, Greig D. Anxiety and depression after cancer diagnosis: Prevalence rates by cancer type, gender, and age. Journal of Affective Disorders. 2012;141(2-3):343–51. [DOI: [10.1016/j.jad.2012.03.025](#)] [PMID]
 23. Tsaras K, Papathanasiou IV, Mitsi D, Veneti A, Kelesi M, Zyga S, et al. Assessment of Depression and Anxiety in Breast Cancer Patients: Prevalence and Associated Factors. Asian Pacific journal of cancer prevention : APJCP. 2018;19(6):1661–9. [DOI: [10.22034/APJCP.2018.19.6.1661](#)] [PMID]
 24. Wu YS, Lin PY, Chien CY, Fang FM, Chiu NM, Hung CF, et al. Anxiety and depression in patients with head and neck cancer: 6-month follow-up study. Neuropsychiatric Disease

- and Treatment. 2016;1029-36. [\[DOI: 10.2147/NDT.S103203\]](#)
25. Habimana S, Biracyaza E, Mpunga T, Nsabimana E, Kayitesi F, Nzamwita P, et al. Prevalence and associated factors of depression and anxiety among patients with cancer seeking treatment at the Butaro Cancer Center of Excellence in Rwanda. *Frontiers in Public Health*. 2023;11:972360. [\[DOI: 10.3389/fpubh.2023.972360\]](#) [\[PMID\]](#)
 26. Yuan L, Pan B, Wang W, Wang L, Zhang X, Gao Y. Prevalence and predictors of anxiety and depressive symptoms among patients diagnosed with oral cancer in China: a cross-sectional study. *BMC Psychiatry*. 2020;20(1):394. [\[DOI: 10.1186/s12888-020-02796-6\]](#) [\[PMID\]](#)
 27. Caruso R, Nanni MG, Riba M, Sabato S, Mitchell AJ, Croce E, et al. Depressive spectrum disorders in cancer: prevalence, risk factors and screening for depression: a critical review. *Acta Oncologica*. 2017;56(2):146-55. [\[DOI: 10.1080/0284186X.2016.1266090\]](#) [\[PMID\]](#)
 28. Wang TJ, Lu MH, Kuo PL, Chen YW, Lee SC, Liang SY. Influences of facial disfigurement and social support for psychosocial adjustment among patients with oral cancer in Taiwan: a cross-sectional study. *BMJ Open*. 2018;8(11):e023670. [\[DOI: 10.1136/bmjopen-2018-023670\]](#) [\[PMID\]](#)
 29. Malekian A, Ahmad A, AhmadzadehGH.H. Anxiety and Depression in Cancer Patients. 2007;5(2). [\[Link\]](#)
 30. Musarezaie A, Momeni Ghaleghasemi T, Ebrahimi A, Karimian J. The relationship between spiritual wellbeing with stress, anxiety, and some demographic variables in women with breast cancer referring to the specialized cancer treatment center in Isfahan, Iran. *Journal of Health System Research*. 2012;8(1):104-13. [\[Link\]](#)
 31. Basirat M, Gholipour E, Rohani B. Investigating lifestyle and dietary style in patients with lymphoma of the head and neck admitted to razi hospital in the city of rasht. *International Journal of Cancer Management*. 2018;11(1). [\[Link\]](#)