

Research Article

Oral Health Related Quality of Life in Patients with Xerostomia Following Radiotherapy for Head and Neck Cancer

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ABSTRACT

Objective: To evaluate the oral health-related quality of life in head and neck cancer patients after radiotherapy treatment who present with xerostomia.

Methods: This was a cross sectional study carried out over six months from July to December, 2025 with 118 patients who were attending the outpatient department of Oral Pathology who were having xerostomia as a sequelae of radiotherapy. A structured questionnaire was used for measuring OHRQoL were used. SPSS version 24 was used for data analysis and $p \leq 0.05$ was considered significant.

Results: The mean age reported was 52.6 ± 11.8 years, and the male predominance was 69.5%. The most impacted domain of OHRQoL was dry mouth, followed by swallowing problems and social eating restrictions. The xerostomia severity, oral hygiene status, age, gender and socioeconomic status showed a significant association with OHRQoL ($p < 0.05$).

Conclusion: Radiotherapy causes xerostomia, which greatly affects the oral health-related quality of life in head and neck cancer survivors. Timely diagnosis, prevention, and multidisciplinary treatment are important to optimize functional and psychosocial outcomes.

Keywords: Head And Neck Cancer, Radiotherapy, Xerostomia, Oral Health-Related Quality Of Life.

INTRODUCTION

Head and neck cancers (HNC) are a heterogeneous group of malignancies developing from the oral cavity, pharynx and larynx and constitute an important cancer burden throughout the world.[1] Global cancer statistics show that over 890,000 cases of HNC are diagnosed every year worldwide.[2] Along with surgery and chemotherapy, radiotherapy, particularly when delivered as a single modality, continues to play a fundamental role in the management of these malignancies, as it is able to provide control of the disease at the local/regional level, while maintaining anatomical structures.[3] Radiotherapy is, however, a very effective treatment, but it is often accompanied by many acute and chronic side effects that have a significant impact on oral and systemic health.[4]

The most debilitating long-term side effect of head and neck radiation therapy is radiation damage to the salivary glands, which results in a subjective dry mouth.[5] Xerostomia has been reported to affect anywhere from 60% to 90% of patients after radiotherapy, depending on the dose, field and technique used.[6] This occurs because of permanent damage to the acinar cells, which means that there is less saliva produced, saliva has changed, and it does not lubricate the mouth as well or provide the antimicrobial protection.[7] As a result, these patients have problems eating, drinking, speaking and tasting food, thereby affecting their nutritional status, are at risk of dental caries and oral infections, and have discomfort in their mouths.[8]

Xerostomia has been shown to have a significant effect on oral health-related quality

of life (OHRQoL) beyond the physical effects.[9] Patients with radiation-induced dry mouth consistently score much lower on functional, psychological and social scores of quality of life.[10] These activities become difficult to undertake such as eating in public, communicating clearly and keeping the mouth clean, and can cause social isolation, anxiety and overall poor well-being.[11] Today, intensity-modulated radiotherapy (IMRT) is one of the modern radiotherapy techniques that has been developed, but xerostomia is still a clinical problem.[12]

The effects of xerostomia on OHRQoL have only been partially assessed in many clinical settings, including resource-constrained areas where sophisticated salivary gland-sparing surgery may not be widely available, even though xerostomia has been acknowledged as a significant issue for survivorship. To create targeted preventative and rehabilitation strategies, it is essential to understand how xerostomia affects patients' function and quality of life. The present study aimed at evaluating OHRQoL in patients with xerostomia following radiotherapy for head and neck cancer

METHODOLOGY

The present study was a cross-sectional analytical study to assess the oral health related quality of life (OHRQoL) of xerostomic patients after head and neck cancer radiotherapy. It was conducted at Department of Oral Pathology from July to December, 2025

Sample size was determined based on the results of a previous cross-sectional study of oral cancer patients that used the same instrument and reported a mean OHRQoL score of 25.02 ± 15.86 . [13] a 95% confidence interval and a margin of error of 8%. The final sample size was 118 participants.

The method of non-probability sequential sampling was applied. Patients included in the study were those who were diagnosed with malignancies of head and neck who had undergone radiotherapy (with or without surgery and/or chemotherapy) within the past year and had been clinically diagnosed with xerostomia after the treatment. Patients with recurrent or metastatic disease that required active treatment with other medications, pre-existing salivary gland disease unrelated to radiotherapy (such as Sjögren's syndrome), severe systemic disease that could directly affect OHRQoL, or incapacity to communicate or complete the questionnaire (due to critical

illness or cognitive impairment) were all excluded from the study.

Data on clinical history of cancer treatment, oral hygiene practices, and sociodemographic characteristics (age, gender, marital status, education level, and socioeconomic status) were gathered using a pre-validated questionnaire. OHRQoL was assessed using the EORTC QLQ-H & N35 questionnaire, with an emphasis on xerostomia-related areas such as dry mouth, swallowing, speech, and social functioning.[14] A skilled examiner additionally assessed the oral hygiene status and xerostomia-related findings during the examination. To guarantee data consistency, all information was gathered using a pre-made proforma and established operating processes. Data were collected and analyzed using SPSS version 24. All the variables were summarized using descriptive statistics. Frequencies and percentages were used for the categorical variables and mean $\pm$ SD was used for the continuous variables (OHRQoL scores). Normality of the data was tested by the Shapiro-Wilk test. For inferential analysis, the independent t-test was used for comparing two groups, while the one-way ANOVA was used for comparing multiple groups as appropriate. Multiple linear regression analysis was used to test the association between OHRQoL and independent variables (sociodemographic factors and clinical parameters). A p-value < 0.05 was deemed to be statistically significant. All relevant analyses were performed at a 95% confidence interval.

RESULTS

This study involved 118 patients with the average age of the participants was 52.6 ± 11.8 years and a majority of the study participants were male (69.5%). The majority of the patients were married (79.7%) and from a low socioeconomic background (60.2%). When it comes to education, a fairly even balance was found among the illiterate, the primary and the secondary or higher levels of schooling. The study population was mainly comprised of middle-aged, socioeconomically disadvantaged male patients. (Table 1)

The most common primary site of malignancy was the oral cavity followed by oropharyngeal and laryngeal cancers. Most patients had received combination therapy, predominantly radiotherapy and chemotherapy (most often) and, a triple-modality. More patients were assessed at 7-12 months after therapy. The oral morbidity was high with more than half of the

patients having moderate to severe xerostomia and almost half of them had poor oral hygiene status. (Table 2)

The most impacted domains were xerostomia-related symptoms (dry mouth), as well as problems with swallowing and eating socially. Other areas of function and psychosocial well-being such as pain, speech difficulties and social interaction problems were also significantly affected, suggesting a general reduction in function and psychosocial well-being following radiotherapy. (Table 3)

There were significant differences between the OHRQoL scores based on certain demographic and clinical factors. Female sex, age group, and poor oral hygiene status and higher xerostomia scores were significantly associated with poorer

quality of life. There was a clear gradient effect with patients reporting poor oral hygiene and severe dry mouth showing the greatest OHRQoL impairments. (Table 4)

The most significant independent predictors of decreased OHRQoL were found to be severe xerostomia and oral hygiene in the multivariable regression analysis model. The lower socioeconomic status, male gender and age also had significant associations but with lesser effect sizes. The overall model explained a high proportion of the variance in QoL and suggested that overall, clinical and sociodemographic factors together contribute to reduced QoL in this patient population. (Table 5).

Table 1: Sociodemographic Characteristics of Study Participants (N = 118)

Variable	Category	Frequency N (%)
Age (Years)	Mean $\pm$ SD	52.6 $\pm$ 11.8
Age Group	≤ 40	18 (15.3)
	41–60	64 (54.2)
	> 60	36 (30.5)
Gender	Male	82 (69.5)
	Female	36 (30.5)
Marital Status	Married	94 (79.7)
	Single/Widowed	24 (20.3)
Education	Illiterate	38 (32.2)
	Primary	42 (35.6)
	Secondary Or Above	38 (32.2)
Socioeconomic Status	Low	71 (60.2)
	Middle	34 (28.8)
	High	13 (11.0)

Table 2: Clinical Characteristics of Head and Neck Cancer Patients (N = 118)

Variable	Category	Frequency N (%)
Cancer Site	Oral Cavity	46 (39.0)
	Oropharynx	32 (27.1)
	Larynx	28 (23.7)
	Others	12 (10.2)
Treatment Received	Surgery + RT	38 (32.2)
	RT + Chemotherapy	44 (37.3)
	Surgery + RT + Chemotherapy	36 (30.5)
Time Since Treatment	≤ 6 Months	41 (34.7)
	7–12 Months	77 (65.3)
Xerostomia Severity	Mild	22 (18.6)
	Moderate	54 (45.8)
	Severe	42 (35.6)
Oral Hygiene Status	Good	21 (17.8)
	Fair	47 (39.8)
	Poor	50 (42.4)

Table 3: Domain-Wise Scores of Ohrqol (EORTC QLQ-H&N35)

Domain	Mean $\pm$ Sd
Pain	41.8 $\pm$ 18.6

Swallowing Difficulty	48.5 ± 20.3
Dry Mouth (Xerostomia)	72.4 ± 16.9
Speech Problems	39.2 ± 17.5
Social Eating	55.6 ± 19.8
Social Contact Limitation	44.3 ± 18.1
Overall Ohrqol Score	51.7 ± 14.9

Table 4: Association of Ohrqol with Sociodemographic and Clinical Variables

Variable	Ohrqol Mean ± SD	P-Value
Gender		
Male	53.2 ± 14.2	0.041*
Female	48.1 ± 15.3	
Age Group		
≤40	45.6 ± 13.8	0.032*
41–60	51.9 ± 14.5	
>60	55.8 ± 15.1	
Oral Hygiene Status		
Good	42.5 ± 12.4	<0.001*
Fair	50.8 ± 13.6	
Poor	58.6 ± 14.7	
Xerostomia Severity		
Mild	38.9 ± 11.2	<0.001*
Moderate	51.7 ± 13.4	
Severe	62.3 ± 15.0	

*Significant At P ≤ 0.05

Table 5: Multivariable Linear Regression Analysis for Predictors of Poor Ohrqol

Predictor	B-Coefficient	Standard Error	P-Value
Severe Xerostomia	0.42	0.08	<0.001*
Poor Oral Hygiene	0.38	0.07	<0.001*
Low Socioeconomic Status	0.21	0.06	0.004*
Male Gender	0.18	0.07	0.012*
Age (>60 Years)	0.15	0.06	0.021*

Model R² = 0.56, P < 0.001

DISCUSSION

Patients with head and neck cancer who experienced xerostomia following radiation therapy had considerably lower OHRQoL, with concerns about dry mouth, difficulty swallowing, and social eating being the most impacted. A multicenter observational study (OraRad study) also showed that dry mouth and sticky saliva were the most troublesome and persistent symptoms even after 24 months of radiotherapy, and had a significant influence on the patient-reported quality of life outcomes.[15] The similarities further highlight the importance of SG dysfunction in the decline of oral function and everyday life activities. The current study revealed that moderate to severe xerostomia was associated with a high prevalence and a significant correlation with low OHRQoL scores. This results of Pathak et al. (2024), reported that despite advancements in radiotherapy delivery, patients treated with

IMRT and VMAT procedures had a high burden of chronic xerostomia and a significantly lower quality of life.[16] Similarly, Shen et al. (2024) noted that a decrease in salivary flow in post-radiotherapy survivors was directly linked to an increase in oral health status and sleep disturbances, highlighting an impact of xerostomia beyond oral discomfort.[17] Furthermore, our study showed that the poor oral hygiene status has a significant impact on the OHRQoL outcomes. According to additional research, individuals who have head and neck cancer who have poor oral hygiene may experience more oral pain, oral problems, and functional impairment.[18] Similar links between oral health and patient-reported outcomes were also reported in observational studies in which poor oral care practices contributed to increased oral morbidity caused by radiation therapy and to a poor overall quality of life.[15]

Older age, lower socioeconomic status and male gender were also significantly associated with worse OHRQoL in the present study. The present study is similar to previous studies, reporting consistently increased symptoms associated with xerostomia and poorer functional outcomes after radiotherapy in older patients.[19] Additionally, the OraRad cohort demonstrated that the recovery of the salivary gland diminishes with age, which is correlated with persistent salivary gland dryness and worse patient-reported outcomes throughout time.[20]

This study's results emphasize that xerostomia after head and neck radiotherapy is not only an oral problem but is also an important factor in low OHRQoL. The clinical significance is the need for early diagnosis and follow-up of patients who have salivary function deficits after radiotherapy. A frequent examination of xerostomia and an evaluation of OHRQoL using validated instruments should be performed in follow-up procedures in oncology and dental health services. Given the strong linkage of poor oral hygiene and the impact on OHRQoL, structured oral hygiene education, preventive dental care and routine dental follow-up should be part of the cancer survivorship care plan.

Further, the identification of severe xerostomia as the strongest predictor of poor quality of life indicates that preventive measures during radiotherapy (e.g. salivary gland-sparing radiotherapy and salivary stimulants or substitutes) should be targeted wherever possible. However, a multi-disciplinary team (MDT) is needed to respond to the combined functional and psychosocial challenges of these patients, incorporating oncologists, dentists and speech and swallowing therapists. These interventions can have a profound impact on functioning in everyday life, nutrition and social wellbeing and so on leading to better outcomes for survivorship.

The study has some limitations. The cross-sectional design is the restriction in being able to draw causal inferences between xerostomia and lower OHRQoL (measured at one time). Second, the study took place in a single-center environment, and the results may not be applicable to other populations with varying socio-economic and health care factors. Third, questionnaires may have recall and response bias that can lead to inaccuracies in reported quality-of-life scores.

Further, there was a lack of pre-radiotherapy OHRQoL baseline measures, offering better comparison of the impact of the treatment. The

severity of xerostomia was not analyzed in detail and may have been affected by the use of different techniques and doses of radiotherapy by participants. Future multicenter longitudinal studies with a larger sample size and uniform treatment variables are recommended to yield more convincing evidence for the progression and long-term effects of xerostomia on QOL.

CONCLUSION

Radiotherapy causes xerostomia, which greatly affects the oral health-related quality of life in cancer survivors. The current study shows that patients with this illness have severe psychological and functional impairment when they experience dry mouth, poor oral hygiene, and functional impairment. The multifactorial morbidity after radiotherapy was the most prominent observed association: severe xerostomia and poor oral hygiene were the most powerful predictors of reduced quality of life. These results highlight the importance of early preventative measures, routine oral health check-ups, and multidisciplinary survivorship care to reduce the likelihood of long-term disability and enhance patient-centered outcomes. Prevention of xerostomia is a proactive step that can make a huge difference in improving functional recovery, social reintegration, and overall quality of life in head and neck cancer survivors.

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