Assessment of Quality of Life in Head and Neck Cancer Patients before and after Radiation Therapy- A Prospective, Analytical Questionnaire–Based Study from a Tertiary Cancer Centre

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Abstract: Head-and-neck cancer (HNC) is a major global health issue, with significantly higher incidence rates in India compared to other countries. The diagnosis and treatment of HNC can severely affect a patient's quality of life (QoL). This study aims to evaluate and compare the QoL of head and neck cancer patients before and after radiation therapy with or without chemotherapy.

We conducted a prospective study on 45 newly diagnosed HNC patients who underwent radiation therapy, either alone or in combination with chemotherapy at our department. We assessed QoL using the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire Core 30 (QLQ-C30) for general assessment and the EORTC QLQ H&N-35 for head and neck-specific evaluation before starting of the treatment and 4 weeks after the completion of the treatment. We used paired t-tests,Mann-Whitney U test and Kruskal-Wallis ANOVA for statistical analysis, with a significance level set at $p \leq 0.05$.

The most commonly affected site was the oral cavity. All participants initially had a good performance status (PS) of either 1 or 2, with Stage IV being the most prevalent. Analysis of the EORTC QLQ-C30 revealed a decline in global health status, and the EORTC QLQ H&N-35 showed deterioration across all domains from pretreatment. On the functional scale, emotional well-being was notably more impaired, while physical, cognitive, and social functions were less affected. Pain, swallowing difficulties, mucositis, and speech issues were identified as the most severely impacted aspects of QoL.

In Conclusion, our study shows a significant decline in QoL following treatment due to the acute and subacute side effects of radiation therapy and chemotherapy. These findings highlight the need for comprehensive supportive care to address the broad impact of HNC treatment on patients quality of life.

Keywords: EORTC QLQ H&N C30, EORTC QLQ H&N-35, head-and-neck cancer, quality of life, QoL, Radiotherapy, CTRT.

INTRODUCTION

Head and neck cancers (HNC) are the seventh most common cancers worldwide, with around890,000 new cases and 450,000 deaths each year [1]. In India, the incidence of new HNC cases is rising rapidly in terms of both incidence and five-year prevalence [2]. HNCs account for 30% of all cancer cases in India [3]. These cancers primarily affect the oral cavity, pharynx, and larynx, originating mainly from mucosal epithelium, though they can also occur in less common sites like the salivary glands, sinuses, muscles, and nerves [4]. Squamous cell carcinoma is the most prevalent type [5].

In India, many HNC patients are diagnosed at locally advanced stages, necessitating a multidisciplinary approach [6]. Treatment typically involves surgery, radiotherapy and chemotherapy, which can significantly impact a patient's physical, emotional, and social QoL. These treatments are associated with high levels of morbidity, making this patient population particularly vulnerable to poor QoL during and after treatment [7-10]. Changes in QoL are influenced by the type of treatment and the patient's ability to adapt [11-14]. As a result, recent clinical trials and studies have increasingly considered QoL as a key outcome measure.

Health-related quality of life (HRQoL) is understood as a multidimensional assessment of how disease and treatment affect a patient's overall function and well-being [15]. Evaluating HRQOL helps us understand how patients perceive their illness and the effects of treatment side effects, enabling better management strategies and enhanced aftercare and rehabilitation services. This prospective study aims to analyze HRQoL in patients with HNC before and after completing radiotherapy (RT) or chemoradiotherapy (CTRT).

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METHODS AND MATERIALS

This study was a prospective, hospital-based, observational, and questionnaire-driveninvestigation.

Participants

We included 45 patients with biopsy-proven HNC who were undergoing either RT or CRT. Inclusion criteria were: patients aged 18 years or older, with HNC in the oral cavity, oropharynx, larynx, or hypopharynx, RT or CTRT delivered as either definitive or adjuvant intent and an Eastern Cooperative Oncology Group (ECOG) Performance Status (PS) of 0–2. Exclusion criteria were the patients with mental or cognitive impairments affecting their ability to understand the questionnaires, those who had previously received RT in the head and neck region, those with distant metastasis, and patients with an ECOG-PS of 3 or higher.

Assessment Tools

We assessed QoL both before and after treatment using two questionnaires: EORTC QLQ H&N-43 and EORTC QLQ-C30, version 3 [16, 17]. The EORTC QLQ H&N-43 addresses specific symptoms and side effects related to HNC and its treatment. It includes 43 items divided into seven scales: pain, swallowing, senses, speaking, eating in social settings, social contacts, and sexual desires. Additional questions cover dental issues, difficulty opening the mouth, oral dryness, thick saliva, coughing, awareness of illness, use of pain medication, food supplements, and weight changes. Responses are rated on a four-point scale. All the patients were assessed before starting of the treatment and 1 week after completion of the treatment.

Data Analysis

We analyzed the data using IBM SPSS version 25. Continuous variables are presented as mean ± standard deviation, while categorical variables are reported as percentages. To compare median pre- and post-treatment scores across different variables, we used the Mann-Whitney U test for dichotomous variables and Kruskal-Wallis ANOVA for multi-categorical variables. A p-value of ≤0.05 was considered statistically significant for all analyses.

RESULTS

A total of 45 patients with histopathologically confirmed HNC were included in the study. The

Table 1: Patient, Tumor and Treatment Characteristics

Variable		Number	Percentage	p Value
Stage	I	1	2.2	0.04
	II	4	8.8	
	III	17	37.7	
	IVA	18	40	
	IVB	5	11.1	
Site	Oral Cavity	30	66.66	0.01
	Oropharynx	4	8.8	
	Hypopharynx	5	11.1	
	Larynx	5	11.1	
	Nasopharynx	1	2.2	
Radiotherapy Intent	Definitive	18	40	0/06
	Adjuvant	27	60	
ECOG	PS 1	30	66.66	0.12
	PS 2	15	33.33	
Trismus	Grade I	18	40	0.001
	Grade II	16	35	
	Grade III	11	24	
NG Tube	Yes	19	42	0.54
	No	26	57	

patients were selected based on predefined inclusion and exclusion criteria. The mean age of the patients was 54 years, with a male-to-female ratio of 2:1. The majority of cases involved the oral cavity as the primary subsite. Stage IV was the most prevalent stage at diagnosis, followed by Stage III. The predominant histological type was well-differentiated squamous cell carcinoma, and over 50% of patients presented with an ECOG performance status of 1.

Treatment plans involved either chemoradiation or radiotherapy alone with definitive or adjuvant intent, depending on the tumor site and associated high-risk features. All the Patients received radiation therapy with doses ranging from 60-70 Gy, delivered in 1.8-2 Gy per fraction, 5 days in a week. Chemotherapy, consisting of cisplatin (40 mg/m² weekly) administered for up to five cycles in selected cases. Most patients were treated with an adjuvant approach. Detailed patient and tumor characteristics are provided in Table **1**.

As shown in Tables **2** and **3**, mean scores across all domains revealed a decline in QoL from pretreatment. Emotional functioning was the most severely impacted, while physical,cognitive, and social functions were less affected. Symptoms like nausea, vomiting, dyspnea, constipation, and diarrhea were mild before treatment, became more frequent and severe afterward. Additionally, all patients experienced increased financial difficulties post-treatment. Global health status also showed a significant decline after treatment. Overall, QoL scores decreased significantly after treatment compared to pretreatment scores ($p < 0.001$).

When comparing QoL scores specific to HNC, there was a noticeable decline in QoL after treatment compared to pretreatment across all the variables and overall score showed decline in scores post treatment (Tables **4** and **5**).

Table 2: Pre and Post Treatment Comparison of C1-30 QoL in HNC

EORTC QoL C-30 meanscores	Pre-Treatment	Post-Treatment	Mean difference	p Value
Functional scale				
Physical functioning	1.49	1.24	0.247	0.007
Role functioning	1.42	1.14	0.277	0.011
Emotional functioning	1.755	1.167	0.588	<.001
Cognitive functioning	1.1	1.033	0.066	0.183
Social functioning	1.281	1.044	0.237	0.003
Symptom scales				
Fatigue	1.68	1.792	0.511	0.111
Nausea and Vomiting	1.133	1	0.133	0.006
Pain	1.83	1.58	0.244	0.1
Dyspnea	1.22	1.33	0.1	0.005
Insomnia	1.8	1.08	0.72	0.002
Appetite loss	1.37	1.48	0.11	0.05
Constipation	1.8	1.6	0.2	0.2
Diarrhea	1.211	1.011	0.2	0.2
Financial difficulties	1.72	1.1	0.62	<.001
Global health Status	4.578	5.2	0.622	0.007

Table 3: Overall QOL Scores Pretreatment and Post Treatment

HNC C1-30	Time ofcomparison	Mean	Standarddeviation	Median	P value
	Pre-Treatment	50.42	9.76	49	<.001
	Post Treatment	39.56	5.79	38	

Table 4: Pretreatment and Post Treatment HNC QoL Scores

EORTC QoL C-31-73 mean scores	Pre-Treatment	Post Treatment	Mean difference	p Value
Pain	1.607	1.255	0.351	<.001
Swallowing	2.25	1.838	0.411	0.01
Nausea and Vomiting	1.8	1.263	0.537	<.001
Senses	1.867	1.889	0.022	0.901
Dysphagia	1.563	1.429	0.133	0.25
Psychological	1.701	1.214	0.487	<.001
Social interaction	1.637	1.429	0.207	0.068
Sexual desire	1.47	1	0.467	0.001
Skin	1.327	1.044	0.283	<.001

Table 5: Overall HNC QOL Scores Pretreatment and Post Treatment

HNC C31-73	Time of Comparisonn	Mean	Standarddeviation	Median	P value
	Pre	70.58	15.484	68	<.001
	Post	59.71	11.012	58	

DISCUSSION

Cancer remains a leading cause of mortality worldwide and a major barrier to increasing life expectancy across all countries [18]. According to GLOBOCAN 2020, India is expected to see 2.1 million new cancer cases by 2040, a 57.5% increase from 2030 [19-21]. HNC predominantly seen in older and middle-aged adults [22,23]. In our study, the average age of patients was 54 years, consistent with this demographic. Previous studies in India have reported a male-to-female ratio ranging from 2:1 to 5:1 [24], which was similar in our study.

In developing countries, around 80% of HNC patients present with Stage III or IV disease,and about 40% are only suitable for chemoradiation [25,26]. Concurrent CTRT improves locoregional disease control and survival due to the combined effects of chemotherapy and radiation [27].

We investigated the QoL among cancer patients based on the understanding that their QoL is more severely impacted across various domains compared to other diseases. However, assessing QoL is challenging for both clinicians and researchers. Measuring QoL involves several obstacles: clinicians often lack time for routine assessments, and researchers face difficulties in developing valid and reliable tools. Additionally, many QoL measurement tools were initially developed by Western researchers, and while psychometric evaluations have been conducted in India, QoL assessment studies are still relatively rare [28].

No single QoL questionnaire is universally accepted as the gold standard. Various questionnaires are available, and for this study, we used the EORTC QLQ-C30 version 3.0 and the QLQ-H&N35. Both questionnaires demonstrated adequate reliability, with the QLQ-C30 showing higher internal consistency than the QLQ-H&N35.

We found a decline in QoL across all domains post-treatment, with the most significant deterioration in emotional functioning. While some studies report general declines across functional domains, others highlight disproportionate impacts on emotional and social domains. For instance, Taher [21], Alvarez-Buylla Blanco *et al*. [27], and Bjordal *et al*. [28] found the worst scores on functional scales. Scharloo *et al*. studied 177 patients and reported worsening in social functioning but not emotional well-being [29]. The severe decline in emotional functioning in our study may reflect how patients receive their cancer diagnosis orthe level of awareness in Indian setting.

Regarding symptom scales, most studies have reported worsening symptoms by the end of treatment compared to pretreatment [21,27,30,31]. Commonly reported symptoms include pain, fatigue, appetite loss, and weight loss, often attributed to radiotherapy-

induced mucositis [30]. Similarly, in our study there was worsening of symptoms post treatment compared to the pretreatment with statistical significance. Patients experienced increase in pain symptoms and its mainly due to the tumor and chemoradiotherapy treatment underscores the need for more effective pain management [21]. Fatigue, which worsened significantly in our study, was also noted in a study of 640 HNC patients by Wan Leung *et al*. [32]. We observed considerable appetite loss after treatment. Symptoms such as dry mouth, sticky saliva, and swallowing difficulties were common, partly due to the high proportion of oral cavity cancers in our cohort. Swallowing issues may have resulted from surgical procedures (15%) or chemoradiotherapy (57%). Other studies have reported similar findings regarding dry mouth, weight gain difficulties and analgesic use [21,33,34].

Boscolo-Rizzo *et al*. [35] noted problems such as dental issues, mouth opening difficulties, dry mouth, and sticky saliva. Additionally, 50%-75% of patients undergoing radiotherapy or chemotherapy experience a loss of taste and smell, contributing to weight loss [36,37].

Maintaining proper nutrition is crucial for improving QoL, despite the increased use of nutritional supplements during treatment [37-39]. Speech problems also worsened in our study, likely due to the advanced stages of the malignancy and also due to the side effects of radiation. Aplak *et al*. [40] and Campbell *et al*. [41] similarly reported worse scores for speech problems in late-stage cancers. Difficulties with social eating and mouth opening have also been reported [40].

To improve patient care and management, we need to make systematic changes that not onlyadd "years to life" but also "life to years." Research shows that palliative care can enhance patient well-being, and integrating it early in cancer treatment can improve QoL, mood, and even survival [42,43]. The American Society of Clinical Oncology recommends palliative care for all patients with advanced cancer [43]. Trained counselors should be available to provide psychosocial support, and comprehensive care should include diet counseling, speech rehabilitation, swallowing therapy, sexual counseling, and pain management.

Further research should focus on developing shorter, simpler, yet valid QoL assessment tools to make routine QoL evaluation more feasible and on evaluating the efficacy of integrating palliative care and providing psychosocial support in improving QoL in HNC patients.

CONCLUSION

Our study found that quality of life (QoL) for head and neck cancer patients is significantly impacted across various functional and symptom-related areas, with overall health and perceived QoL being less than satisfactory. These treatment-related complications, which are often unavoidable, should be discussed with patients before starting radiation therapy (RT). Offering pre- and post-treatment counseling can help patients adjust to these symptoms more effectively and may improve health-related QoL outcomes. Ongoing, detailed follow-up is essential for healthcare providers to address specific needs throughout the patient's recovery.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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