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ORIGINAL RESEARCH ARTICLE

Longitudinal Assessment of Quality of Life among Head and Neck Cancer Patients Receiving Radiotherapy

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ABSTRACT

Introduction: With a significant increase in head and neck carcinomas (HNC) patients' survival with the recent advances in treatment modalities, the impact of treatment-related morbidities often continues to have an impact on their quality of life (QoL). The aim of the study is to evaluate changes in QoL in patients with head and neck cancer undergoing radiotherapy using FACT-HN scores.

Material & Methods: This longitudinal study was conducted at a tertiary care hospital from August 2023 to February 2024. A sample of 60 patients scheduled to undergo radiotherapy was selected based on previous hospital records. QoL assessment was done using the FACT-HN (Version 4) questionnaire at five follow-up points. Repeated measures ANOVA was used to assess changes in QoL scores over time.

Results: Among the 60 participants, 83.33% were male, and 43.33% were aged 45 to 60 years. Tumor sites included buccal mucosa (38.33%) and tongue (26.67%). Physical well-being scores significantly declined from baseline to the 4th week of post-RT (p <0.001). Social and emotional well-being remained stable over time. Total FACT-HN score declined significantly by the 4th week and the end of RT (p <0.05). However, at 1 and 4 months post-RT, all FACT-H&N components showed improvement.

Conclusion: This study concludes that the quality of life among head and neck cancer patients significantly declined during radiotherapy, with the lowest scores recorded at the end of treatment. Four months after treatment, scores improved and returned close to baseline level. There is a need of integrating psychological counselling, nutritional support, and rehabilitation programs to enhance patient outcomes.

Keywords: Head and neck cancer, Functional assessment, Quality of life, Pre-post radiation therapy, FACT-HN.

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INTRODUCTION

Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020.[1] Head and neck cancers (HNC) account for more than 550,000 cases and 380,000 deaths per annum globally.[2] HNCare aggressive, multifactorial disease with approximately 0.2 to 0.25 million new HNC patients diagnosed each year, according to the Indian Council of Medical Research Atlas.3 The mainstay of treatment for loco-regionally advanced head and neck squamous cell carcinoma is either surgery followed by adjuvant radiation therapy (aRT) or definitive concurrent chemoradiation (CRT), reserving surgery as salvage therapy.[4]

Treatment-related morbidities often continue to have an impact on functional and aesthetic aspects because the affected region is the anatomical site of basic functions, such as breathing, swallowing, speech and hearing which are of vital importance for an individual, besides being related to social interaction.[5,6] With improved survival rates, the treatment related co-morbidities lead to long-term physical and psychological distress, which remain significant concerns in survivors.[7] Moreover, substantial relationships exist between specific quality of life (QoL) measures and the functional outcomes among HNC patients.[8] Thus, the specific items in the QoL measurement assist clinicians in addressing the daily life challenges faced by the patient cohort.[9]

Therefore, a study about the quality of life of patients receiving radiotherapy (RT) for HNC will help in identifying factors affecting QoL. This will funnel the efforts of the workplace and clinics to help cancer survivors to their desired level of work function and economic productivity. This study aims to determine the health-related QoL of head and neck cancer patients in a tertiary care hospital in Bareilly.

MATERIAL AND METHODS

This prospective longitudinal study was conducted among patients with head and neck carcinoma who were

to start radiotherapy from August 2023 to February 2024, at a tertiary care centre in Bareilly, Uttar Pradesh, after ethical approval from the Institute Ethics Committee (letter no. SRMS IMS/ECC/2022/106). Sample size was calculated on the basis of the number of Head and Neck Cancer patients who had reported in the previous year in the hospital and scheduled for RT. There were 660 head and neck cancer patients in the previous year; out of them, 160 were scheduled for RT. Expected prevalence of HNC patients who were scheduled for RT came out to be 24.24%, taken from the last 1 year's hospital data. Thus, using the Cochran's formula with

Where P = 24.24% Q = 100-P = 75.76%, 10% allowable error = 10%, α = 10%

Therefore, n = 50, after addition of 20% more for non-response, the final sample size of 60 patients was used in the analysis. Patients diagnosed with HNC, scheduled to start RT, with or without chemotherapy, or patients who were scheduled to start RT post-operatively, who gave written and informed consent to participate in the study, were included. Patients diagnosed with HNC, scheduled for surgery or immediate post-operative patients, patients scheduled for palliative care and those who refused to participate were excluded.

Data was collected by using the FACT-HN (Version 4) questionnaire, which was taken from the *FACIT.org* website, which is free available.[10]

Segment A

Part I had questions regarding sociodemographic information. Part II had questions regarding the clinical factors, namely, clinic-pathological information.

Segment B

It was modelled on functional assessment of cancer therapy, seeking information on the symptoms and problems faced by the patients during the past week. It is used as it allows comparison across cancer diagnoses while still probing issues specific to head and neck cancer.

The questionnaire consisted of 5 subscales which included physical well-being with 7 questions in the subscale witha score range of 0-28, social well-being with 7 questions in the subscale with a score range of 0 to 28, emotional well-being with 6questions in the subscale with a score range of 0 to 24, functional well-being with 7 questions in the subscale with a score range of 0 to 28 and additional 12 items on head and neck specific subscale for which only 10 questions in the subscale are included in the scoring and the subscale Score range from 0 to 40. The response options comprised a 5-point Likert scale ('not at all', 'a little bit', 'somewhat', 'quite a bit', and 'Very much', scored from 0 to 4. The subscale scores are calculated as per the scoring protocol. Add subscale scores to derive total scores. The higher the score, the better the QoL.[10]

Data Collection Procedure

The patients were assessed in 5 phases of the treatment course. The patients with HNC who were scheduled to start radiation therapy (pre-RT) were contacted and baseline information was collected using the study tool. The study subjects were again contacted during the course of RT and at the end of the 4th week and information on all 2 segments of the Interview schedule was again collected. The study subjects were followed further and were again contacted after the completion of RT (End RT), after 1 month of RT (Post RT1), after 4 months of RT (Post RT2), and during the follow-up visits in the hospital.

Statistical Analysis

The collected data were entered into an MS Excel (2013) sheet and analysed using the trial version of SPSS. Descriptive statistics were used to summarize data. To assess the difference in continuous parameters across various follow-ups, repeated measures ANOVA was used after checking the normality assumption. Post hoc analysis was performed using Tukey HSD. Post HOC Test was not done in case the p-values of the ANOVA test showed no significant change. A *p-value* of <0.05 was considered statistically significant.

RESULTS

Table 1 depicts the distribution of study participants on the basis of gender and shows that the majority, 50 (83.33%) of study subjects were males and only 10 (16.67%) were females. Majority, 26 (43.33%) of study subjects were within 45 to 60 years of age, followed by 19 (31.67%) subjects aged between 30 to 45 years and 12 (20%) were aged 60 to 75 years of age, 2 (3.33%) were > 75 years of age and only 1 (1.67 %) was in <30 years age group. Maximum 31 (51.67%) patients were from urban area followed by 23 (38.33%) patients who belonged to rural area and 6 (10.00%) were dwelling in urban slum areas. The majority, 51 (85.00%) of study subjects were married, followed by 6 (10.00%) subjects who were widowed and 3 (5.00%) were single. The distribution of study participants on the basis of socioeconomic status according to BG Prasad Scale modified for June 2023 shows that maximum 24 (40.00%) subjects belonged to lower middle class, 12 (20.00%) patients belonged to upper middle class, 11 (18.33%) belonged to lower class, 10 (16.67%) belonged to middle class and only 3 (5.00%) belonged to Upper class. Table 2 shows the distribution of study participants on the basis of the site of tumour where 23 (38.33%) of the participants

Table 1: Distribution of study participants on the basis of sociodemographic profile of study participants (N=60)

Variable	*Category*	*Frequency*	*Percentage*
Gender	Male	50	83.33
	Female	10	16.67
Age group (in years)	<30	1	1.67
	30–45	19	31.67
	45–60	26	43.33
	60–75	12	20
	>75	3	3.33
Residence	Rural	23	38.33
	Urban	37	61.67
Education	Illiterate	17	28.33
	Primary	3	5.00
	Middle	15	25.00
	Secondary	6	10.00
	Intermediate	13	21.67
	Graduate	2	3.33
	Post Graduate	4	6.67
	Professional	1	1.67
Occupation	Clerical	6	10.00
	Sales Worker	6	10.00
	Agricultural Worker	15	25.00
	Service Worker	11	18.33
	Production Worker	14	23.33
	Others	7	11.67
Socio economic status (BG Prasad Classification 2024)	Class I (>8763)	3	5.00
	Class II (4381.5-8675.3)	12	20.00
	Class III (2630-4294)	10	16.67
	Class IV (1314.5-2541.27)	24	40.0
	Class V (<1314.5)	11	18.33
Total		60	100

had tumour involving buccal mucosa, followed by 16 (26.67%) participants with involvement of tongue, 9 (15.00%) had tumour involving larynx & hypopharynx, 6 (10.00%) had involvement of base of tongue, 2 (3.33%) each had either involvement of alveolus or maxilla. One each (1.67%) had either tumour of floor of mouth or soft palate and the distribution of study participants on the basis of their treatment modality where maximum, 20 (33.33%) study participants received primary CT+RT, 18 (30.00%) received only post-operative RT, 11 (18.33%) received RT alone, 7 (11.67%) received adjuvant CT+RT. Only 4 (6.67%) participants received neoadjuvant CT+RT.

Table 3 represents the mean scores of different health-related quality of life (HRQOL) domains measured using the FACT-HN scale at five follow-up visits: baseline (before treatment), the 4th week of treatment, the end of

Table 2: Distribution of study participants on the basis of the site of tumour (N = 60)

Variable	*Category*	*Frequency*	*Percentage*
Tumour site	Alveolus	2	3.33
	Base of tongue	6	10.00
	Buccal mucosa	23	38.33
	Floor of mouth	1	1.67
	Larynx & Hypopharynx	9	15.00
	Maxilla	2	3.33
	Soft palate	1	1.67
	Tongue	16	26.67
Treatment modality	RT	11	18.33
	Neoadjuvant CT+RT	4	6.67
	Primary CT+RT	20	33.33
	Adjuvant CT+RT	7	11.67
	Post operative RT only	18	30.00
Total		60	100.0

radiotherapy (RT), one month after treatment, and four months after treatment. Physical well-being showed a significant decline from baseline (18.75 ± 5.81) to the 4th week (10.31 ± 4.79) and further decreased at the end of RT (8.88 ± 3.01). However, it improved by one-month post-treatment (17.85 ± 5.70) and further increased at four months (21.69 ± 7.34). The changes over time were statistically significant (p <0.001). Post hoc analysis showed a significant decline from baseline to the 4th week (p = 0.001) and end of RT (p <0.01), while recovery was significant by the 4th month (p = 0.046). Social/Family well-being remained relatively stable across follow-ups, with scores ranging between 19.45 ± 5.05 and 21.66 ± 6.23. The differences over time were not statistically significant (p = 0.09). Emotional well-being also remained stable, with scores fluctuating slightly from 20.90 ± 7.12 at baseline to 22.38 ± 6.29 at four months. No statistically significant differences were observed (p = 0.16). Functional well-being showed a significant decline from baseline (14.85 ± 4.90) to the 4th week (8.68 ± 2.56) and further dropped at the end of RT (7.62 ± 2.49). However, it improved at one month (15.28 ± 5.72) and remained stable at four months (15.84 ± 4.41). The overall change was significant (p = 0.005), with post hoc analysis showing a significant decline at the 4th week and end of RT (both p = 0.001), but no significant differences between baseline and one month (p = 0.75) or four months (p = 0.64). Head and neck cancer subscale (HNCS) scores significantly decreased from baseline (14.78 ± 4.78) to the 4th week (10.21 ± 3.77) and the end of RT (9.06 ± 2.83). Scores improved at one month (14.24 ± 4.51) and four months (16.5 ± 4.12). The

Table 3: Mean scores of the corresponding health related quality of life (HRQOL) scale domains of FACT-HN for the five follow-up visits

Variables	Baseline (BL)	4th week	End RT	1 month	4 months	p value#	p-value (Tukey HSD Post hoc test)			
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		BL vs 4th week	BL vs End RT	BL vs 1 month	BL vs 4th month
Physical well-being	18.75 ± 5.81	10.31 ± 4.79	8.88 ± 3.01	17.85 ± 5.70	21.69 ± 7.34	<0.001***	0.001	<0.01	0.51	0.046
Social/ Family well-being	21.66 ± 6.23	20.46 ± 6.11	20.23 ± 6.48	21.43 ± 6.12	19.45 ± 5.05	0.09NS	-	-	-	-
Emotional well-being	20.90 ± 7.12	20.33 ± 6.87	20.27 ± 6.81	21.55 ± 6.19	22.38 ± 6.29	0.16NS	-	-	-	-
Functional well-being	14.85 ± 4.90	8.68 ± 2.56	7.62 ± 2.49	15.28 ± 5.72	15.84 ± 4.41	0.005**	0.001	0.001	0.75	0.64
HNCS	14.78 ± 4.78	10.21 ± 3.77	9.06 ± 2.83	14.24 ± 4.51	16.5 ± 4.12	0.012**	0.033	0.009	0.38	0.11
FACT-HN Total	90.95 ± 15.26	69.99 ± 16.14	66.07 ± 15.94	90.39 ± 20.10	93.99 ± 26.44	0.003**	<0.01	<0.01	0.84	0.61

****p-value <0.001; ** p-value <0.05; NS: Not Significant, #Repeated measure Anova test along with Tukey HSD Post hoc analysis. HNCS= Head and Neck Cancer Subscale; FACT-HN = Functional Assessment of Cancer Therapy -Head and Neck; BL = Baseline*

overall change was significant (p = 0.012), with post hoc analysis showing a significant decline at the 4th week (p = 0.033) and end of RT (p = 0.009), but no significant difference at one month (p = 0.38) or four months (p = 0.11). The total FACT-HN score followed a similar pattern. It significantly declined from baseline (90.95 ± 15.26) to the 4th week (69.99 ± 16.14) and further decreased at the end of RT (66.07 ± 15.94). However, scores improved at one month (90.39 ± 20.10) and remained stable at four months (93.99 ± 26.44). The overall change was statistically significant (p = 0.003), with post hoc analysis showing significant declines at the 4th week and end of RT (both p <0.01), while no significant difference was found between baseline and one month (p = 0.84) or four months (p = 0.61).

DISCUSSION

This study found majority of patients were male, with 50 (83.33%) belonging to the age group 40 to 49 years with 21 (35.00%)followed by 19 (31.67%) patients between 30 to 45 years. The findings of this study were aligned with the results of Karimi AM *et al*., and Barma M D *et al*., who observed a predominance of male head and neck cancer patients.[11,12] In this study, the majority of patients (51.67%) were from urban areas, followed by 38.33% from rural areas and 10.00% from urban slums. In contrast, a study conducted in Western India by Parkar S *et al*. reported that 53.50% of the patients belonged to rural communities. This difference may be attributed to the availability of advanced medical facilities in the tertiary care hospital where the present study was conducted. The presence of specialized services and modern healthcare infrastructure likely attracts patients from urban centres and nearby cities, leading to a higher proportion of urban patients seeking treatment at this facility.[13]

In this study, 40.00% of subjects belonged to the lower middle class and 18.33% to the low socioeconomic class (Modified BG Prasad scale, June 2023), likely due to the availability of health schemes at this hospital. Similarly, Parkar S *et al*. reported 57.50% of patients in the lower socioeconomic class (Kuppuswamy scale), reflecting regional differences in healthcare access and classification criteria.[13]

In this study, the most commonly affected site was the buccal mucosa (38.3%), followed by the tongue (26.67%), larynx and hypopharynx (15%), base of the tongue (10%), alveolus and maxilla (3.33% each), and floor of the mouth or soft palate (1.7% each). Similarly, Gomes EPAA *et al*. reported palate/oropharynx (21.21%) and floor of the mouth (21.21%) as the most frequently affected sites, followed by the larynx and tongue (12.12% each), aligning with our findings.13 However, Bashir A *et al*. found laryngeal cancer to be the most common (49.5%), followed by oral cavity cancer (42.9%), highlighting

regional variations in tumor distribution.[14] In this study, most subjects had a T2 grade tumor (45%), followed by T3 (26.67%), T4 (16.67%), and T1 (11.67%). Regarding node status, the majority were N0 (48.3%), followed by N2 (35%) and N1 (16.67%). Bashir A et al. reported a higher proportion of patients (57.1%) with advanced-stage tumors (T3 and T4).[14] However, findings from Egestad H and Nieder C were similar to our study, with most patients having a T2 grade tumor and N0 node status.[15]

This study reported, at baseline, the mean scores for HNCS, FACT-H&N TOI, FACT-G, and FACT-H&N Total were 14.78 ± 4.78, 48.33 ± 11.01, 76.18 ± 13.43, and 90.95 ± 15.26, respectively. These scores declined significantly by the 4th week of therapy and further decreased by the end of RT (p <0.05). However, at 1 and 4 months post-RT, all FACT-H&N components showed improvement, returning to approximately baseline values. Notably, physical well-being improved beyond baseline (21.69 ± 7.34 vs. 18.75 ± 5.81, p <0.05). This aligns with Rogers et al., who reported better outcomes in patients with preserved larynx function, leading to improved role function.[16] Similarly, Rathod et al. found that role function at a 3-month follow-up nearly returned to pretreatment levels.[17] Gomes EPAA *et al*. also observed that FACT-G and FACT-H&N TOI had the highest scores, while emotional and physical well-being had the lowest, with a statistically significant positive correlation, consistent with our findings.[18] The study by Cmelak *et al*. reported comparable findings, showing statistically significant changes in QoL over time for the FACT emotional subscale, FACT-HN, and TOI (p < 0.001). Post-hoc analyses revealed an increase in the FACT emotional subscale scores from baseline to post-induction (p < 0.05), which then stabilized. FACT-HN and TOI scores showed a significant decline between post-induction and three months (p < 0.05), highlighting the impact of treatment on QoL.[19]

CONCLUSION

This study concludes that the majority of head and neck cancer patients were male, aged between 45 to 60 years, from urban areas, and belonged to the lower middle class. Buccal mucosa was the most common tumor site, and the most frequent treatment modality was primary chemotherapy with radiotherapy. Health-related quality of life significantly declined during radiotherapy, with the lowest scores recorded at the end of treatment, particularly in physical and functional well-being. However, one and four months after treatment, scores improved and returned close to baseline levels, with physical well-being showing even greater improvement than before treatment. Social and emotional well-being remained relatively stable throughout.

This study recommended there is a need of integrating psychological counselling, nutritional support, and rehabilitation programs can enhance patient outcomes. Future research with interventional support and a longer follow-up period should be done for an effective strategy.

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