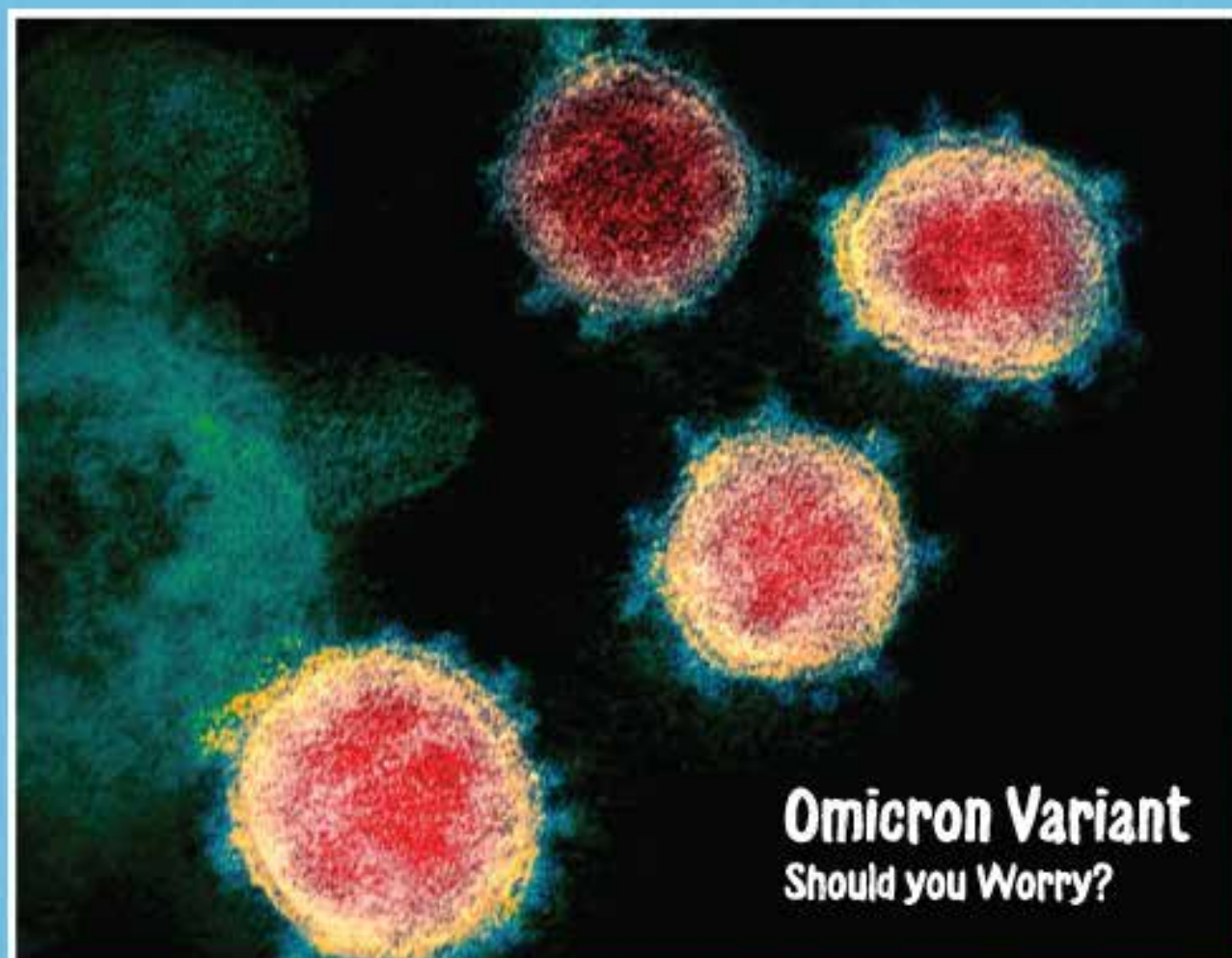


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Omicron Variant
Should you Worry?

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A Prospective Study to Evaluate the Impact of Cancer Directed Treatment on Quality of Life in Head and Neck Cancer Patients

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Abstract

Introduction: Head and neck cancer and its treatment play a significant role in a patient's quality of life. The evaluation of the quality of life is important for the better survival of the patients. The study aims to determine how the different treatment modalities impact the quality of life in head and neck cancer patients.

Methods: A prospective cross-sectional study was conducted among the 400 HNC patients. Patients who were newly diagnosed with cancer (treatment not yet started) and those who received cancer-directed treatment were enrolled. The quality of life was assessed by using European Organization for Research and Treatment of Cancer: Core (QLQ-C30) and Head and Neck specific module (QLQ-H&N35).

Results: Tumor involving pharynx and larynx had significantly worst score as compared to cancer of oral

cavity. The quality of life deteriorated in the advanced stage of cancer as compared to the initial stage. Problems related to social contact were significantly more in patients treated with surgical treatment. The symptoms scores were high in patients receiving chemoradiation therapy. Patients treated with single treatment had a significantly better score on most scales than patients receiving combined treatment modality. Performance status was a strong predictor of quality of life.

Conclusion: The result of the study concludes that the many domains of quality of life were significantly affected in patients receiving cancer-directed treatment. Assessment of quality of life will help reduce the impact of therapeutic complications and thus improve patients' quality of life.

Keywords: Head and neck cancer, quality of life, surgery, chemo-radiation

Introduction

Head and neck cancer (HNC) is one of the most preventable public health threats in the developed world and is rapidly increasing in developing countries. In India, HNC is a major public health problem ranking third among all types of cancer and accounting for over 30% of all cancers reported.^(1,2) Several aspects of a patient's life, including psychosocial, physical, and financial, are all affected during cancer and its treatment and play a part in contributing to negative or positive effects in the patient's QoL.⁽³⁾

The treatment modalities of HNC are surgery, radiotherapy, chemotherapy, and/or a combination of these modalities. Despite recent technologies and advances in the field of curative oncology, it is impossible to avoid treatment-related side effects.⁽⁴⁾ The treatment-

related side effects of HNC may include xerostomia, taste disturbances, dietary restrictions, dysphagia and pain, fatigue, distortion of physical appearance, permanent disfigurement, and infirmity which has a strong impact on a patient's QoL.⁽⁵⁾ As a result, when deciding on the desirability of a recommended treatment for any particular patient, the quality of that survival becomes a major consideration.⁽⁶⁾ Hence, QoL data becomes an important aspect for providing information on treatment outcomes for HNC patients.^(7,8)

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Variety of predictors of QoL including tumor characteristics (e.g. site, stage, treatment modalities), clinical characteristics, treatments, health behaviors (e.g. alcohol use or smoking), and demographics are associated with QoL. At the consultation, such predictors are identified which may facilitate and improve communication between patients and health care professionals. This enables decision-making to select the best treatment option as patient participation is enhanced. Early interventions like any pre-treatment interventions (extraction of teeth, oral hygiene maintenance), support services and rehabilitation services, good nursing care, and palliative measures such as pain control, adequate nutrition at a different phase of cancer will ultimately reduce or prevent long-term complications if any.

In developing countries like India to date, there is a strong fear about cancer treatment and its grave consequences on the QOL. Also, there is a paucity of information from India on these squeals. Hence, the current study was the first of its kind from the western part of India, aimed to determine how the different treatment modalities impact QoL in HNC patients.

Materials and Methods

A prospective cross-sectional study was conducted among 400 HNC patients attending a tertiary cancer center. The study was conducted after seeking the permission of the local ethics committee and institutional review board of a tertiary cancer center. The study was conducted following the Declaration of Helsinki. The purpose of the study was explained to patients and informed consent was obtained.

Eligibility criteria to enroll in the study include: a histopathologically proven case of malignant neoplasm at head and neck site, both male and female patients above 18 years old, had Karnofsky's Performance Status score (KPS) more than 60. While those patients above 65 years of age, had clinical evidence of disease recurrence or a secondary tumor, unable to read or write the Gujarati language, and had survived for more than 18 months after treatment in any form were excluded from the study. Once the eligibility criteria were met, patients were consented and enrolled in the study. The enrolled patients were categorized into two groups:

- 1) Newly diagnosed group: Patients who were recently diagnosed histopathologically and no cancer-directed treatment had initiated at the time of evaluation of QoL.
- 2) Treatment group: Those patients receiving cancer-directed treatment like surgical (S), radiotherapy (RT), chemotherapy (CT), and/or combined treatment modality.

Data Collection

The enrolled patients were interviewed at different time intervals i.e. before the start of treatment, during treatment, and after completion of treatment. The data were collected by using a self-designed, pre-tested questionnaire consisting of two parts: First part consists of demographic details (age, gender, socioeconomic status (SES), residence, marital status, type of family) through a personal interview. The SES of the patients was assessed as per Kuppuswamy's scale.⁽⁹⁾ Second part consists of clinical details (site of cancer, stage of cancer, type of treatment, duration of treatment, and KPS) which were retrieved from patient medical records. The patient's performance status was assessed by using Karnofsky's Performance Status (KPS).⁽¹⁰⁾ The QoL of patients was assessed by using self-administered questionnaires developed by the European Organization for Research and Treatment of Cancer: Core (QLQ-C30)⁽¹¹⁾ and Head and Neck specific module (QLQ-H&N35).⁽¹²⁾ The Gujarati version of EORTC QLQ-C30 and QLQ-H&N35 questionnaires are copyrighted instruments. Copies of the questionnaires, scoring instructions, and permission to use them (free of charge for academic users) were obtained from the EORTC Data Centre, Quality of Life Unit, Avenue EMounier83 Bte 11, 1200Brussels, Belgium.⁽¹³⁾

The EORTC QLQ-C30⁽¹¹⁾ is a widely used questionnaire and contains QoL issues relevant to a general aspect of cancer patients. It includes five multi items functional scales, three multi items symptoms scales, six single items symptoms scales, and two items concerning the global quality of life, and overall health. The EORTC QLQ-H&N35⁽¹²⁾ is a tumor-specific module used in conjunction with EORTC QLQ-C30 for the assessment of QoL in HNC patients. It contains seven multi items symptom scales and eleven single item symptoms scales. The patients have to answer the questions on a Likert scale with a response ranging from '1=not at all' to '4=very much', whereas the last five items of EORTC QLQ-H&N35 have a dichotomous scale having a no/yes format. Scores of all items and scales are then linearly transformed to 0 to 100. Higher the functional or global QoL score scale represents good functioning, or a high QoL, whereas a high score for a symptom scale represents poor QoL.⁽¹⁴⁾

Statistical Analysis

The data were analyzed by using Statistical Package for Social Science software (SPSS® version 22; IBM Corp., Armonk NY, USA). The demographic and clinical characteristics were summarized using percentages. Kolmogorov-Smirnov test shows data were not normally distributed ($P < 0.05$) and hence, a non-parametric test was used. Kruskal-Wallis and Mann-Whitney tests were used

to compare the study variables. The influence of clinical characteristics was examined using forward stepwise multivariate linear regression. An initial model includes all clinical variables as described previously. Duration treatment and KPS were included as continuous variables. Site of cancer (oral cavity v/s pharyngolaryngeal) and stage of cancer (I/II v/s III/IV) variables were dichotomized. $P < 0.05$ was considered statistically significant.

Results

Table 1 shows the demographic and clinical characteristics of the patients enrolled in the study. The mean age of the patients was 45.47 ± 10.31 years. More than one-third ($n=350$, 87.50%) of the study population were male patients. A total of 214 (53.50%) of the patients resides in a rural area. More than half ($n=230$, 57.50%) of the patients belong to an upper lower class. The most common site of cancer was the oral cavity accounting for 85% of the total sample size. 69.50% of patients reported advanced cancers (stages III and IV), whereas 30.50% had stages I and II cancer. 163 (40.75%) patients had KPS of 80 while only 3 (0.75%) patients had reached the score of 100. Out of 400 patients, 20% of patients were newly diagnosed cases of HNC in which the curative treatment had not yet started at the time of evaluation. While 71 (17.75%) of patients received a combination of all three types of treatment. Most of the patients, 92 (23%) had received treatment in combination with surgical and radiotherapy. The average duration reported following surgical (S), radiotherapy (RT), and chemotherapy (CT) were 4.02 ± 3.19 , 2.49 ± 3.02 , and 2.79 ± 2.78 months respectively.

Mean scores of QoL were compared according to site and stage of cancer in Table 2 and Table 3 respectively. Tumors involving pharyngeal and hypo-pharyngeal regions had significantly ($P < 0.05$) impaired scores as compared to cancer of the oral cavity. The scores of swallowing, speech, and cough were significantly high ($P < 0.001$) for laryngeal cancer whereas the score of mouth opening and use of feeding tube were significantly high ($P < 0.001$) for oral cavity cancer. No significant difference ($P > 0.05$) was observed according to the stage of cancer for EORTC QLQ C30. The scores for social contact, mouth opening, use of feeding tube, and weight loss were significantly high ($P < 0.001$) in the advanced stage of cancer as compared to the early stage.

The impact of various treatment modalities on QoL is shown in Table 4. The emotional function (EF) and quality of life (QL) scores were significantly ($P < 0.05$) low in the patients receiving chemo-radiation treatment. The nausea-vomiting (NV) score was significantly ($P < 0.001$) more in patients receiving chemotherapy. The radiotherapy

Variables	Number (n=400)	Percent (%)
Mean age (in years)	45.47 ± 10.31	
Gender		
Men	350	87.50
Women	50	12.50
Location		
Urban	186	46.50
Rural	214	53.50
Marital status		
Unmarried	35	8.75
Married	357	89.25
Divorced/ Widow	8	2.00
Socio-economic status		
Upper	7	1.75
Upper middle	45	11.25
Lower middle	80	20.00
Upper lower	230	57.50
Lower	38	9.50
Family type		
Nuclear family	82	20.50
Joint family	318	79.50
Site of Tumor		
Oral cavity	340	85.00
Pharynx/ hypopharynx	26	6.50
Larynx	34	8.50
Stage of cancer		
I/II	122	30.50
III/IV	278	69.50
Karnofsky Performance status		
60	32	8.00
70	107	26.75
80	163	40.75
90	95	23.75
100	3	0.75
Treatment Modalities		
No treatment (newly diagnosed)	80	20.00
Only surgical	39	9.75
Only radiotherapy	25	6.25
Only chemotherapy	28	7.0
Surgical +Radiotherapy	92	23.00
Radiotherapy+ Chemotherapy	65	16.25
Combination of all	71	17.75

Table 1: Demographic and Clinical Characteristic of Head and Neck Patients

Scales	Oral Cavity (n=340)	Pharynx/ Hypopharynx(n=26)	Larynx(n=34)	P Value
EORTC QLQ-C30				
Physical functioning (PF)	89.50± 16.15	78.19±25.75	87.24±14.89	0.02*
Role functioning (RF)	93.77±13.65	85.25±19.05	94.11±10.76	0.01*
Emotional functioning (EF)	83.08±19.86	73.71±25.57	84.79±19.19	0.09
Cognitive functioning (CF)	93.18±14.43	92.29±12.67	97.54±7.26	0.14
Social functioning (SF)	89.69±7.42	85.25±20.72	93.13±14.28	0.18
Fatigue (FA)	20.42±20.23	35.04±21.70	27.78±21.92	<0.01**
Nausea Vomiting (NV)	11.28±19.85	8.33±21.73	13.73±21.11	0.41
Pain (PA)	13.97±17.88	19.23±20.38	14.70±17.29	0.33
Quality of life (QL)	75.04±20.07	64.72±21.88	73.25±16.25	0.03*
Dyspnoea (DY)	6.69±17.19	12.82±23.24	19.61±26.09	<0.001**
Insomnia (SL)	18.43±26.61	25.64±35.65	31.39±32.76	0.04*
Appetite loss (AP)	20.39±29.12	32.05±33.30	32.31±35.28	0.008*
Constipation (CO)	14.99±26.24	8.97±17.78	21.56±25.79	0.08
Diarrhoea (DI)	1.67 ±9.60	0	5.88±15.29	0.005*
Financial difficulties (FI)	34.11±34.15	48.71±37.98	31.37±31.72	0.13
EORTC QLQ-H&N35				
Pain (HNPA)	24.34±20.06	25.32±21.01	18.63±21.03	0.14
Swallowing (HNSW)	20.61±22.75	30.44±25.49	35.29±23.34	<0.001**
Senses (HNSE)	14.66±21.46	8.33±17.16	17.16±22.28	0.47
Speech (HNSP)	18.59±23.89	22.65±28.01	43.45±33.65	<0.001**
Social eating (HNSO)	30.08±26.21	31.09±26.19	31.86±22.70	0.79
Social contact (HNCS)	13.49±19.53	16.67±26.55	9.99±16.35	0.51
Sexuality (HNSX)	5.56±15.14	10.14±21.16	0.62±3.21	0.08
Problem in Teeth (HNTE)	26.75±31.78	22.66±29.99	19.19±33.36	0.2
Opening mouth (HNOM)	35.48±34.65	8.97±22.22	9.80±23.96	<0.001**
Dry mouth (HNDR)	37.06±34.90	35.89±41.00	36.27±29.99	0.91
Sticky saliva (HNSS)	32.64±30.44	21.79±28.19	35.29±27.14	0.11
Coughing (HNCO)	13.82±23.50	28.20±33.59	29.41±29.31	<0.001**
Felt ill (HNFI)	16.27±25.40	32.05±27.45	23.53± 27.86	0.002*
Pain Killers (HNPK)	82.35±38.18	65.38±48.52	85.29±35.95	0.08
Nutritional supplement (HNNU)	3.53±18.48	3.85±19.61	0	0.54
Feeding tube (HNFE)	18.82±39.15	3.85±19.61	2.94±17.15	0.01*
Weight loss (HNWL)	59.11±49.23	73.08±45.23	67.65± 47.49	0.26
Weight gain (HNWG)	10.88±31.19	15.38±36.79	8.82±28.79	0.71

Mean values compared by Kruskal Wallis test; *P<0.05 significant; **P<0.001 highly significant

Table 2: Comparison of Mean Score of EORTC QLQ-C30 and EORTC QLQ- H&N35 according to tumor site

Scales	I/II (n=122)	III/IV (n=278)	P Value
EORTC QLQ-C30			
Physical functioning (PF)	89.55±15.45	88.14±17.67	0.61
Role functioning (RF)	92.75±15.14	93.46±13.44	0.98
Emotional functioning (EF)	84.49±19.17	81.79±20.76	0.26
Cognitive functioning (CF)	95.21±11.83	92.73±14.66	0.09
Social functioning (SF)	91.38±15.48	88.95±18.19	0.24
Fatigue (FA)	14.37±17.99	22.40±22.22	0.92
Nausea Vomiting (NV)	9.97±18.01	11.75±20.90	0.49
Pain (PA)	13.79±17.37	14.63±18.29	0.77
Quality of life (QL)	74.77±20.64	73.98±19.76	0.54
Dyspnoea (DY)	10.11±23.43	7.67 ±16.42	0.76
Insomnia (SL)	21.86±29.92	19.18±27.16	0.47
Appetite loss (AP)	22.95±30.92	22.06±29.99	0.85
Constipation (CO)	16.39±27.18	14.63±25.21	0.64
Diarrhea (DI)	0.82 ±5.18	2.39±11.42	0.23
Financial difficulties (FI)	34.42±35.83	35.00±33.71	0.72
EORTC QLQ-H&N35			
Pain (HNPA)	22.88±19.21	24.37±20.66	0.62
Swallowing (HNSW)	23.31±24.08	22.16±23.11	0.67
Senses (HNSE)	13.25±19.28	14.99±22.15	0.75
Speech (HNSP)	20.03±26.94	21.38±25.62	0.29
Social eating (HNSO)	27.78±26.26	31.41±25.67	0.13
Social contact (HNSC)	10.81±19.28	14.53±19.95	0.03*
Sexuality (HNSX)	4.35±12.45	5.99±15.12	0.52
Problem in Teeth (HNTE)	26.72±33.25	25.46± 31.22	0.88
Opening mouth (HNOM)	25.95±33.33	34.05±34.68	0.01*
Dry mouth (HNDR)	32.51±32.76	38.85±35.62	0.11
Sticky saliva (HNSS)	33.06±32.49	31.77±29.05	0.95
Coughing (HNCO)	19.94±30.19	14.39±22.67	0.2
Felt ill (HNFI)	17.21±25.44	18.22±26.33	0.77
Pain Killers (HNPK)	84.43±36.41	80.22±39.91	0.32
Nutritional supplement (HNNU)	2.46±15.55	3.60±18.66	0.56
Feeding tube (HNFE)	9.02±28.76	19.78±39.91	0.008*
Weight loss(HNWL)	53.28±50.09	64.03±48.08	0.04*
Weight gain (HNWG)	10.66±30.98	11.15±31.53	0.88

Mean values compared by Mann Whitney U test; *P<0.05significant

Table 3: Comparison of Mean Score for EORTC QLQ-C30 and EORTC QLQ-H&N35 according to stage of tumor

Scales	No (n=80)	S (n=39)	RT (n=25)	CT (n=28)	S+RT (n=92)	RT+CT (n=65)	ALL (n=71)	P Value
EORTC QLQ-C30								
PF	90.32± 16.67	90.58± 18.14	86.92± 19.76	87.37± 19.31	87.59± 16.31	86.35± 19.27	89.85± 13.42	0.25
RF	92.28 ±18.17	93.58± 14.11	91.99± 14.52	94.03± 14.49	94.01± 11.47	93.07± 12.46	93.42± 12.74	0.98
EF	88.32 ± 15.44	80.12± 20.19	77.33± 20.19	80.05± 27.34	84.14± 18.11	76.15± 25.25	84.38± 17.98	0.03*
CF	96.66 ± 9.71	97.42 ± 7.19	87.32± 19.99	91.06± 18.41	92.02± 15.33	93.07± 14.09	93.18± 13.08	0.04*
SF	93.12 ± 14.69	84.17± 19.84	93.32± 10.75	88.09± 23.06	90.57± 16.81	89.48± 16.02	87.32± 19.61	0.08
FA	17.35 ± 20.53	23.64± 21.95	27.11± 24.65	18.64± 17.12	20.89± 20.69	29.39± 21.28	20.49± 18.56	0.08
NV	2.50 ± 9.59	2.99 ± 8.44	14.00± 19.05	21.43± 26.78	7.97± 15.91	18.20± 23.15	18.31± 25.53	<0.001**
PA	11.20 ± 17.34	12.39± 15.63	19.99± 25.91	16.07± 21.51	14.31± 16.68	17.43± 19.86	13.61± 14.44	0.34
QL	79.1± 20.45	71.55± 22.35	69.31± 21.60	77.05± 19.85	76.78± 17.41	64.59± 20.56	76.26± 17.45	<0.001**
DY	8.75± 19.66	14.53± 26.26	7.99± 14.53	3.57± 10.49	6.52± 17.28	9.74± 21.02	7.98± 16.39	0.48
SL	14.9± 29.95	19.66± 26.17	34.66± 31.15	15.48± 23.09	17.75± 23.41	29.23± 30.90	16.89± 27.53	0.001*
AP	16.6± 29.05	16.24± 28.47	33.33± 34.69	22.62± 24.09	21.37± 27.77	31.79± 33.03	20.66± 31.55	0.005*
CO	9.99± 22.12	7.69± 17.86	22.66± 32.94	5.95± 15.85	21.37± 26.42	17.43± 29.52	15.96± 26.93	0.02
DI	0.83± 5.23	2.56± 11.80	1.33± 6.66	2.38± 12.59	2.17± 10.83	2.05± 8.07	2.34± 12.99	0.97
FI	36.6± 36.59	33.33± 34.19	29.33± 32.37	49.99± 40.06	29.71± 31.04	34.36± 32.26	36.61± 35.26	0.34
EORTC QLQ-H&N35								
HNPA	24.8± 20.17	15.81± 14.02	28.99± 28.88	20.83± 20.72	23.19± 18.36	30.25± 22.17	21.83± 18.22	0.03*
HNSW	18.2± 24.66	15.78± 20.52	25.99± 23.36	10.81± 22.08	22.04± 21.04	31.96± 25.68	26.21± 21.04	<0.001**
HNSE	3.12± 9.22	4.27± 10.62	15.99± 21.77	4.17± 9.75	17.38± 21.38	23.84± 25.33	23.94± 24.84	<0.001**
HNSP	13.8± 25.27	24.78± 23.29	31.99± 37.99	14.28± 20.25	22.58± 26.17	28.54± 27.84	16.59± 19.59	<0.001**
HNSO	21.5± 26.84	42.52± 25.70	25.99± 27.77	15.18± 22.46	33.69± 25.13	32.68± 23.58	34.39± 24.44	<0.001**
HNSC	6.41± 14.52	22.39± 25.24	13.59± 26.90	10.47± 19.24	14.13± 16.38	13.54± 20.24	16.34± 20.55	<0.001**
HNSX	5.02± 13.79	11.11± 21.12	0.72± 3.47	10.41± 26.37	6.97± 16.05	1.96± 9.80	3.70± 10.13	0.06

HNTE	23.1± 29.49	23.42± 27.06	23.19± 33.98	23.81± 29.89	31.47± 34.02	27.69± 37.06	22.70± 28.28	0.69
HNOM	18.7± 33.47	37.60± 32.60	27.99± 39.29	30.94± 39.47	37.32± 31.58	30.76± 36.94	37.55± 30.82	<0.001**
HNDR	15.4± 25.40	16.24± 24.02	50.66± 37.41	11.90± 20.71	53.26± 32.79	47.69± 31.71	46.47± 35.84	<0.001**
HNSS	19.5± 25.81	21.36± 24.76	42.66± 34.04	14.28± 21.14	40.93± 32.81	38.97± 27.99	38.02± 28.34	<0.001**
HNCO	17.4± 26.50	16.23± 22.77	27.99± 39.29	13.09± 24.57	10.14± 21.95	16.92± 21.34	18.31± 25.69	0.08
HNFI	17.0± 25.43	15.38± 21.41	22.66± 28.41	15.47± 24.81	15.57± 25.41	25.64± 31.05	15.49± 23.78	0.30
HNPK	78.7± 41.17	79.49± 40.91	96.00± 20.00	89.29± 31.49	73.91± 44.15	87.69± 33.11	81.69± 38.95	0.11
HNNU	1.25± 11.18	5.13± 22.35	4.00± 20.00	3.54± 18.89	5.43± 22.79	0	4.23± 20.26	0.50
HNFE	0	51.28± 50.63	4.00± 20.00	7.14± 26.22	21.74± 41.47	10.77± 31.24	22.54± 42.08	<0.001**
HNWL	43.7± 49.92	58.97± 49.83	56.00± 50.66	64.29± 48.79	57.61± 49.69	78.46± 41.43	69.01± 46.57	0.002*
HNWG	7.50± 26.51	20.51± 40.91	16.00± 37.42	7.14± 26.22	15.22± 36.12	6.15± 24.29	8.45± 28.01	0.16

Mean values compared by Kruskal Wallis test; *P<0.05 significant; **P<0.001 highly significant. For abbreviations of scale see Table 2.

Table 4: Comparison Mean Score for EORTC QLQ–C30 and EORTC QLQ–H&N35 according to treatment

and chemo–radiation had a significant ($P<0.05$) impact on symptoms scales like fatigue (FA), insomnia (SL), appetite loss (AP), and constipation (CO). Similarly, most of the symptoms scores for H&N35 were significantly low ($P<0.05$) when the patients received chemo–radiation. The scores for social eating (HNSO) and social contact (HNSC) were most affected in the patients undergoing surgical treatment. In general, patients treated with single treatment had significantly better scores on most scales than patients receiving combined treatment modalities.

The results of multivariate linear regression analysis showed that in most of the scales KPS was the strong predictor for the functional scales for EORTC QLQ–C30 (Table 5). Duration for surgical treatment was found to be the predictor for the theoretically linked scale of pain, swallowing, and use of painkillers. Duration of chemotherapy was the predictor for nausea and vomiting, senses, and sticky saliva.

Discussion

The evaluation of QoL among HNC patients had gained popularity in the field of oncology during the last two decades. It has a major role in helping to shape treatment strategies and patient support. Survival of HNC patients is

considered a topmost priority which is primarily based on the availability of the best possible treatment modalities. However, during the post–treatment stage, patients live with a negative consequence of treatment which ultimately affects the QoL.⁽¹⁵⁾ Hence, this cross–sectional study investigated the quality of life of HNC patients receiving single or multi modalities treatment.

In this study majority of patients reported oral cavity cancer, this was in accordance with cancer registries,⁽¹⁶⁾ and with previous reports.^(5,17) The reporting of patients at the advanced stage was common a finding of this study. This reduces the chances of survival because the studies have shown that detecting oral cancer in early stages when these are amendable to single modality therapies, offers the best prognosis and increases the chance of long–term survival, and also improves the quality of life at the later stage of their life.⁽¹⁸⁾ Reporting at the late stage might be due to the fact that the patients in the present study were from rural areas having low income and had a lack of awareness of the existence of an oral cancer examination.

The symptoms score related to speech (HNPS) and cough (HNCO) were significant with the patients suffering from laryngeal carcinoma while difficulty in the opening

Dependent Variables	Predictors	R ²	β coefficient	SE	P value
PF	Constant	0.32	50.56	14.03	0.001
	KPS		0.50	0.17	0.006
QL	Constant	0.37	17.69	17.92	0.33
	KPS		0.75	0.23	0.002
FA	Constant	0.44	95.23	18.39	<0.001
	KPS		-0.95	0.23	<0.001
NV	Constant	0.18	28.90	3.86	<0.001
	Duration of CT		-3.21	0.82	<0.001
PA	Constant	0.37	31.07	3.43	<0.001
	Duration of Surgery		-2.27	0.68	0.001
SL	Constant	0.32	97.61	28.79	0.001
	KPS		-1.03	0.37	0.006
DI	Constant	0.28	-29.52	12.89	0.03
	Cancer site		31.43	12.63	0.02
HNPA	Constant	0.37	31.07	3.43	<0.001
	Duration of Surgery		-2.27	0.68	0.001
HNSW	Constant	0.31	34.98	4.06	<0.001
	Duration of Surgery		-2.16	0.81	0.001
HNSE	Constant	0.31	31.37	3.95	<0.001
	Duration of CT		-2.25	0.84	0.001
HNSP	Constant	0.36	81.04	20.18	<0.001
	KPS		-0.83	0.26	0.002
HNSO	Constant	0.36	110.81	24.17	<0.001
	KPS		-0.98	0.31	0.002
HNCS	Constant	0.55	118.55	19.03	<0.001
	KPS		-1.31	0.24	<0.001
HNSS	Constant	0.15	48.59	4.37	<0.001
	Duration of CT		-3.21	0.93	0.001
HNCO	Constant	0.31	25.93	4.09	<0.001
	Duration of CT		-2.31	0.86	0.01
HNFI	Constant	0.34	89.05	24.72	0.001
	KPS		-0.94	0.32	0.004
HNPK	Constant	0.64	115.77	6.04	<0.001
	Duration of Surgery		-8.38	1.19	<0.001
HNFE	Constant	0.27	126.77	44.73	0.01
	KPS		-1.34	0.57	0.02
HNWL	Constant	0.29	195.98	49.08	<0.001
	KPS		-1.63	0.63	0.01
HNWG	Constant	0.27	2.44	4.10	0.55
	Duration of RT		2.57	1.08	0.02

Multivariate linear regression using forward method; criteria to enter in the equation is $P < 0.05$. For abbreviations of scale see Table 2.

Table 5: Multivariate determinants of EORTC QLQ-C30 and EORTC QLQ-H&N35

mouth (HNOM), pain (HNPA), and teeth problems (HNTE) were associated with carcinoma of the oral cavity. However, the latter does not reach a significant level. These findings were in line with the original study by Bjordal K et al,⁽¹⁹⁾ and other studies.^(20,21) Tumors located in the posterior region demonstrate a worse scoring this might be due to the fact that these tumors often remain unnoticed during a screening of cancer at the early stage, and may get advanced without any interventions and thus affecting the health of the individuals. Most of the scores for the advanced stage (III/IV) were deteriorating as compared to an early stage of cancer (I/II). This was in line with previous studies.^(22–24) Advanced stage of disease and its aggressive multimodality treatment leads to high morbidity, worse QoL outcomes, and poor survival.⁽²⁵⁾ There was a significant difference in the scores for almost all the scales and single items of the EORTC QLQ–C30 and QLQ–H&N35 for KPS. KPS score was directly proportional to QoL. This result was in line with the original study conducted by Bjordal K et al.⁽¹⁹⁾

The significantly lower scores were observed in 6 out of 15 domains for EORTC QLQ–C30 and 10 out of 18 domains for EORTC QLQ–H&N35 for the patients undergoing surgical treatment either as a single modality or in combination with RT. Post-operative consequences like difficulty in chewing and/or swallowing, disfigurement have been associated with moderate to severe distress, negative self-image, and disturbed interpersonal relationships.^(4,26) In the present study those patients who underwent the surgical treatment showed significantly poor scores for social domains (HNSC and HNSO) and difficulty in mouth opening (HNOM). This might be because that surgery requires resection of a large amount of the cancerous as well as normal tissues, leading to disfigurement, anxiety, and depression which in turn disabled the patients to have social interaction.

A decline in the scores of emotional (EF) and social functioning (SF) and problems such as fatigue (FA) and pain (PA) were documented high as a consequence of the radiotherapy treatment. This relationship has been observed in previous reports.^(17,27,28) The score for the post RT complications like difficulty in swallowing (HNSW), senses (HNSE), speech problems (HNSP), dry mouth (HNDR), and sticky saliva (HNSS) were significantly high in the present study. This finding was in line with previous studies.^(5,21,27,29) Irradiation of lymph nodes within the vicinity of the neck region often covers the radiosensitive salivary glands resulting in xerostomia following treatment. As reported by Backstrom I et al⁽³⁰⁾ xerostomia is a significant cause of distress, which may affect eating and further increase the risk of inadequate nutrition. Unfortunately, EORTC questionnaires do not provide a complete assessment of xerostomia.

The use of chemotherapy has become popular for the treatment of HNC having an advantage in reducing the negative cosmetic sequelae as well as certain functional impairments. However, severe acute toxicities and likely some degree of chronic impairment may also occur hence, the major adverse effect of CT has to be considered for the patients. A highly significant result was obtained for nausea and vomiting (NV). Problems while eating may result due to the synergetic effects of the tumor as well as the treatment-induced adverse effects, such as pain, a problem in teeth, dry mouth, sticky saliva, and swallowing.⁽²¹⁾ Also, taste alterations and loss of appetite are the common side effects of both CT and RT which further contribute to poor nutritional intake and weight loss.⁽²⁹⁾

Even though in the present study the data collection and its analysis were done in an appropriate manner the results should be interpreted very cautiously. Few limitations should be kept in the mind and should consider for the future aspect of this study. First, in this study, QoL was evaluated just once in a cross-sectional fashion, and thus, one cannot rule out the possibility that QoL is a dynamic process that keeps on changing during the course of the disease and its treatment. Hence, a longitudinal study is required to further investigate QoL issues. Second, the present study was limited to only one institute. However, it is the regional hospital and considered as a center for registration of cancer, which thus improves the external validity of the study.

Conclusion

Within the limitations of the study, it can be concluded that significant changes in functional and symptoms scales were observed in the expected direction. Not only the status and stages of its occurrence, but this study has also put a special emphasis on patients during and after completion of treatment of HNC concerning their social stigma and physical cum psychological condition and impediments that come in their general health-related quality of life due to cancer. The adoption of a QoL assessment as a standard procedure in hospital settings can help in the early interventions and reduce the impact of therapeutic complications and thus improving patients' QoL. Future longitudinal studies into these aspects would be helpful to gain insight into the patients' functional, emotional, and psycho-social problems, and therefore, optimized advising, treatment, and rehabilitation.

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Conflict of interest

Authors declare no conflict of interest

Ethics approval and consent to participate

The study was approved by the Ethics committee of Ahmedabad Dental College and Hospital, Gujarat, and the Institutional review board of Gujarat Cancer Research Institute, India. Informed consent was obtained from patients.

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