

## Original Article



# Dysphagia, Voice Problems and Health Related Quality of Life Among Head and Neck Cancer Survivors

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**Abstract**

**Introduction:** Head and neck cancer (HNC) and its treatment can cause significant side effects like dysphagia, voice problems which can affect health related quality of life (HRQOL). Examining quality of life among these patients are helpful in streamlining cancer treatment protocols. The present study aimed to find out the relationship between dysphagia, voice problems, and HRQOL among HNC survivors.

**Methods:** A convenient sampling technique was adopted to recruit 110 HNC survivors. Data was collected using Eating Assessment Tool (EAT), Voice Handicap Index (VHI), European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core Version 3 (EORTC QLQ-C30) and head and neck specific module of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-H &N 35).

**Results:** Majority of the HNC survivors (85.5%) had dysphagia, and 50% of them reported severe voice problems. The overall QOL mean (SD) score was high in cognitive functioning 80.76 (22.19) and role functioning 80.30 (25.54) of the functional domain. While considering symptom scale highest mean score was reported for pain 42.42 (25.01), fatigue 42.22 (23.82) and financial difficulties 41.21 (28.56). There was a mild positive correlation between dysphagia and voice problem ( $r=0.202$ ), dysphagia and health related global health ( $r=0.248$ ) and voice problem and global health ( $r=0.280$ ).

**Conclusion:** Dysphagia and voice problems were common among HNC survivors and it has great impact on their HRQOL. Therefore, it is important to initiate various measures to increase awareness for prevention and early management of these symptoms and improvement of HRQOL of HNC survivors.

**Introduction**

Head and neck cancer (HNC) is the seventh most common cancer globally with an estimated 888 000 new cases and 453 000 in the year 2018.<sup>1,2</sup> Asia accounts for 57.5% of all HNCs worldwide, particularly in India where it accounts for 30% of all cancers.<sup>3-5</sup> Surgery and radiation therapy (RT) are the standard treatments for HNC, and up to two-thirds of patients who are in advanced stages receive a combination of surgery, radiation therapy, and chemotherapy.<sup>3</sup> The prognosis of the patient is determined by the type of the disease and its extent of spread. The majority of early stage I and stage II patients can be treated with single modality therapy, which includes either surgery or radiation therapy. In contrast, multimodality therapy is necessary for treating stage III and stage IV advanced cancer to cure the patient.<sup>6,7</sup> Although overall survival rates for HNC have improved due to more aggressive therapy, increasing level of

comorbidities have been reported among these patients. Common comorbidities reported among these patients include dysphagia, xerostomia, taste alterations, and voice impairments.<sup>6-9</sup> Reduced voice quality have been found among significant proportion of HNC patients even after the completion of the treatment.<sup>10</sup> Patients with HNC frequently experience malnutrition and dysphagia.<sup>7</sup>

According to numerous research evidences, dysphagia and voice quality has been strongly linked with health-related quality of life (HRQOL) of HNC patients.<sup>11-13</sup> Moreover, HNC and its treatment can leave devastating side effects with a relevant impact on physical and emotional quality of life (QOL) of HNC patients. Examining QOL among these patients can also help in streamlining cancer treatment protocol by integrating the clinical, social, and rehabilitation measures.<sup>14</sup> Many studies have been conducted in foreign countries among HNC patients to address these problems. However, in

India very few studies have been carried out in this area especially focusing on the impact of dysphagia and voice problems on HRQOL of HNC survivors. Exploring dysphagia, voice problems and QOL of HNC survivors will provide baseline data for planning various interventional studies to alleviate these problems and to improve QOL of HNC survivors. Therefore, the current study was undertaken to assess the dysphagia, voice problems and health related QOL and to find out relationship between dysphagia, voice problems and health related QOL among HNC survivors.

## Materials and Methods

### Study Design and Sampling Technique

Descriptive cross sectional research design was selected to achieve the objectives of the study. Non probability convenient sampling was used to recruit 110 HNC survivors who are coming for follow up treatment at oncology outpatient department of a selected tertiary care hospital in central India. Data collection period was from 19-09-2022 to 07-11-2022. Minimum estimated sample size of 110 for the study was estimated based on prevalence rate of dysphagia (16.1%)<sup>15</sup> by power analysis at 80% of statistical power and type I error (alpha) of 0.05. Data analysis was done with Statistical Package for Social Sciences (SPSS, version 18) based on objectives of the study using appropriate descriptive statistics and inferential statistics. Frequency and percentage distribution, standard deviation (SD), mean percentage (mean %), chi-square, ANOVA and Karl Pearson correlation coefficient were used to analyze the data.

### Data Collection Tools and Technique

#### Sociodemographic and Clinical Datasheet

Self structured socio-demographic and clinical datasheet was used to assess socio-demographic and clinical data of HNC survivors. Questionnaire to assess the demographic data of the participants consisted of 10 variables including age, gender, marital status, education, occupation, monthly family income, area of living, living condition and habit of smoking, tobacco chewing and alcohol consumption. Questionnaire to assess clinical variables consisted of 12 variables including weight, height, body mass index (BMI), tumor site, tumor stage, type of treatment, duration of treatment, time since the diagnosis of disease, any complications of treatment, type of surgery, type of food taking, and presence of any comorbid illness. Face validity and content validity of the self-structured socio-demographic and clinical datasheet was established. Item content validity index (I-CVI) and scale content validity index (S-CVI) was calculated. The S-CVI was found to be 0.88 and 0.941 for sociodemographic and clinical datasheet respectively.

#### Eating Assessment Tool (EAT-10)

Standardized EAT-10 was used to assess dysphagia

experienced by HNC survivors. EAT-10 included 10 items and each of the items were rated by patient on a 5-level scale ranging from 0 (no problem) to 4 (severe problem), with total score range of 0-40. A score of 3 or greater is considered abnormal and indicative of clinically significant dysphagia. EAT-10 is having well established validity and reliability (reliability value,  $r=0.963$ ).<sup>15</sup>

#### Voice Handicap Index (VHI)

VHI was used to assess voice problems among HNC survivors. VHI consisted of 30 statements assessing the degree of problems experienced by the patient when talking to other people and each of the items were rated on a five-point scale as: 0 (never), 1 (almost never), 2 (sometimes), 3 (almost always), and 4 (always). Total obtained score was categorized into three categories namely mild, moderate and severe with a score ranging from 0 to 30, 31 to 60 and 61 to 120 respectively. VHI is having well established reliability value ( $r=0.713-0.850$ ).<sup>16</sup>

#### European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core (EORTC QLQ-C30) Version 3

EORTC QOL C30 consists of 30 items and each item is scored on a 4-point scale 1(not at all), 2 (a little), 3 (quite a bit), and 4 (very much). It contains five functional scales (physical, role, cognitive, emotional, and social), three symptom scales (fatigue, pain, and nausea and vomiting), a global QoL scale and six single-items. All scales pertaining to the EORTC QLQ-C30 range from zero to 100. A high score for a functional or global health related QOL scale represents a relatively high/healthy level of functioning or global quality of life, whereas a high score for a symptom scale represents the presence of a symptoms or problems.

#### European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-H &N 35)

EORTC QLQ-H &N 35 contained 35 questions including seven multiple-item scales to assess pain, swallowing, senses (taste and smell), speech, social eating, social contact, and sexuality. Additionally, it contains eleven single item to assess problems with teeth, opening the mouth, dry mouth, sticky saliva, coughing, feeling ill, use of pain killers, nutritional supplements or a feeding tube, weight loss and weight gain. Each item is scored on a 4-point scale 1(not at all), 2 (a little), 3 (quite a bit), and 4 (very much). All the scales and single item measures range from 0-100. High score represents a high level of symptomatology or problems for all the scales and single items. The reliability value of EORTC QLQ-C30 and EORTC QLQ-H &N 35 (Ranges from 0.72-0.95).<sup>17</sup>

#### Language Consistency of the Tool

Translation of tools from English to Hindi and back translation was done and validated by language experts.

Standardized Hindi version of the tool was obtained for EORTC QLQ-C30 and EORTC QLQ-H & N 35.

### Study Design

Permission to carry out the study was taken from concerned hospital administration. A pilot study was carried out prior to final study to assess the feasibility of the study. Main study was conducted from 19-09-2022 to 07-11-2022. All survivors of HNC meeting the inclusion and exclusion criteria was tracked from Oncology OPD of AIIMS Bhopal. HNC survivors who are on follow up treatment, can understand Hindi or English, aged above 18 years and willing to participate in the study were recruited. HNC survivors with serious cognitive impairment and psychological problems and who are unable to give response were excluded from the study. Demographic and clinical data and assessment of dysphagia, voice problem and QOL was collected by the researcher on one-to-one basis through interview.

### Ethical consideration

Ethical clearance to carry out the study was obtained from Institutional Human Ethics Committee (Ref No: IHEC-PGR/2021/MSc Nursing/ July/29). Permission was taken from hospital authorities before the data collection. Written informed consent was obtained from each participant before the collection of data. Participation in the study was voluntary, anonymity was maintained and confidentiality of the collected information was assured.

### Results

While considering demographic characteristics most of the participants 70 (63.6%) belonged to the age group of 40-60 years and 84 (76.4%) were males. More than half of the participants 58 (50.2%) were living in rural area. Study results also revealed that 67 (60.9%) had the habit of tobacco or betel nut chewing, 16.6% were smokers and 2.7% had the habit of alcohol consumption. Among these 58.2% of the participants were consuming these substances for more than five years. Study findings revealed that 66 (60%) were not having any co morbidities and more than half 58 (52.7%) were having cancer of the oral cavity. Detailed description of various clinical characteristics of study population is shown in [Table 1](#).

Majority of the HNC survivors 94 (85.5%) were having dysphagia. The mean (SD) score of dysphagia was found to be 19.16 (10.63) with mean percentage of 47.91%. Description of individual item score of EAT-10 questionnaire is presented in [Table 2](#). Half of the subjects 55 (50.0%) were suffering from severe voice problems and mean (SD) score of Voice Handicap Index was 51.20 (36.33) with mean percentage of 42.67%. In the assessment of QOL of HNC survivors using EORTC QLQ-C30 version 3 mean score in the global health was found to be 45.45 (31.38). However, in the functional domain mean (SD) score was high in cognitive functioning 80.76 (22.19)

**Table 1.** Frequency and percentage distribution of participant's according to various clinical variables (N=110)

Clinical variables	No. (%)
Presence of any co-morbid disease	
Hypertension	23 (20.9)
Diabetes mellitus	10 (9.1)
Others	11 (10.0)
No comorbidities	66 (60.0)
Tumor site	
Oral cavity	58 (52.7)
Oropharyngeal/nasopharyngeal	22 (20.0)
pharyngeal	18 (16.4)
Larynx & hypopharynx	12 (10.9)
Type of treatment taken	
Sx	11 (10.0)
CT	11 (10.0)
RT	18 (16.4)
Sx+CT	6 (5.5)
Sx+RT	8 (7.3)
CT+RT	52 (47.3)
Sx+CT+RT	4 (3.6)
Any complication after treatment	
No	57 (51.8)
Ulcer	30 (27.3)
Weight loss	4 (3.6)
Pain	7 (6.4)
Swelling	3 (2.7)
Recurrence	7 (6.4)
Alopecia	0 (0.0)
Vomiting	2 (1.8)
Weakness	0 (0.0)
Tumor stage	
1st	19 (17.3)
2 <sup>nd</sup>	25 (22.7)
3 <sup>rd</sup>	36 (32.7)
4 <sup>th</sup>	30 (27.3)
Duration of treatment	
Upto 6 months	61 (55.5)
6-12 months	33 (30.0)
Above 12 months	16 (14.5)
BMI	
Underweight	37 (33.6)
Normal	56 (50.9)
Overweight	16 (14.5)
Obese	1 (0.9)
Type of food taking	
Solid	36 (32.7)
Semisolid	51 (46.4)
Liquid	23 (20.9)
Time since diagnosis	
Up to 6 months	50 (45.5)
6-12 months	26 (23.6)
Above 12 months	34 (30.9)

CT=Chemotherapy, RT=radiation therapy, Sx=Surgery, Sx+CT=Surgery with chemotherapy, Sx+RT=Surgery with radiation therapy, CT+RT=Chemotherapy with radiation therapy, Sx+CT+RT=Surgery with chemo-radiation therapy

**Table 2.** Mean (SD) and mean % of individual items of EAT -10 questionnaire N=110

Items	Mean (SD)	Mean %
My swallowing problem has caused me to lose weight	2.40 (1.42)	12.54%
My swallowing problem interferes with my ability to go out for meals	1.63 (1.39)	8.50%
Swallowing liquid takes extra effort	1.32 (1.43)	6.88%
Swallowing solids takes extra effort	2.74 (1.49)	14.30%
Swallowing pills takes extra effort	2.08 (1.58)	10.85%
Swallowing is painful	2.19 (1.53)	11.43%
The pleasure of eating is affected by my swallowing	2.57 (1.34)	13.41%
When I swallow food sticks in my throat	1.13 (1.43)	5.89%
I cough when I eat.	0.91 (1.48)	4.75%
Swallowing is stressful	2.20 (1.64)	11.47%
Total EAT -10 score	19.16 (10.63)	47.91%

and role functioning 80.30 (25.54). While considering symptom scale highest score was reported for pain 42.42 (25.01), fatigue 42.22 (23.82) and financial difficulties 41.21 (28.56). Total mean score was high in functional domain (70.48 ± 17.15). Mean (SD) and mean % of QOL among HNC survivors assessed using EORTC QLQ-C30 version 3 and EORTC QLQ-H & N 35 is depicted in Tables 3 and 4.

Findings of the present study revealed that dysphagia and voice problems have significant relationship with QOL of HNC survivors. There was positive correlation between dysphagia and symptom scale ( $r=+0.248$ ,  $P=0.009$ ), voice problem and symptom scale ( $r=+0.280$ ,  $P=0.003$ ), dysphagia and voice problem ( $r=+0.202$ ,  $P=0.034$ ). But negative correlation was found between symptom scale and global health QOL ( $r=-0.208$ ,  $P=0.029$ ), dysphagia and functional scale ( $r=-0.339$ ,  $P=0.000$ ), dysphagia and global health ( $r=-0.237$ ,  $P=0.013$ ), voice problem and functional scale ( $r=-0.219$ ,  $P=0.029$ ), functional scale and symptom scale ( $r=-0.723$ ,  $P=0.000$ ) (Table 5).

In the present study significant association was found between the dysphagia and type of treatment taken ( $P=0.048$ ). Patients who are on combined treatment modality with chemotherapy, radiotherapy and surgery experienced significant higher level of dysphagia as compared to those on single treatment modality. There was no significant association between dysphagia and voice problems among HNC survivors with other socio-demographic and clinical variables like age, gender, employment status, consumption of alcohols and smoking, tumor stage, site of the tumor, duration of treatment and body mass Index. There was significant association between QOL of HNC survivors in the functional domain with duration of treatment ( $P=0.040$ ) and presence of co-morbidities ( $P=0.016$ ). As the duration of treatment increases, the functional ability of the patient was deteriorating. Patients having comorbidities reported lowest score in the functional domain.

**Table 3.** Mean (SD) and mean % of QOL among HNC survivors according to domains assessed using (EORTC QLQ-C30) version 3 (N=110)

Analytic measure	Mean (SD)	Mean %
Global health	45.45 (31.38)	45.45
Functional		
Physical functioning	62.73 (23.37)	62.73
Role functioning	80.30 (25.54)	80.30
Emotional functioning	62.88 (22.49)	62.88
Cognitive functioning	80.76 (22.19)	80.76
Social functioning	65.76 (23.01)	65.76
Total	70.48 (17.15)	70.48
Symptoms		
Fatigue	42.22 (23.82)	47.50
Nausea/vomiting	19.24 (31.70)	19.24
Pain	42.42 (25.01)	42.42
Dyspnea	23.33 (31.98)	23.33
Insomnia	36.06 (34.76)	36.06
Appetite loss	34.24 (36.13)	34.24
Constipation	11.82 (27.39)	11.82
Diarrhea	15.76 (32.23)	15.76
Financial difficulties	41.21 (28.56)	41.21
Total	29.59 (17.30)	42.80

**Table 4.** Mean (SD) and mean % of QOL among head and neck cancer survivors assessed using EORTC QLQ-H & N 35 (N=110)

Analytic measure	Mean (SD)	Mean %
Pain	38.64 (28.75)	38.64
Swelling	26.44 (28.46)	26.44
Teeth problem	29.39 (41.32)	29.39
Mouth opening	41.21 (36.66)	41.21
Dry skin	32.73 (37.23)	32.73
Sticky salivation	49.09 (40.56)	49.09
Senses	24.70 (19.78)	49.39
Coughing	33.03 (40.00)	33.03
Felt ill	57.88 (33.39)	57.88
Speech	32.32 (24.85)	32.32
Social eating	46.06 (29.32)	50.25
Social contact	22.79 (26.02)	25.29
Sexuality	14.85 (24.14)	14.85
Pain killers	60.91 (50.86)	30.45
Nutritional supplements	76.36 (44.78)	38.18
Feeding tube	13.64 (37.04)	6.82
Weight loss	72.73 (70.27)	12.12
Weight gain	29.09 (72.12)	4.85

## Discussion

The current study explored dysphagia, voice quality and HRQOL among HNC survivors. HNC survivors are experiencing high rate of HNC specific symptoms like pain, dysphagia and voice problems and it has



**Table 5.** Correlation between dysphagia, voice problems and HRQOL among head and neck cancer Survivors (N=110)

Variables	n=110	Dysphagia	Voice problem	Global health status	Functional scale	Symptom scale
Dysphagia	R value		0.202	-0.237	-0.339	0.248
	P value		0.034	0.013**	0.000**	0.009**
Voice problem	R value	0.202		0.019	-0.249	0.280
	P value	0.034*		0.843	0.021*	0.003**
Global health status	R value	-0.237	0.019		0.130	0.208
	P value	0.013**	0.843		0.176	0.029*
Functional scale	R value	-0.339	-0.249	0.130		-0.723
	P value	0.000	0.021*	0.176		0.000**
Symptom scale	R value	0.248	0.280	-0.237	-0.723	
	P value	0.009**	0.003**	0.013	0.000	

\*Significant at 0.05 level; \*\*Significant at 0.01 level.

Note: Correlation matrix was done by using Karl Pearson correlation.

considerable impact on quality of life of these patients.<sup>18</sup> It is very important to evaluate short term and long-term side effects among HNC patients to plan and implement comprehensive cancer management programmes. The present study adds to the body of evidences by providing new information on relationship between dysphagia, voice quality and HRQOL among HNC survivors.

In the present study 94 (85.5%) participants suffered from dysphagia. However contradictory findings have been reported in a previous study, where only 54.9% of patients suffered from dysphagia.<sup>19</sup> Increasing level of prevalence of dysphagia in the present study may be due to combined modality treatment as higher proportion of the patients received multimodality treatment. While considering the treatment strategy used, consistent with findings of the previous study patients who are on multimodality treatment experienced significantly higher level of dysphagia as compared to patients on single modality treatment. Findings of the present study also revealed that body mass index is not related with dysphagia among HNC survivors. However, contradictory findings of increased swallowing difficulty with low body mass index were reported in a study.<sup>19</sup> Patients with chronic dysphagia experiences higher rates of malnutrition and aspiration.<sup>19</sup> Moreover, contradictory to the findings of the present study, self-reported dysphagia was correlated with age and older patients experienced less impairments with swallowing than young patients in previous studies.<sup>19,20</sup> As dysphagia is a common side effects with oncological treatment, early detection and treatment play an important role to minimize major secondary complications associated with dysphagia among HNC patients.<sup>21</sup>

Present study also revealed that half of the subjects (50%) had severe voice problems. Mean score of the voice problems was found to be 51.20 on 0-120 scale indicating significant proportion of the subjects had voice problems. Concurrent findings have been reported in previous studies<sup>22</sup> Consistent with findings of the previous studies voice problems were not associated demographic

variables like age and gender.<sup>19,23</sup> Additionally, behavioral factors like alcohol consumption and smoking were not associated with dysphagia and voice problems experienced by HNC survivors. Similar findings have been reported in previous studies carried out among HNC survivors.<sup>19</sup> In the present study employment status was not related with dysphagia and voice impairment experienced by HNC patients. However, inconsistent findings have been found in earlier studies.<sup>19,23</sup> Dysphagia, discomfort, and voice problems pose substantial obstacles to returning to work and resuming daily activities among HNC patients.<sup>23</sup>

HNC cancer treatment have major impact on physical, functional and emotional status and affect QOL of patients. While considering QOL of HNC patients among five subscales of functional domain lowest quality of life score was reported in physical 62.73 (23.37) and emotional functioning 62.88 (22.49) indicating poor emotional functioning among these patients. However higher scores have been reported in cognitive 80.76 (22.19) and role functioning 80.30 (25.54). The most common symptoms experienced by HNC patients were fatigue 42.22 (23.82), pain 42.42 (25.01) and financial difficulties 41.21 (28.56). Concurrent findings of poor quality of life among HNC patients were reported in previous studies.<sup>24-26</sup> However, overall global QOL score was satisfactory.<sup>27</sup> In the Head and neck specific quality of life symptoms like weight loss 72.73 (70.27), feeling ill 57.88 (33.39), sticky salivation 49.09 (40.56), social eating 46.06 (29.32) and more use of pain killers 60.91 (50.86) and nutritional supplements 76.36 (44.78) were the common concerns for HNC patients. However, contrast findings were reported in previous literature.<sup>25,26</sup> Consistent with findings of the previous studies socio demographic variables were not associated with QOL of HNC patients.<sup>25</sup> However, previous researchers also found significant relationship between demographic variables and QOL.<sup>4,26,27</sup> The probable reason may be due to uneven distribution of the sample in terms of variables such as age, socioeconomic status, gender and disease status in the present study. Besides this, presence of comorbidity ( $P=0.016$ ), and

duration of treatment ( $P=0.030$ ) was significantly associated with QOL of HNC patients. Wan Leung et al also identified association between QOL and presence of comorbidities among HNC patients.<sup>26</sup> Worsening of QOL have been demonstrated among HNC patients after receiving cancer treatment.<sup>3,4,28,29</sup>

The present study indicates that speech problems, and swallowing impairments have a significant effect on quality of life of HNC patients. There was negative correlation between dysphagia and functional scale ( $r=-0.339$ ,  $P=0.000$ ), dysphagia and global health ( $r=-0.237$ ,  $P=0.013$ ), and voice problem and functional scale ( $r=-0.219$ ,  $P=0.021$ ). Consistent findings of association between dysphagia, voice problems and quality of life was demonstrated in previous literature.<sup>23</sup> Moreover, poor quality of life related to swallowing problems among HNC patients have been reported in previous studies.<sup>30</sup> Moreover, dysphagia has been suggested as the most reliable indicator of disease specific survival among HNC patients.<sup>31</sup> This indicates the importance of considering dysphagia in the evaluation of overall QOL of HNC patients. Therefore, it is important to devise various strategies to address swallowing impairments among HNC patients to improve quality of life. Long term studies evaluating QOL of HNC patients have identified significant reduction in the QOL of life of patients throughout the continuum of treatment with worsening of symptoms like dysphagia, voice impairments, fatigue and functional problems.<sup>4,32</sup>

Although current study aimed to assess the relationship between dysphagia, voice quality and HRQOL among HNC patients, it was cross sectional in nature and carried out in a single institution. Therefore, multicentric long term studies can be carried out in future to understand long term effect dysphagia, voice quality and health related QOL among HNC patients as quality of life is dynamic and keep on changing at every point of time. Further qualitative and mixed method studies can be done to get in-depth understanding of various problems experienced by HNC patients and its impact on QOL. It is essential to plan and implement effective health promotional activities including preventive measures of dysphagia, and voice problems and early detection and management of these problems and rehabilitative programmes to prevent dysphagia and voice problems among HNC patients.

## Conclusion

The current study identified higher prevalence of dysphagia, and voice problems and significant effect of this on HRQOL of HNC patients. Therefore, it is utmost priority to incorporate assessment of dysphagia, voice problems, and health-related QOL among HNC patients in the hospital settings. It will be helpful in initiating early interventions to reduce treatment related complications and thus improving QOL of HNC patients.

## Research Highlights

### What is the current knowledge?

- HNC survivors' experiences varying degrees of HNC specific symptoms like dysphagia, and voice problems and impaired quality of life due to cancer and its treatment.

### What is new here?

- Dysphagia, and voice problems were prevalent among HNC survivors and it has significant impact on HRQOL of these patients.
- Therefore, it is important to initiate early interventional strategies to reduce these symptoms and to improve HRQOL of HNC survivors.

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## Author' Contribution

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## Competing Interests

There are no conflicts of interest between the authors of the study.

## Data Availability Statement

Research data is available with authors and will be shared upon request to the corresponding author.

## Ethical Approval

The study was reviewed and approved by Institutional Human Ethics Committee of All India Institute of Medical Sciences (AIIMS), Bhopal, Madhya Pradesh, India (Ref No: IHEC-PGR/2021/MSc Nursing/ July/29).

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