Oral Health Related Quality of Life in Patients of Head and Neck Cancer Attending Cancer Hospital of Bhopal City, India
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Abstract:
Background: To assess the oral health related quality of life (OHRQoL) of head and neck cancer patients and to find association between QoL, demographic and disease variables.

Methods: This cross-sectional study was conducted on 153 patients diagnosed and being treated for head and neck cancer attending Jawaharlal Nehru Cancer Hospital, Bhopal where study was conducted. All the patients were included after written consent was obtained from the participants.

Results: The majority of the population 84 (54.9%) belonged to 41-60 years age group and most of them were male (78.4%). The most frequent site of the primary tumor was the oral cavity (71.3%) and the majority of patients had Stage II and III cancer. Main factors affecting QoL were loss of weight, use of painkillers, sticky saliva, reduced mouth opening and problems in social eating. Significant association found between pain (P = 0.018), sense (P = 0.001), Social eating (P = 0.003), social contact (P = 0.008), reduced mouth opening (P = 0.008) with respect to type of treatment.

Conclusions: We conclude that there was a significant reduction in the QoL in cancer patients resulting from myriad forms of cancers. An assessment of the QoL and symptoms can help the dentist to direct attention to most important symptoms and provide counseling for appropriate interventions towards improving QoL outcomes and the response to the treatment.

Key Words: European Organization of Research for Treatment of Cancer-Head and Neck-35, head and neck cancer, quality of life

Introduction
The term head and neck cancer (HNC) consists of group of tumors that arise from the lip, oral cavity, tongue, tonsil, oropharynx, hypopharynx, nasopharynx, nose and para nasal sinus, larynx, parotids and the thyroid.¹ In India, HNC accounts for approximately 30% of all the cancers and its important disease in term of incidence and mortality in the region.² Patients with HNC have multiple, unique, and challenging symptoms due to their disease and treatment side effects such as xerostomia, taste disturbances, dietary restrictions, dysphagia and pain, fatigue, distortion of physical appearance, permanent disfigurement and infirmity which has an impact on the patient’s quality of life (QoL), thus, the concept of QoL is extremely important for these patients.³,⁴ QoL is a multidimensional concept which looks at the way which patients feel about themselves in the context of a medical condition. Aspects such as physical status, emotional status, social factors and the way that patients consider that they are able to function in all aspects of their lives outside medical care are usually assessed. The evaluation of health-related QoL (HR-QoL) has become increasingly essential for health care, especially in the field of chronic diseases. For patients with HNC, where key functions are affected by both the disease and its therapy, the potential for an adverse effect on QoL is conceivably greater than that for other cancers.⁵ No study have been conducted on HNC patients regarding their oral health related QoL (OHRQoL) in central India. Determining how to measure and quantify the subjective experience of OHR-QoL has been a challenging issue. So, questionnaire based study was conducted to assess OHRQoL in HNC patients attending the cancer care centre in Bhopal, central India.

Methods
The study was conducted among the HNC patients in Jawaharlal Nehru Cancer Hospital of Bhopal city, India. The study was a descriptive cross-sectional questionnaire based study. Study protocol was discussed and ethical approval was taken from the ethical committee of the People’s University and the respective authorities of Jawaharlal Nehru Cancer Hospital, Bhopal where study was conducted. All the patients of HNC diagnosed and receiving treatment in the hospital over a period of 6 months comprised the sample for the study. The study was conducted among 153 HNC patients between the periods of March 2014 and August 2014. Written consent was also obtained from the participants.
Subjects were selected by purposive sampling technique.

**Inclusion criteria**

Patients with age of 18 years and above, both sexes, diagnosed with HNCs, receiving treatment and willing to participate were recruited in the study.

Data collection was obtained from questionnaire consisting of two parts. The first part consisted of demographic characteristics including age, gender, marital status, diet, socio-economic status and cancer information including, type of tobacco, duration of tobacco chewing, site of cancer, stage of cancer, duration of treatment, type of treatment, duration of treatment and category of treatment. The second part was the European Organization of Research and Treatment of Cancer QoL Head and Neck-35 (EORTC QLQ-H&N-35) questionnaire which assessed the QoL. In order to complete the questionnaire, personal information was completed by the patient and disease characteristics, including location, type and tumor staging was extracted from patient’s hospital records.

**Scoring criteria**

The time frame of the module (EORTC QLQ-H&N-35) is “during the past week,” and the format is similar to that of the core questionnaire. The tool consisted of 35 items with the domains including: Pain, swallowing, sense, speech, social eating, social contact, sexuality and other single item (e.g., difficulty in opening mouth, sticky saliva, dry mouth, etc.) specific to HNC. Items HN1 to HN30 are scored on four-point Likert-type categorical scales (“not at all-1,” “a little-2,” “quite a bit-3,” “very much-4”). Items HN31 to HN35 have a “no/yes” or (1 or 2) or response format. The scores are transformed into 0-to-100 scales. All of the scales and single-item measures range in score from 0 to 100 with linear transformation by, symptom scale/items: $S = RS-1/range*100$.

A high score for a symptom scale/item scale score represents a higher response level or symptomatology/problems.

The QLQ-H&N35, the HNC-specific HR-QoL questionnaire contains 35 questions of which 24 are component items of 7 domains (pain, swallowing, sense, speech, social eating, social contact, sexuality), and 11 are single items for example, taking pain killers, and tooth problems. In cases where the patient was low-literate or illiterate questions were read for the patient by the researcher who tried to read all questions in an identical manner in order to prevent any prejudice or from guiding the patient to give a specific answer. After collecting the data, they were entered into the computer manually and analysis was done by using SPSS software version 17 analyzed by Chi-square and ANOVA. ANOVA was used to assess the association between the QoL domains and location of tumor, cancer stage, therapy method, surgical method and radiotherapy dose. The $P \leq 0.05$ is considered significant whereas $P \leq 0.001$ highly significant.

The questionnaire was translated into local language (Hindi). Reliability of the tool was established by administering the QoL questionnaire to 20 patients with HNC and calculated Cronbach’s alpha (reliability coefficient 0.92).

**Results**

The study population consisted of 153 patients diagnosed with HNC and receiving treatment. Patients’ characteristics for the whole study group are shown in Tables 1 and 2. Among the cancer patient’s males comprised the majority of the study population i.e., 120 (78.4%). 84 (54.9%) belonged to 41 and 60 years age group. Most of them were married (148, 96.7%), the majority of subjects belonged to upper lower class 55 (35.9%) (Table 1). 95 (62.1%) HNC patients had smokeless tobacco and majority of duration of tobacco chewing 69 (45.1%) were more than 15 years. For ease of analysis we divided site of cancer into four categories. Buccal mucosa, tongue, alveolus, maxilla, mandible, gingivo buccal sulcus and pyriforma were clubbed into a single category i.e., oral cavity. The remaining three categories were oropharynx, hypopharynx and larynx respectively. majority of cancers originated in oral cavity i.e., 118 (77.12%). At the time of study 83 (54.2%) population presented with Stage II cancer and majority of the patients 88 (57.6%) were diagnosed within 6 months. The most administered form of treatment was radiation + surgery therapy 39 (25.5%) followed by radiation therapy 38 (24.8%). The QLQ-H&N35 specific questionnaire, Graph 1 shows the mean value of all the domains and single items. High mean score shows worst symptoms response. So, according to mean value the main factors affecting QoL were lost weight (79.08), taking painkiller (75.82), sticky saliva (72.75), reduced mouth opening (68.17) and difficulty in social eating (69.10). The scales and single items of QoL questionnaire were compared according to sites of tumor, stage of cancer, type of treatment method. Table 3 shows patients with small tumors (Stage I+II) scored better than those with large tumors (Stage III+IV). Patients with large tumor (Stage III+IV) had worst value for swallowing ($P = 0.00$), speech ($P = 0.00$), social eating ($P = 0.00$), social contact ($P = 0.001$), reduced mouth opening ($P = 0.00$), dry

[Graph 1: Percentage distribution of domains and single items according to mean value.]
Table 1: Percentage distribution according to socio-economic and demographic characteristics.

| Variable           | N (%) |
|--------------------|-------|
| Gender             |       |
| Male               | 120 (78.4) |
| Female             | 33 (21.6) |
| Age range          |       |
| 20-40              | 45 (29.4) |
| 41-60              | 84 (54.9) |
| 61-80              | 24 (15.7) |
| Marital status     |       |
| Married            | 148 (96.7) |
| Unmarried          | 5 (3.3) |
| Education          |       |
| Illiterate         | 26 (17) |
| Primary school     | 15 (9.8) |
| Middle school      | 55 (35.9) |
| High school        | 17 (11.1) |
| Intermediate       | 22 (14.4) |
| Graduate           | 18 (11.8) |
| Professional       | 0 (0) |
| Occupation         |       |
| Unemployed         | 41 (26.8) |
| Unskilled          | 20 (13.1) |
| Semi-skilled       | 21 (13.7) |
| Skilled            | 38 (24.8) |
| Clerical, Shop owner | 24 (15.7) |
| Semiprofessional   | 9 (5.9) |
| Professional       | 0 (0) |
| Income             |       |
| <1802              | 41 (26.8) |
| 1803-5386          | 33 (21.6) |
| 5387-8998          | 40 (26.6) |
| 8999-13,494        | 35 (22.9) |
| 13,494-17,999      | 4 (2.6) |
| 17,999-18,000      | 0 (0) |
| More than 18,000   | 0 (0) |
| Socio-economic status |     |
| Lower              | 38 (24.8) |
| Upper lower        | 55 (35.9) |
| Lower middle       | 49 (32) |
| Upper middle       | 11 (7.2) |
| Upper              | 0 (0) |
| Total              | 153 (100) |

Table 2: Percentage distribution according to disease variables.

| Diseases variable | N (%) |
|-------------------|-------|
| Type of tobacco   |       |
| Smoking           | 32 (20.9) |
| Smokeless         | 95 (62.1) |
| Combined          | 16 (10.5) |
| No habits         | 10 (6.5) |
| Duration of tobacco chewing |     |
| 1-5 years         | 10 (6.5) |
| 6-10 years        | 29 (19) |
| 11-15 years       | 35 (22.9) |
| More than 15 years| 69 (45.1) |
| Site of cancer    |       |
| Buccal mucosa     | 53 (34.0) |
| Tongue            | 43 (28.1) |
| Alveolus          | 9 (5.9) |
| Maxilla           | 4 (2.6) |
| Mandible          | 1 (0.7) |
| Gingivo bucal sulcus | 7 (4.6) |
| Pyrifossa         | 1 (0.7) |
| Oropharynx        | 2 (1.3) |
| Hypopharynx       | 7 (4.6) |
| Larynx            | 26 (17) |
| Other (nasopharynx, thyroid) | 0 (0) |
| Stages of cancer  |       |
| Stage I           | 6 (3.9) |
| Stage II          | 83 (54.2) |
| Stage III         | 52 (34) |
| Stage IV          | 12 (12) |
| Duration of illness |     |
| 1-6 months        | 88 (57.5) |
| 7-12 months       | 41 (26.8) |
| Above 12 months   | 24 (15.7) |
| Type of treatment |       |
| No treatment      | 2 (1.3) |
| Surgery alone     | 28 (18.3) |
| Radiation alone   | 38 (24.8) |
| Chemotherapy+radiation | 25 (16.3) |
| Surgery+radiation  | 38 (24.8) |
| Surgery+chemotherapy+radiation | 22 (14.4) |
| Total             | 153 (100) |

mouth \( (P = 0.001) \), cough problem \( (P = 0.00) \) feeling of being ill \( (P = 0.00) \) and use of feeding tube \( (P = 0.050) \).

Table 4 shows, statistically significant differences for reduced mouth opening in patients with oropharynx cancer \( (P = 0.00) \).

In Table 5, when the QoL scores were compared with the type of treatment, statistically significant difference was found for pain, swallowing, sense, social eating, social contact and reduced mouth opening. The patients who were treated with radiotherapy had better symptoms for social contact, sexuality, teeth problem, cough, use of feeding tube and weight gained.

Discussion

HNCs are one of the major problem worldwide. It is a substantial problem evolving in a country like India. Acknowledging the relatively miscellaneous nature of HNC, patients and treatments experienced, the findings of OHR-QoL outcome for oral cancer patients following treatment appear to be somewhat discordant and also complicated in the literature. The head and neck region include numerous delicate dainty structures necessary for basic physiologic function. On the basis of tumor size, location and type of treatment, HNC can affect varying degree of structural antonyms, and functional hindrance comprising of well being, self esteem, and social interactions. The treatment of HNC instigate the other problems by worsening the QoL of individuals which could, in the future, help in clinical judgment and the definition of the treatment approaches. In this context, the interest for the QoL of these patients is directly associated with the day-to-day care practices in health centers. Hence, QoL is a important end point to assessing the treatment result.

We found that the male female ratio among the patients was 4:1. This correlates with the findings of the studies done
by de Graeff et al., Alicikus et al., and Herce Lopez et al. Hammerlid et al. examined patients with oral, pharyngeal and laryngeal cancer and found that the oral cavity was more common as tumor location among females (52%) than among male. Whereas in the present study oral cavity was more common as tumor among males (73.7%) than females.

Among the HNC patients 95 (62.1%) were tobacco chewers, 32 (20.9%) were smokers, 16 (10.5%) were both tobacco chewers and smokers and 10 (6.5%) patients had never smoked and chewed tobacco. These finding are very important factor in development of tumor in the head and neck region. Meyer et al. found a 64% incidence of tobacco use among their studied patients group. Our results correlate with these findings.

In present study the commonly most affected site was the buccal mucosa, in 53 patients (34%), followed by tongue in 43 patients (28.1%), whereas in a study done by Lam Thang et al., the mandible was the most affected area (44%). Kim et al. conducted study on 133 patients, they found tonsillar area to be affected in 89 cases (66.9%), the base of the tongue in 23 (17.29%), and the soft palate in 15 patients (11.28%).

**Table 3: Comparison of QoL points according to stage of cancer.**

| EORTC-H&N35 | Mean | P value |
|-------------|------|---------|
| Pain | Stage I (N=6) | Stage II (N=83) | Stage III (N=52) | Stage IV (N=12) |
| 33.33 | 45.35 | 55.27 | 51.83 | 0.215 |
| Swallowing | 43.00 | 51.41 | 68.94 | 88.83 | 0.000** |
| Sense | 38.67 | 46.83 | 53.06 | 65.08 | 0.296 |
| Speech | 22.17 | 54.39 | 72.94 | 89.00 | 0.000** |
| Social eating | 40.33 | 61.71 | 79.02 | 91.58 | 0.000** |
| Social contact | 39.00 | 47.86 | 62.81 | 82.08 | 0.001** |
| Sexuality | 47.33 | 41.95 | 41.33 | 26.42 | 0.488 |
| Teeth | 16.50 | 34.13 | 34.58 | 25.00 | 0.619 |
| Reduced mouth opening | 83.50 | 66.39 | 82.67 | 86.02 | 0.000** |
| Dry mouth | 38.83 | 52.57 | 79.48 | 83.33 | 0.001* |
| Sticky saliva | 66.67 | 66.24 | 79.46 | 91.67 | 0.065 |
| Cough | 22.20 | 36.07 | 49.29 | 88.92 | 0.000** |
| Felt III | 61.00 | 50.94 | 79.46 | 83.25 | 0.000** |
| Painkiller | 66.67 | 78.31 | 73.08 | 75.00 | 0.860 |
| Nutritional supplement | 16.67 | 39.76 | 51.92 | 58.33 | 0.196 |
| Feeding tube | 16.67 | 37.35 | 44.23 | 75.00 | 0.050* |
| Lost weight | 66.67 | 75.90 | 82.69 | 91.67 | 0.460 |
| Gained weight | 50.00 | 8.43 | 3.85 | 0.00 | 0.001** |

**Table 4: Differences of scales and single items of the QLQ-H&N-35 by site of tumor.**

| EORTC-H&N35 | Mean | P value |
|-------------|------|---------|
| Oral cavity (N=118) | Oropharynx (N=2) | Hypopharynx (N=7) | Pharynx (N=26) |
| Pain | 50.16 | 33 | 42.43 | 45.31 | 0.744 |
| Swallowing | 57.79 | 100 | 71.14 | 63.81 | 0.216 |
| Sense | 47.14 | 100 | 68.86 | 51.59 | 0.097 |
| Speech | 59.11 | 100 | 81 | 67.92 | 0.060 |
| Social eating | 70.53 | 91.50 | 64.29 | 62.19 | 0.462 |
| Social contact | 58.36 | 83.50 | 49.43 | 40.23 | 0.033 |
| Sexuality | 42.80 | 16.50 | 40.57 | 33.27 | 0.448 |
| Teeth | 32.74 | 50 | 38.14 | 30.77 | 0.895 |
| Reduced mouth opening | 74.56 | 100 | 81 | 33.27 | 0.000** |
| Dry mouth | 63.25 | 100 | 71.43 | 60.23 | 0.630 |
| Sticky saliva | 73.14 | 100 | 81 | 66.65 | 0.568 |
| Cough | 40.64 | 50 | 80.86 | 52.50 | 0.054 |
| Felt III | 64.92 | 100 | 66.71 | 63.56 | 0.382 |
| Painkiller | 75.42 | 100 | 57.14 | 80.77 | 0.514 |
| Nutritional supplement | 43.22 | 100 | 42.86 | 46.15 | 0.462 |
| Feeding tube | 41.53 | 50 | 57.14 | 38.46 | 0.840 |
| Lost weight | 78.81 | 100 | 100 | 73.08 | 0.405 |
| Gained weight | 9.32 | 0.00 | 0.00 | 7.69 | 0.815 |

**"P<0.001 (Reduced mouth opening was the main problem posed to patients suffering from oropharyngeal cancer), EORTC-H&N35: European Organization of Research and Treatment of Cancer Head and Neck-35, QoL: Quality of life**
The most commonly applied treatment method was radiation alone (24.8%). This confirms with the result of Scharloo et al.\textsuperscript{15} (40.7%), and Rinkel et al.\textsuperscript{16} (32%).

The tumor localization and treatment method, together with the general disease stage, play essential role not only in the treatment of HNC but also the incidence and intensity of side effects and QoL.\textsuperscript{9,17,19}

In our study main factors affecting QoL were weight loss, sticky saliva, use of painkiller, reduced mouth opening and difficulty in social eating. Psoter et al.\textsuperscript{18} study showed that mainly affected factors were pain, social eating and social contact and loss of sexuality, whereas Silva et al.\textsuperscript{20} found pain and loss of taste mainly affected the QoL.

In our study, QoL was evaluated with EORTC head and neck QoL questionnaire. According to questionnaire results, swallowing, speech, social eating, dry mouth, sticky saliva, taking painkiller and loss of weight in Oropharyngeal cancer have high symptom points and difficulty in mouth opening was significantly associated with it. While patients with oropharynx cancer had the worst values for reduced mouth opening ($P = 0.00$).

Fang et al.\textsuperscript{7} found that patients presented with tumor in Stage IV had lower QoL than patients in Stage I, II and III, and this is consistent with the results of the present study.\textsuperscript{20}

In our studies patients with large tumor, swallowing difficulties, speech problem, difficulties in social eating, reduced mouth opening, dry mouth, problem of cough and feeling of being ill were significantly high. So, the similar result will found in the study done by Campbell et al.\textsuperscript{21} In present study, according to QoL results, pain and swallowing were significantly high in radiotherapy group. Sense domain was significantly high in radiotherapy + surgery group. Surgical methods are directed to remove the cancer totally and to prevent the breathing, swallowing and voice functions.\textsuperscript{22–26} In some studies it was shown that surgery increases the survival but physical changes causes difficulty in mouth opening and social contact and negatively affect the QoL.\textsuperscript{25} Present study has found that majority of the subjects have mean scored more than 50, which shows their high level of symptomatology or problem. 79 patients in this study experienced severe weight loss after being affected by radiation-induced gustatory disturbance, which could be related to various factors leading to loss of appetite including burning sensation and appearance of lesions in different areas of oral mucosa and pharyngeal tissues, difficulty in swallowing, loss of ability to perceive taste or smell, feeling nauseous (because of radiotherapy or chemo therapy), and psychological complications such as depression. To assess the QoL of cancer patients is complex, considering the large number of variables which impact the patient’s self-perception, from their social situation all the way to the very particularities of their diseases. It encompasses individual assessment characteristics, which does not depend on the patient’s system of beliefs, values and even physical strength.\textsuperscript{7} For these reasons, it is a fundamental tool used to assess the impact of the disease and its treatment obtaining epidemiological evidence which support changes to a more effective multi professional support protocol for the patients.\textsuperscript{7}

**Conclusion**

We conclude that there was a significant reduction in the QoL in cancer patients resulting from myriad types of HNC. An

| Table 5: Comparison of QoL points according to type of treatment of cancer. |
|---------------------------------------------------------------|
| **EORTC-H&N-35** | **Mean** | **P value** |
|------------------|-----------|-------------|
| No treatment     | Surgery   | Rt          | Chemo+Rt | Surgery+Rt | Surgery+Chemo+Rt |
| (N=2)            | (N=28)    | (N=38)      | (N=25)   | (N=38)     | (N=22)           |
| Pain             | 0.00      | 45.68       | 51.97    | 47.12      | 42.76            | 63.77            | 0.044*           |
| Swallowing       | 0.00      | 47.11       | 67.32    | 59.36      | 61.87            | 66.55            | 0.018*           |
| Sense            | 0.00      | 27.86       | 55.53    | 51.12      | 60.79            | 53.68            | 0.001**          |
| Speech           | 5.50      | 58.75       | 62.68    | 61.28      | 67.34            | 62.68            | 0.164            |
| Social eating    | 0.00      | 57.07       | 67.97    | 72.32      | 74.34            | 79.91            | 0.003*           |
| Social contact   | 6.50      | 67.57       | 45.16    | 50.72      | 55.71            | 65.41            | 0.008*           |
| Sexuality        | 16.50     | 33.96       | 39.00    | 49.36      | 39.47            | 46.91            | 0.476            |
| Teeth            | 0.00      | 26.11       | 39.50    | 26.52      | 30.76            | 43.91            | 0.296            |
| Reduced mouth opening | 0.00   | 84.54       | 56.13    | 59.96      | 73.66            | 74.18            | 0.008*           |
| Dry mouth        | 0.00      | 50.00       | 68.37    | 61.32      | 71.03            | 68.14            | 0.120            |
| Sticky saliva    | 16.50     | 71.39       | 71.00    | 74.76      | 76.29            | 74.18            | 0.498            |
| Cough            | 33.00     | 39.11       | 39.42    | 49.28      | 50.84            | 42.41            | 0.795            |
| Felt III         | 0.00      | 72.54       | 70.13    | 51.92      | 63.13            | 60.55            | 0.114            |
| Painkiller       | 50.00     | 89.29       | 76.32    | 76.00      | 68.42            | 72.73            | 0.456            |
| Nutritional supplement | 50.00 | 42.86       | 52.63    | 44.00      | 36.84            | 45.45            | 0.857            |
| Feeding tube     | 0.00      | 57.14       | 28.95    | 36.00      | 42.11            | 54.55            | 0.129            |
| Lost weight      | 50.00     | 75.00       | 76.32    | 72.00      | 89.47            | 81.82            | 0.447            |
| Gained weight    | 0.00      | 21.43       | 7.89     | 4.00       | 5.26             | 4.55             | 0.168            |

\*P≤0.05; **P≤0.001. Domains pain, sense, social contact and eating and reduced mouth opening were highly affected when the treatment comprised of surgery or in combination with other treatments except domain swallowing which was most affected by radiotherapy treatment. EORTC-H&N-35: European Organization of Research and Treatment of Cancer Head and Neck-35, QoL: Quality of life.
assessment of the QoL and symptoms can help the dentist to direct attention to most important symptoms and provide counseling for appropriate interventions toward improving QoL outcomes and the response to the treatment. After the diagnosis of oral cancer, it is important to ensure that the diagnosed patient receives appropriate dental care before treatment and thus reducing the oral complication associated with cancer treatment.

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