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# Comparative Evaluation of Presurgical and Post Surgical Nutritional Status in Patients with Oral Squamous Cell Carcinoma

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**KEYWORDS**

Oral health care, Oral squamous cell carcinoma, Nutritional status, QoL

**ABSTRACT:**

**Background:** The most frequent malignant epithelial neoplasm impacting the oral cavity is oral squamous cell carcinoma. Although OSCC can occur in a variety of oral cavity anatomical features, it typically manifests on the lower lip, floor of the mouth, and lateral edge of the tongue. A degree of nutritional status variations and a deterioration in quality of life (QoL) are common among individuals with OSCC.

**Aim:** The study was conducted to compare and evaluate the nutritional status in patients with OSCC before and after the surgery.

**Methods:** 30 patients aged between 25-75 years were underwent OSCC surgery in the department. The patients were divided into two groups randomly i.e., Group A: Presurgical status (n=25) and Group B: Post surgical status (n=25). The patient's weight, BMI, serum albumin and quality of life were measured before the surgery and after 30 days of surgery. The obtained data were compared between the groups to compare the nutritional status of the patients.

**Results:** The comparative evaluation of presurgical and post-surgical nutritional status in patients with oral squamous cell carcinoma was studied in 30 patients with OSCC. There was a decline in BMI, weight and serum albumin level and quality of life post-surgery. The Fluid Intake increase before the surgery but there was a decline in the fluid output post-surgery.

**Conclusion:** The effects of OSCC on a patient's nutritional status and quality of life are emphasized in the present study, which also underscores the necessity of further studies to examine certain interventions that may support long-term improvements in QoL and nutritional status. It highlights a strong emphasis on providing these patients with individualized, comprehensive care.

**Clinical Significance:** The study highlights nutritional risk among the patients with OSCC at both presurgical and post surgically.

## 1. Introduction

A malignant tumor that develops inside the mouth is called oral cancer. Because squamous cells are the histological source of almost 90% of oral malignancies, this form of cancer is commonly referred to as OSCC [1]. Age is a factor in OSCC, as the likelihood of developing the condition rises with age [2]. In decreasing order, the tongue, oropharynx, lip, floor of mouth, gingiva, hard palate, and buccal mucosa are the most commonly afflicted locations by OSCC [3]. There are two forms of

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OSCC: the first is brought on by an infection with the human papillomavirus, while the second is primarily brought on by alcohol and tobacco use [4]. In OSCC, the dentition might also be important. A 5.23-fold increase in the risk of tongue cancer is linked to every millimeter of alveolar bone loss, which is caused by periodontal disease or tooth loss [5].

With epidemiologic differences between different geographic regions, oral cancer ranks tenth globally in terms of cancer incidence (it is the third most prevalent malignancy in south-central Asia). It is the most frequent cancer among men in India, but it is also the third most common cancer overall (across all genders) and ranks third among the different cancer kinds that cause death in the nation [6].In the coming decades, the World Health Organization anticipates an increase in the incidence of oral squamous cell carcinomas (OSCC) globally [7].

The majority of research on the nutritional risk to patients with oral cancer are cross-sectional surveys that assess risk from a static angle and fail to take into account risk's evolving trend [9]. Thus, the purpose of this study was to assess the nutritional status of patients with oral squamous cell carcinoma before and after surgery. In order to lower patients' nutritional risk and enhance clinical results, it can serve as a basis for adoption of standardized and relevant whole-process nutritional management programs by clinical medical personnel.

Patients with oral cavity squamous cell cancer (OSCC) frequently suffer from malnutrition [8]. According to a clinical investigation, patients with oral cancer had a significant incidence of nutritional risk—roughly 27.1%. The main therapy for oral cancer is surgery, yet there may be dangers to nutrition throughout the recovery phase. Before surgery, malignant tumors speed up the body's metabolism; yet, patients may find it difficult to eat because of mouth ulcers, lumps, and localized pain. Furthermore, patients may require feeding tubes to receive nourishment since surgical wounds may prevent them from eating orally and postoperative stress leads to systemic metabolic problems. After being discharged, patients might not receive post-discharge counseling, monitoring, or education on nutrition [9]. As a result, at the time of their initial assessment, nearly half of patients with OSCC exhibit some degree of malnutrition. There is a clear correlation between survival rates and starvation, according to certain research. Generally speaking, malnutrition, with losses in body mass and albumin, is a result of the tumor process and surgical and oncological therapy used as standard therapies for OSCC. This results in compromised immunity and nutritional condition [4]. Patients with oral cancer may experience decreased quality of life (QOL), higher treatment expenditures, and an altered prognosis as a result of postoperative complications. Certain dysfunctions linked to carcinogenesis, like eating and swallowing issues, can significantly lower a patient's quality of life and exacerbate their oral and overall health [10].Because systemic inflammatory responses and changes in body cell mass might cause weight loss in cancer patients, serum albumin concentrations may be related to this phenomenon. Cancer patients may eventually die as a result of a progressive loss of essential proteins and an ongoing inflammatory response component, which is a reflection of their nutritional state and the effectiveness of their cancer treatment [11].Thus, there is an urgent need to address the nutritional risk associated with patients receiving surgery for oral cancer [9].

## 2. Material and Methodology

**Study Design:**

This study was conducted in the department of oral surgery. The study got approval from the ethical committee of the institute. Overall, 30 participants were taken in the study and using simple randomisation they were divided into group A: Presurgical status (n=15) and Group B: Post surgical status (n=15). Single oral surgeon performed all the surgical procedures. Informed consent was also obtained from the participants before the beginning of the study.

**Inclusion Criteria:**

30 patients aged between 25-75 years were included in the study who will undergo oral squamous cell carcinoma surgery in the department were included in the study.

**Exclusion Criteria:**

The patients' who having other medical conditions, previous surgeries and pregnancy were excluded from the study.

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**Body Mass Index:**

The standards procedure used as the basis for determining BMI. It is computed by dividing the square of a person's height in meters by their weight in kilos. The following is a definition of the BMI categories: Normal weight is defined as 18.5 kg/m2 ≤ BMI < 24.0 kg/m2, underweight as indicated by malnutrition, overweight as indicated by BMI ≥ 28.0 kg/m2, and obesity as defined by BMI < 18.5 kg/m2 [9].

**Collection of Blood and Serum Separation:**

A 5 ml venous blood sample was drawn between 8 and 10 a.m. from a subset of patients who had fasted the previous night. After allowing the samples to clot, the serum was extracted right away using ultracentrifugation, with every safety measure taken to avoid hemolysis. The remainder of the material was kept at -20 degrees Celsius and the supernatant was disposed of [12].

**Assessment of Serum Albumin:**

Serum albumin was biochemically analyzed in the department. Utilizing the Biuret method with absorption at 540 nm, serum albumin was assessed. The expression for serum albumin was g/dL [12].

**Fluid Balance:**

The input and output measures evaluated by administrating saline or glucose to the patients. The administrating amount were noted and after administrated the output was recorded before the surgery and after the surgery.

**Weight:**

The weight of the patients was measured using standard weighing machine. The weight was measured in kg. The weight of the patients was measured before the surgery and after the surgery.

**Quality of Life:**

The study used the standardized Quality of Life Index questionnaires from EORTC QLQ-C30 and QLQ-HN43, which covered the physical, psychological, social, and environmental domains. Prior to starting therapy, a preoperative evaluation of QOL was carried out, and an immediate postoperative evaluation of QOL was also performed [13].

**Statistical Analysis:**

The software program SPSS, version 20.0, was used to perform descriptive statistical analyses [4]. We applied the $x^2$ test on nominal data. $P \leq 0.05$ was established as the significant level [14].

## 3. Result

A total of 30 participants aged between 25-75 years with a mean age of 50 years were enrolled in this study and split into two groups (Group A: Presurgical status, Group B: Post surgical status) with 15 participants in each group. A comparative analysis of the nutritional status was done among the patients suffering from the oral squamous cell carcinoma before and after the surgery. The parameters analysed for the study includes BMI, serum albumin levels, fluid input and output and weight.

The table 1 represent a comparative analysis of various nutritional parameters in patients with oral squamous cell carcinoma after and before the surgery. There was a considerable decline in the serum albumin level after the surgery, with the mean ALB level decreased from 4.280 g/dL pre-surgery to 4.107 g/dL post-surgery. This decline in the serum albumin value is statistically considerable (p=0.000), indicating a potential deterioration in the patients' nutritional status post-surgery. The patients experienced a considerable reduction in the body weight after the surgery, with the average weight falling from 73.87 kg pre-surgery to 69.287 kg post-surgery, which is statistically considerable (p=0.000). The analysis of fluid Input-Output intake by the patients with OSCC reveal that there was a considerable increase in the fluid intake post-surgery from 2382.00 ml to 2792.67 ml (p = 0.000). The analysis of fluid balance reveals a significant increase in fluid input post-surgery, from 2382.00 ml to 2792.67 ml (p = 0.000), and a corresponding reduction in fluid output from 1527.67 ml to 1228.00 ml (p = 0.000). There was a considerable reduction in BMI, with the mean BMI dropping from 26.60 to 23.13 post-surgery, which is statistically considerable (p = 0.000).

Table 2 displays the quality of life data for patients with OSCC both before and after surgery. Prior to surgery, every patient has a mediocre quality of life. But following surgery, no patient was able to maintain a "fair" rating, and their quality of life significantly declined. Rather, six patients assessed their quality of life

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as "extremely poor," and eight patients ranked it as "poor."(Figure 1)

## 4. Discussion

In patients with oral squamous cell carcinoma (OSCC), the study offers a comparative assessment of their nutritional status and quality of life prior to and following surgery. This study compared the nutritional status and quality of life of patients before and after surgery by evaluating a number of indicators, including BMI, weight, ABL, and quality of life. Significant improvements were seen in all of the study's measures following the procedure, underscoring the significant influence that surgery can have on the patient's general health. According to a study by Liu et al. (2006), dietary factors were found to have a substantial impact on patients' survival with oral cancer in addition to clinical aspects. For this reason, maintaining a healthy nutritional state is essential to increasing the prognosis of patients with oral cancer [15].

Serum albumin is typically used to evaluate the prognosis, disease progression, severity, and nutritional status [16].In this investigation, most patients had blood albumin levels at optimal levels prior to surgery; nevertheless, following the procedure, there was an abrupt drop in serum albumin levels, suggesting that a systemic process may still be causing protein loss. Pretreatment blood albumin levels have been shown by Liu et al. (2006) to be an independent prognostic predictor for patients with cancer of the oral cavity [15].A study evaluated by Gupta and Lis (2010) found a correlation between low serum albumin levels and a bad prognosis for cancer patients. Additionally, low serum albumin levels can function as a stand-alone predictor of the necessity for intensive nutritional intervention [17]. Wu et al.'s (2018) investigation into the relationship between serum albumin levels and cancer mortality found a significant correlation between albumin levels below 4.2 g/dL and a higher risk of cancer [18].Chang et al. (2021) found that patients with OSCC had a poorer overall survival rate when their albumin levels were lower [19]. Serum albumin was revealed to be an independent predictive factor for patients with oral cavity cancer in a study by Bobdey et al. (2016). Regardless of age, gender, or disease stage, patients with serum albumin levels of ≥4.35g/dL had a statistically significantly greater chance of survival than those with values of ≤4.34g/dL [16].A greater preoperative serum albumin level was linked to lower rates of postoperative complications and improved wound healing,

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The significant weight and BMI loss following surgery emphasizes the patients' nutritional difficulties even more. According to a study by Nett et al. (2022), patients with oral cancer who experience a considerable postoperative weight and BMI loss are more likely to experience malnutrition and, consequently, higher morbidity during the first three months following surgery [21].Since most of the patients in our study were overweight before to surgery, there was a good possibility that they would survive overall. Chang et al. (2020), who point out that patients with lower

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preoperative BMI values had poorer OS rates than those with higher (overweight) BMI values [22], corroborated this conclusion.According to Pingili et al. (2021), individuals undergoing surgery who experienced a BMI loss of more than 10% were more likely to experience problems [23]. According to Wang et al. (2023), patients' body weight declined and their nutritional risk increased significantly as a result of eating less than they did prior to surgery. Additionally, the study demonstrated a negative correlation between nutritional risk and BMI, with lower BMIs associated with greater nutritional risk scores. A patient's ability to tolerate therapy side effects may be diminished by a low body mass index, and it may even result in treatment discontinuation [9].

This study shows that during the preoperative and postoperative periods, there was an increase in fluid intake and a decrease in fluid output. The significance of these alterations might point to the body's efforts to preserve homeostasis while addressing the demands of healing and surgical stress. Following surgery, increased fluid retention may be a reaction to inflammation or stress-induced release of antidiuretic hormone. According to a study by Obermeier et al. (2022), our patient population has an excessively positive fluid balance. For group A, the median fluid balance is +1700 mL, while for group B, it is +2750 mL. The anesthesiologist should proceed cautiously when seeing this in surgical patients since it may cause difficulties, even though it is desirable in certain situations, such as shock patients [14].Nutritional therapies during treatment have been shown by Van den Berg et al. (2008) to have a good impact on treatment outcomes and to significantly reduce malnutrition status in patients receiving therapy for oral and oropharyngeal cancer [24].

The significant drop in quality of life following surgery is another finding of this study. A loss in quality of life can be caused by a variety of circumstances, including physical discomfort, pain that interferes with eating and speaking, and mental suffering related to the treatment and recovery of cancer. Six months following therapy, QoL greatly improved, namely in the areas of chewing, speaking, and swallowing, according to Agarwal et al. (2014) [25].After six months of treatment, Biazevic et al. (2008) saw a decrease in the overall rating, which indicated an improvement in the quality of life. They also documented the immediate impact of tumor excision in oral and oropharyngeal cancer on the health-related QOL. It was noted that chewing issues, taste abnormalities, pain, and issues related to swallowing and speaking were the most often affected functions [26]. Dzebo et al. (2017) draw attention to the fact that surgical therapy for cancer of the oral cavity may cause loss or impairment of various essential activities, including speaking, swallowing, and taste and smell perception, which may significantly lower quality of life [27]. According to QoL alterations, Pingili et al. (2021) have shown that patients with OSCC have changes in their emotional, physical, and functional status [23].Patients with worse clinical status may be more susceptible to psychological issues during the postoperative phase, according to Stretton et al. (2023). On the other hand, patients who have psychological issues after surgery are less likely to adhere to treatment regimens and lead healthy lifestyles [28].According to Stojanović et al. (2024), individuals with oral squamous cell carcinoma most frequently reported experiencing dysphagia and xerostomia as disturbances in their quality of life [4].

**Figure Legend:**

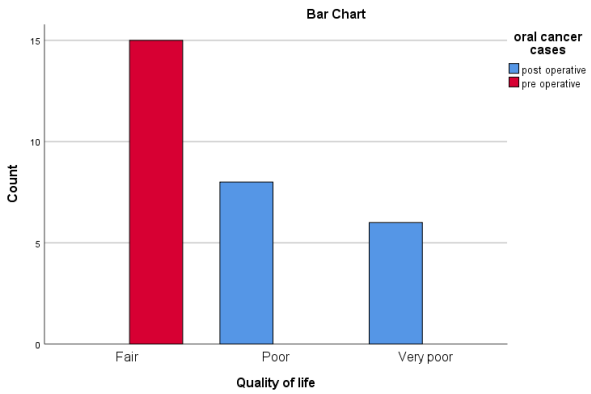


**Figure 1: The quality of the life before and after the surgery in the patient with OSCC**

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**Table Legend:**

**Table 1: The comparative analysis of presurgical and postsurgical nutritional status in patients with OSCC across various health parameters.**

| S.No. | Parameters | Group | Mean | N | Std. Deviation | Std. Error Mean | Sig. |
|---|---|---|---|---|---|---|---|
| 1. | Serum albumin level | Pre surgical | 4.280 | 15 | 0.2007 | 0.0518 | 0.000 |
| 2. | Serum albumin level | Post surgical | 4.107 | 15 | 0.1668 | 0.0431 | |
| 3. | Weight (kg) | Pre surgical | 73.87 | 15 | 3.314 | 0.856 | 0.000 |
| 4. | Weight (kg) | Post surgical | 69.287 | 15 | 3.4054 | 0.8793 | |
| 5. | Input (ml) | Pre surgical | 2382.00 | 15 | 162.972 | 42.079 | 0.000 |
| 6. | Input (ml) | Post surgical | 2792.67 | 15 | 134.932 | 34.839 | |
| 7. | Output (ml) | Pre surgical | 1527.67 | 15 | 142.939 | 36.907 | 0.000 |
| 8. | Output (ml) | Post surgical | 1228.00 | 15 | 179.491 | 46.344 | |
| 9. | BMI | Pre surgical | 26.60 | 15 | 0.910 | 0.235 | 0.000 |
| 10. | BMI | Post Surgical | 23.13 | 15 | 0.640 | 0.165 | |

**Table 2: The quality of the life before and after the surgery in the patient with OSCC**

| Quality of life | Oral squamous cell carcinoma | | Total |
|---|---|---|---|
| | Post Surgical | Pre Surgical | |
| Fair | 0 | 15 | 15 |
| Poor | 8 | 0 | 8 |
| Very poor | 6 | 0 | 6 |
| Total | 14 | 15 | 29 |
| Chi Square = 29.000, p-value = 0.000 | | | |

## 5. Conclusion

The study compares the Presurgical and Post surgical nutritional status in patients with oral squamous cell carcinoma. The decline in life quality highlights the significance of postoperative treatment that attends to patients' psychological and social demands in addition to their physical ones. Better results are achieved when nutritional risk is promptly identified and screened for, making it easier to send a patient to a dietician for nutrition management. The standardization of the nutritional status analysis for patients with OSCC must be the focus of future research.

**Clinical Significance:**

The study highlights the need of close monitoring and adequate nutritional support both presurgical and post surgically that can help in reducing the mortality and promote more rapid healing and recovery process. Furthermore, these findings suggest that collaboration between surgeon and dietitians to address the complex nutritional needs of these patients. Addressing nutritional deficiencies proactively could shorten hospital stays, reduce readmissions, and lower overall healthcare expenditures.

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**Limitation:**

The present study had a relatively small sample size (30 patients), lasted for a relatively short time, and was conducted in a single centre. There may be presence of other nutritional health condition (diabetes and CVS).

**List of abbreviations:**

| | |
|---|---|
| OSCC | Oral Squamous Cell Carcinoma |
| BMI | Body Mass Index |
| QOL | Quality of Life |
| EORTC QOL | European Organization for Research and Treatment of Cancer Quality of Life Questionnaire |
| Kg | Kilogram |
| mL | Millilitre |

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