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Prevalence of Malnutrition in Head and Neck Cancer

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ABSTRACT

Background: Head and neck cancers, particularly oral squamous cell carcinoma, are highly prevalent in Pakistan. Malnutrition is a frequent but underdiagnosed complication in these patients, adversely affecting treatment outcomes and overall prognosis. **Objective:** To assess the prevalence and severity of malnutrition in patients with head and neck cancer admitted for treatment at a tertiary care hospital. **Methods:** This cross-sectional study was conducted at the ENT and Head and Neck Surgery Department, Liaquat National Hospital, Karachi, from December 2024 to May 2024. A total of 105 histologically confirmed oral cancer patients aged 18–70 years were included. Nutritional status was assessed through weight loss, BMI, and muscle mass evaluation based on predefined operational definitions. **Results:** Among 105 patients, 67.6% were male and 32.4% were female, with a mean age of 49.6 ± 10.2 years. Out of 105 patients, 60.0% were moderatley-nourished, while 27.6% were well and 12.4% were severely malnourished. The average BMI was 20.6 kg/m^2, which is close to the lower limit of normal. Weight loss of more than 5% over the past month was observed in 37.1% of participants, and reduced muscle mass was found in 30.5%, indicating significant protein-energy malnutrition in a sizable subset of the cohort **Conclusion:** It is concluded that malnutrition is prevalent among patients with head and neck cancers in Pakistan, particularly those presenting with advanced-stage disease and substance addiction. Early screening and nutritional interventions are essential to improve patient outcomes and reduce treatment-related complications.

INTRODUCTION

In Pakistan, oral cancer is the most prevalent cancer in men and the second most common malignancy in women [1]. Making Pakistan one of the country with high incidence rate of oral cancer, with an age-adjusted rate of 12.0/100,000, In Pakistan, around 16,000 new cases of oral cancer are documented each year, and oral cancer is responsible for an estimated 5,500 annual deaths [2]. Surgical Excision is the mainstay of treatment in Oral Squamous Cell Carcinoma [3]. It is followed by adjuvant chemo and radiation therapy in higher stage of disease. Malnutrition due to disease is frequent among oral cancer patients, with 40=80 percent experiencing it at some point during their treatment [4]. Due to lesion in oral cavity, patient experiences difficulty in chewing and swallowing and is often associated with discomfort, dry mouth, sticky saliva, taste alteration, and mucositis, especially in patients who underwent surgical excision or received radiation therapy. These symptoms cause malnutrition to worsen or develop during the period of treatment [5]. Complications related to malnutrition include, longer hospitalizations, increased morbidity and death rates, delayed wound healing, as well as impaired muscular function [6]. Even slight weight loss (around 5% of body weight) can have an adverse influence on the prognosis. Patients who have lost weight have a lower response to chemotherapy [7]. Around 20% of cancer patients die from malnutrition-related complications rather than the underlying illness itself [8,9]. Malnutrition, on the other hand, is preventable and, in most cases, reversible if treated early enough. Due to a lack of awareness, knowledge, and clinical processes to identify and mitigate this condition within hospitals, it frequently goes unnoticed [10,11]. According to a recent analysis released by Northeast Asia Study group, malnutrition in hospitalized patient is wide spread in Asian Countries [12]. Malnutrition in hospitalized patient was also seen by Chughtai et al in Lahore, Pakistan (March 2022) which showed that more than half (59.4%) of the patients (937) was found to be undernourished, of which 26.4% was severely malnourished [13]. Surprisingly, there is a general lack of data on the prevalence of malnutrition in oral cancer patients in Pakistan, despite of its large population and the economic pressure on its health care system. Despite the availability of numerous nutritional screening tools there is still disagreement over which is the most effective option endorsed for checking hospitalized patients' nutritional risk, the nutritional screening tool that best predicts clinical outcomes (post-operative complications) during a hospital stay is the most appropriate for patients [14]. Tools like Nutritional Risk Screening 2002, Malnutrition Universal Screening Tool (MUST), Mini Nutrition Assessment (MNA), and GLIM are commonly utilized to assess the nutritional status of cancer patients [15]. The values reported in the literature of various tools show sensitivity and specificity values ranging between 62-85% [16-18]. According to the study conducted by Orell-Kotikangas H, et al, 28% patients of head and neck cancers had malnutrition prior to oncological treatment [19]. A study done by Steer et al analyzing head and neck cancer patients found that 22.6% patients had malnutrition [20]. A systematic strategy to managing malnutrition in hospitals should start with a pre-admission screening of all patients, accompanied by a complete assessment of nutritional status in those determined to be at risk [21] Therefore, the primary objective of this study is to assess the prevalence of malnutrition in head and neck cancer patients in Liaquat National hospital (Karachi, Pakistan). Despite having high incidence of oral cancer in Pakistan, there is limited data on malnutrition of such patients. Therefore, finding prevalence will help in correction of malnutrition pre / post operatively and will result in decrease complications and better outcomes of those going through treatment.

Objective

To assess the prevalence of malnutrition in head and neck cancer patients pre-operatively.

METHODOLOGY

This cross-sectional study was conducted at ENT and Head and Neck Surgery Department, Liaquat National Hospital, Karachi, from December 2024 to May 2024. A sample size of 105 patients was calculated using the WHO sample size calculator. This calculation was based on an anticipated malnutrition prevalence of 22.6%, with a 95% confidence level and an 8% margin of error. Non-probability consecutive sampling was employed to recruit eligible patients meeting the inclusion and exclusion criteria.

Inclusion Criteria:

- Male and female patients aged 18 to 70 years
- Histopathologically confirmed cases of oral cancer
- Patients admitted for further management of the disease
- Patients staged I to IV according to the NCCN Guidelines for Head and Neck Cancers (2022)

Exclusion Criteria:

- Patients who had received prior treatment for oral squamous cell carcinoma
- Patients with recurrent head and neck cancer
- Patients with malignancies outside of the head and neck region
- Individuals with severe comorbidities (e.g., chronic kidney disease, chronic liver disease, or advanced heart failure)
- Patients who had undergone recent major surgery or experienced significant trauma within the last three months
- Pregnant or lactating women
- Patients with known eating disorders

Data Collection Procedure

After approval from the College of Physicians and Surgeons Pakistan (CPSP) and the institutional ethical review committee, eligible patients were informed about the study objectives, and written informed consent was obtained. At the time of enrollment, patient demographics including age, gender, height, weight, BMI, site of tumor, TNM staging, duration of disease, and addiction history (pan, gutka, betel nuts, niswar) were recorded. Nutritional status was assessed based on predefined operational definitions focusing on weight loss and muscle mass. The presence and severity of malnutrition were also documented using a structured data collection proforma.

Data Analysis

All data were analyzed using IBM SPSS Statistics Version 26.0. Qualitative variables such as gender, TNM stage, tumor site, addiction type, malnutrition presence, and severity were presented as frequencies and percentages. Quantitative variables including age, height, weight, BMI, and disease duration were presented as mean ± standard deviation (for normally distributed data) or as median with interquartile range (for non-normally distributed data). Normality of data distribution was assessed using the Shapiro-Wilk test. Stratification was performed for potential effect modifiers such as age, gender, TNM stage, tumor site, addiction history, and disease duration. Post-stratification, the chi-square test or Fisher's exact test was applied to examine associations with malnutrition status. A p-value of <0.05 was considered statistically significant.

RESULTS

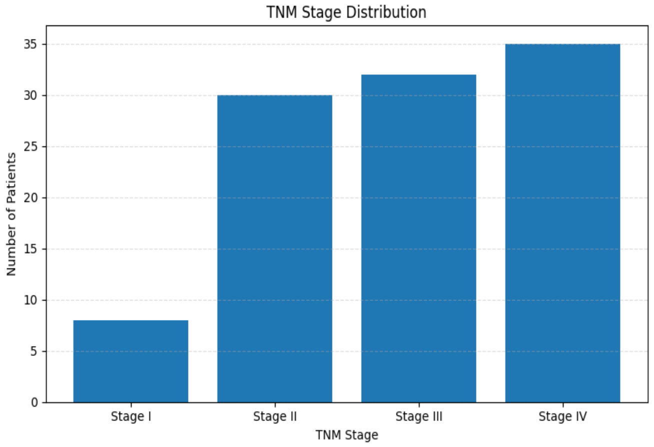
Data were collected from 105 patients; the majority were male (67.6%) and most participants fell into the older age group of 51–70 years (49.5%). The oral cavity was the most common tumor site, accounting for 53.3% of cases, followed by oropharynx (21.0%) and larynx (16.2%). Most patients presented with advanced-stage disease, with 30.5% in Stage III and 33.3% in Stage IV. A large proportion (74.3%) had a history of addiction, with gutka being the most frequently used substance (45.7%).

Table 1

Demographic and Clinical Characteristics of Study Participants (n = 105)

Variable		Frequency (n)	Percentage (%)
Gender	Male	71	67.6%
	Female	34	32.4%
Age Group (years)	18–30	12	11.4%
	31–50	41	39.0%
	51–70	52	49.5%
Tumor Site	Oral cavity	56	53.3%
	Oropharynx	22	21.0%
	Larynx	17	16.2%
	Others	10	9.5%
TNM Stage	Stage I	8	7.6%
	Stage II	30	28.6%
	Stage III	32	30.5%
	Stage IV	35	33.3%
Addiction History	Yes	78	74.3%
	No	27	25.7%
Type of Addiction	Gutka	48	45.7%
	Betel nut	21	20.0%
	Niswar	7	6.7%
	Smoking	2	1.9%

Figure 1



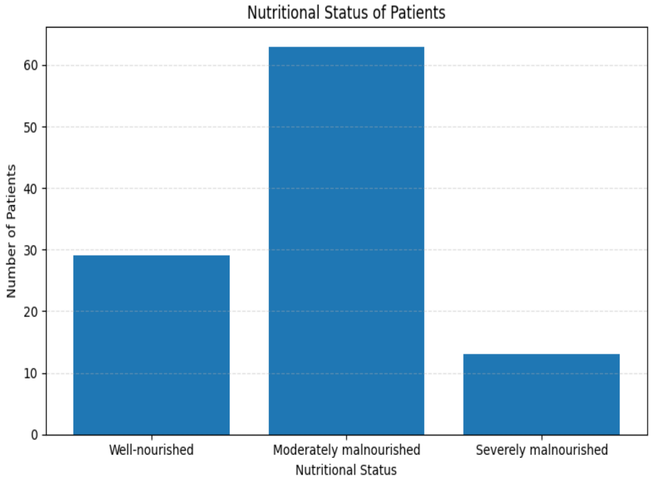
Out of 105 patients, 60.0% were moderatley-nourished, while 27.6% were well and 12.4% were severely malnourished. The average BMI was 20.6 kg/m², which is close to the lower limit of normal. Weight loss of more than 5% over the past month was observed in 37.1% of participants, and reduced muscle mass was found in 30.5%, indicating significant protein-energy malnutrition in a sizable subset of the cohort.

Table 2

Nutritional Status of Study Participants (n = 105)

Nutritional Status	Frequency (n)	Percentage (%)
Well-nourished	29	27.6%
Moderately Malnourished	63	60.0%
Severely Malnourished	13	12.4%
BMI (kg/m²)	20.6 ± 3.4	–
Weight loss >5% (past 1 month)	39	37.1%
Reduced muscle mass	32	30.5%

Figure 2



Malnutrition was more common in males (73.8%) compared to females, but the difference was not statistically significant ($p = 0.29$). Patients over 50 years were more frequently malnourished, though again not significantly ($p = 0.17$). A significant association was observed with TNM stage, as 38.1% of malnourished patients were in Stage III and 59.5% at stage IV ($p = 0.38$). Addiction history was also significantly linked to malnutrition ($p = 0.04$), whereas tumor site did not show a statistically significant correlation ($p = 0.08$).

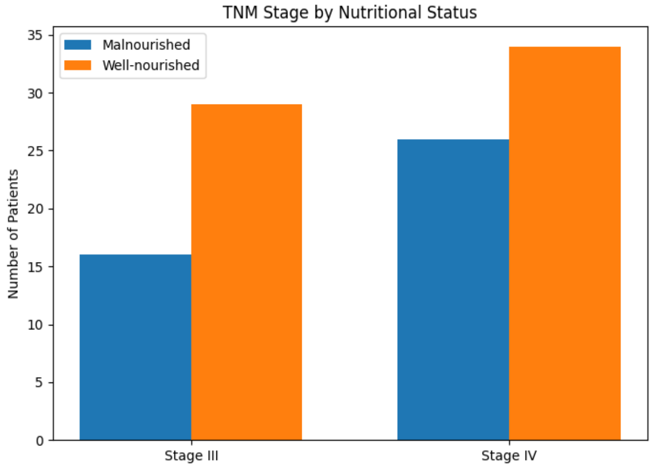
Table 3

Association Between Malnutrition and Clinical Variables

Variable	Malnourished (n = 42)	Well-nourished (n = 63)	p-value
Gender (Male)	31 (73.8%)	40 (63.5%)	0.29
Age Group (>50 yrs)	24 (57.1%)	28 (44.4%)	0.17
TNM Stage III	16 (38.1%)	29 (46.0%)	0.41
TNM Stage IV	26 (61.9%)	34 (54.0%)	0.38
Tumor Site (Oral)	25 (59.5%)	31 (49.2%)	0.08
Addiction History	36 (85.7%)	42 (66.7%)	0.04*

*$p < 0.05$ indicates statistically significant association

Figure 3



Discussion

This cross-sectional study aimed to evaluate the prevalence of malnutrition in patients diagnosed with head and neck cancers, specifically oral squamous cell carcinoma, prior to definitive treatment. The findings revealed that 40% of patients were malnourished at the time of hospital admission, with 27.6% classified as moderately and 12.4% as severely malnourished. These findings are consistent with global estimates suggesting that 40 to 80 percent of head and neck cancer patients develop some degree of malnutrition during their disease course [22]. A comparable study by Orell-Kotikangas et al. in 2015 reported a 28 percent prevalence of pre-treatment malnutrition in head and neck cancer patients using the NRS-2002 tool. Similarly, Steer et al., using the GLIM criteria, observed a malnutrition prevalence of 22.6 percent. The slightly higher proportion observed in our study may be attributed to socioeconomic disparities, limited awareness of nutritional care, delayed presentation, and higher prevalence of substance use in the local population. Our results are also in line with data from Pakistan [23]. A recent cross-sectional study conducted by Chughtai and colleagues in Lahore demonstrated that nearly 60 percent of hospitalized adults were undernourished, underscoring the broader issue of malnutrition in clinical settings across the country [24].

A notable finding in our study was the significant association between advanced TNM staging and malnutrition. This is biologically plausible, as patients with advanced tumors often experience mechanical obstruction, mucositis, or odynophagia that limits oral intake. Additionally, the systemic inflammatory response associated with advanced cancer contributes to increased metabolic demands and a catabolic state, leading to muscle wasting and weight loss [25]. Our data also identified a statistically significant correlation between addiction history particularly gutka and betel nut use and malnutrition. These addictive substances not only predispose individuals to oral cancers but also contribute to poor dentition, oral ulcers, and gastrointestinal disturbances, all of which may impair adequate nutrient intake. The cultural normalization of chewing substances in many parts of Pakistan necessitates targeted education and nutritional counseling in high-risk populations [26].

No significant associations were observed between malnutrition and gender, age group, or tumor site, although trends suggested higher malnutrition in older individuals and those with oral cavity tumors. This aligns with studies by Raslan and colleagues and Kondrup et al., which found that age and tumor site alone were not reliable predictors unless combined with functional and inflammatory markers [27]. The mean BMI of patients in our cohort was 20.6 kg/m^2, which borders the underweight threshold according to WHO classification. While BMI alone is not a comprehensive nutritional assessment, its consistency with reported weight loss and muscle mass depletion further supports the diagnosis of protein-energy malnutrition in a substantial proportion of our patients [28].

The implications of our findings are critical. Malnutrition is a modifiable risk factor that significantly impacts clinical outcomes, including postoperative complications, infection rates, wound healing, treatment tolerance, and overall survival. Early identification and intervention can improve prognosis, reduce hospital stay durations, and enhance quality of life. Yet, in many low- and middle-income countries, including Pakistan, nutritional screening remains poorly integrated into oncologic care pathways. Despite the availability of validated tools such as NRS-2002, MNA, and GLIM, there is a lack of consensus on the most suitable screening method for hospitalized cancer patients. Our study reinforces the need for routine nutritional risk assessment upon hospital admission, especially in high-risk groups such as those with advanced-stage head and neck malignancies. Strengths of this study include its focused approach on a neglected area in Pakistani oncology and the use of operational definitions for weight loss and muscle mass reduction, which improve the validity of the findings. However, several limitations must be acknowledged. This was a single-center study, which may limit the generalizability of the findings. Biochemical parameters such as serum albumin or CRP were not evaluated due to resource constraints. Additionally, the study did not assess long-term outcomes such as response to therapy or survival, which would require a prospective design.

CONCLUSION

It is concluded that malnutrition is a common and clinically significant issue among head and neck cancer patients, with a prevalence of 40% observed in this study population. Malnutrition was found to be significantly associated with advanced tumor stage and a history of substance addiction, particularly the use of gutka and betel nut. These findings highlight the need for early nutritional assessment and intervention as part of routine oncological care. Integrating standardized screening tools and involving dietitians at the time of hospital admission may improve treatment tolerance, reduce postoperative complications, and enhance overall patient outcomes.

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