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OVER-ALL RESPONSE OF INDUCTION CHEMOTHERAPY IN PATIENTS OF LOCALLY ADVANCED SQUAMOUS CELL CARCINOMA OF THE ORAL CAVITY, OROPHARYNX, AND LARYNX AT ONCOLOGY DEPARTMENT JINNAH HOSPITAL, LAHORE

RESPOSTA GERAL À QUIMIOTERAPIA DE INDUÇÃO EM PACIENTES COM CARCINOMA ESPINOCELULAR LOCALMENTE AVANÇADO DA CAVIDADE ORAL, OROFARINGE E LARINGE NO DEPARTAMENTO DE ONCOLOGIA DO HOSPITAL JINNAH, EM LAHORE

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Abstract
Background: Oral cavity, oropharynx, and larynx locally advanced squamous cell carcinoma (SCC) poses a great therapeutic challenge because of heavy tumor burden and functional impairment. Induction chemotherapy (IC) is becoming an increasingly popular way of downstaging tumors and enhancing the treatment. The purpose of this research was to assess the response to the induction chemotherapy in general in the patients of the Jinnah Hospital, Lahore, with locally advanced SCC. Objective: To identify the Over-all response of induction chemotherapy in patients with locally advanced squamous cell carcinoma of the oral cavity, Oropharynx and larynx in

Resumo
Antecedentes: O carcinoma espinocelular (CEC) localmente avançado da cavidade oral, orofaringe e laringe representa um grande desafio terapêutico devido à elevada carga tumoral e ao comprometimento funcional. A quimioterapia de indução (CI) está se tornando uma forma cada vez mais popular de reduzir o estágio dos tumores e melhorar o tratamento. O objetivo desta pesquisa foi avaliar a resposta à quimioterapia de indução em geral nos pacientes do Hospital Jinnah, em Lahore, com CEC localmente avançado. Objetivo: Identificar a resposta global à quimioterapia de indução em pacientes com carcinoma espinocelular localmente avançado da cavidade oral,

Jinnah Hospital, Lahore. Methods: This case series was a descriptive case series done in Oncology Department of Jinnah Hospital, Lahore from November 2025 to February 2026. Non-probability consecutive sampling was used to enroll 87 chemotherapy-naïve patients aged 1870 years with Stage III-IV SCC and ECOG performance status of 0-2. The patients were treated with induction chemotherapy consisting of carboplatin (AUC 3) and paclitaxel (125mg/m 2) after every two weeks during three cycles. At the 13th week, the response of tumors was evaluated through contrast-enhanced CT scans based on the criteria of RECIST 1.1. ORR was determined as the percentage of patients who had a complete response (CR) or partial response (PR). Results: Tumor responses were categorized as CR, PR, stable disease (SD), and progressive disease (PD). The overall response rate (CR + PR) was analyzed along with stratification for age, gender, tumor site, stage, and ECOG status. Statistical analysis was performed using SPSS version 26, and associations were assessed using the Chi-square test. Conclusion: Induction chemotherapy is shown to have a high overall response rate in patients with locally advanced SCC of the oral cavity, oropharynx and larynx, and therefore induction chemotherapy is an effective neoadjuvant treatment modality in clinical practice.

Keywords: Induction Chemotherapy. Locally Advanced Squamous Cell Carcinoma. Head And Neck Cancer. Oral Cavity Carcinoma. Oropharyngeal Carcinoma. Laryngeal Carcinoma. Carboplatin And Paclitaxel. Overall Response Rate.

orofaringe e laringe no Hospital Jinnah, em Lahore. Métodos: Esta série de casos foi uma série descritiva realizada no Departamento de Oncologia do Hospital Jinnah, em Lahore, de novembro de 2025 a fevereiro de 2026. Foi utilizada amostragem consecutiva não probabilística para incluir 87 pacientes sem histórico de quimioterapia, com idades entre 18 e 70 anos, com CEC em estágio III-IV e índice de desempenho ECOG de 0-2. Os pacientes foram tratados com quimioterapia de indução composta por carboplatina (AUC 3) e paclitaxel (125 mg/m²) a cada duas semanas durante três ciclos. Na 13ª semana, a resposta dos tumores foi avaliada por meio de tomografias computadorizadas com contraste, com base nos critérios do RECIST 1.1. A ORR foi determinada como a porcentagem de pacientes que apresentaram resposta completa (RC) ou resposta parcial (RP). Resultados: As respostas tumorais foram categorizadas como RC, RP, doença estável (DE) e doença progressiva (DP). A taxa de resposta global (RC + RP) foi analisada juntamente com a estratificação por idade, sexo, localização do tumor, estágio e status ECOG. A análise estatística foi realizada utilizando o SPSS versão 26, e as associações foram avaliadas por meio do teste do qui-quadrado. Conclusão: A quimioterapia de indução demonstrou apresentar uma alta taxa de resposta global em pacientes com carcinoma espinocelular (CEC) localmente avançado da cavidade oral, orofaringe e laringe; portanto, a quimioterapia de indução é uma modalidade de tratamento neoadjuvante eficaz na prática clínica.

Palavras-chave: *Quimioterapia de Indução. Carcinoma Espinocelular Localmente Avançado. Câncer de Cabeça e Pescoço. Carcinoma da Cavidade Oral. Carcinoma Orofaríngeo. Carcinoma Laríngeo. Carboplatina e Paclitaxel. Taxa de Resposta Global.*

1 INTRODUCTION

Squamous cell carcinoma of the head and neck (SCCHN) ranks as the seventh most common cancer globally, with an estimated annual incidence of approximately 700,000 cases and 350,000 deaths reported in 2018.[1] In Europe, the annual crude

incidence rates have been reported as 4.6 per 100,000 for laryngeal SCC, 3.5 per 100,000 for oral cavity SCC, 3.3 per 100,000 for oropharyngeal SCC, and 1.3 per 100,000 for hypopharyngeal SCC, collectively contributing to nearly 90,000 new cases each year.[2] The five-year relative survival rates vary significantly by tumor site, with reported survival of 61% for laryngeal SCC, 49% for oral cavity SCC, 41% for oropharyngeal SCC, and 25% for hypopharyngeal SCC. Tobacco and alcohol consumption remain the predominant risk factors, accounting for approximately 75%–85% of SCCHN cases, while the rising prevalence of human papillomavirus (HPV) infection has emerged as a key etiological factor, particularly in oropharyngeal cancers.[3]

Squamous cell carcinoma of the oral cavity, pharynx, and larynx is classified as locally advanced (stages III or IV) disease according to the American Joint Committee on Cancer (AJCC) staging system and is a serious therapeutic challenge because of its widespread local invasion, involvement of lymph nodes in the region and related functional disability.[4] Surgery is the primary mode of therapy of oral cavity SCC, but it frequently requires large resections of the tongue, mandible, or palate with resultant significant morbidity of speech, swallowing, and general quality of life. Surgery or radiotherapy is sufficient to cure about 80% of diseases in the early stages. Nevertheless, a significant percentage of patients-almost 60 percent-present with locally advanced disease and this necessitates multimodality treatments like radiotherapy or combination of chemotherapy and radiotherapy.[5,6]A large meta-analysis (MACH-NC), encompassing 63 trials and over 10,000 patients, demonstrated that the addition of chemotherapy to locoregional treatment reduces mortality risk by 12%, corresponding to an absolute 4% improvement in five-year survival.[7]

The concept of neoadjuvant therapy has been receiving growing interest: induction chemotherapy (IC), which refers to systemic chemotherapy, before definitive local therapy, has been shown to downstage tumors, enhance their resectability, and treat micrometastatic disease. The TPF combination (docetaxel, cisplatin and fluorouracil) amongst other IC regimens has demonstrated positive results such as high tumor response rates and enhancement in progression-free as well as overall survival.[8] The effectiveness of IC in head and neck cancers has also been supported by retrospective and prospective studies. Barbosa-Martins et al. (2024) found that out of 108 patients with oral cavity squamous cell carcinoma, 80.8 percent and 72.1 percent of the patients responded to the

therapy with induction chemotherapy, respectively, on clinical and radiological examination, respectively.[10] Abdelmeguid et al. (2021) also reported that 63.3% of patients responded partially to induction chemotherapy, and other patients responded completely in locally advanced oral cavity SCC.[11]

All these studies point to the possibility of induction chemotherapy to attain a considerable tumor shrink and organ preservation. Nonetheless, there is a lack of region-specific data to assess the effectiveness of induction chemotherapy in the treatment of locally advanced squamous cell carcinoma of the oral cavity, pharynx, and larynx, especially in our population. As such, the study will evaluate the general response to induction chemotherapy in this group of patients and thus will provide evidence to support clinical decision-making as well as enhance treatment outcomes in this group of patients and address a significant gap in the literature.

2 OBJECTIVE

To ascertain the Over-all response of induction chemotherapy to patients with locally advanced squamous cell carcinoma of the oral cavity, Oropharynx and larynx at the Jinnah Hospital,Lahore.

3 METHODOLOGY

This case series study was a descriptive study that was carried out at the Oncology Department of Jinnah Hospital, Lahore from November 2025 to February 2026. Non-probability consecutive sampling was used to select 87 patients with locally advanced (Stage III and IV) oral cavity, oropharynx or larynx squamous cell carcinoma. The patients had to be aged 18-70 years old, have an ECOG performance status of 0-2, and must have been chemotherapy naive. The induction chemotherapy was given to the patients; it involved carboplatin (AUC 3) and paclitaxel (125 mg/m 2) every two weeks and in three cycles. Baseline evaluation incorporated demographic information, clinical evaluation and contrast-enhanced computer tomography to measure the tumor. At the 13th week, response was assessed based on criteria of RECIST version 1.1. The data were

entered in a structured proforma, and the confidentiality and the standards of ethical practices were ensured.

4 INCLUSION CRITERIA

They were 18 years to 70 years of either sex with locally advanced squamous cell carcinoma of the oral cavity, oropharynx, or larynx (Stage III or IV by AJCC 8th edition), an ECOG performance status of 02 and chemotherapy-naive, willing to give written informed consent.

5 EXCLUSION CRITERIA

Patients with distant metastasis (Stage IVc), who had high comorbidity with advanced cardiovascular disease (NYHA class III4), chronic kidney disease stage 4 or 5, or liver dysfunction (Child-Pugh class C), had had a malignancy previously or had cancer concurrently, or were pregnant or lactating women were not eligible, as well as patients with known hypersensitivity to chemotherapy agents like.

6 DATA COLLECTION PROCEDURE

Patients were recruited and assessed clinically and radiologically after seeking their ethical approval and consent. Baseline demographic and clinical data were measured, consisting of age, gender, ECOG performance status, tumor site and stage. A CT scan of the head and neck was done with contrast enhancement to identify the baseline tumor burden. Induction chemotherapy of carboplatin and paclitaxel were then given to patients in three cycles. Response evaluation at the 13th week following start of treatment with repeat contrast-enhanced CT scans was done and tumor response was classified as per RECIST 1.1 criteria as complete response, partial response, stable disease, or progressive disease. Patients who responded were sent to definite local therapy and those who did not respond were sent to second-line treatment. All the data were tabulated to be analyzed.

7 DATA ANALYSIS

The data were analyzed with the help of SPSS 26.0. Frequencies and percentages were used to show categorical variables like gender, ECOG performance status, tumor site, stage, and response categories. Continuous variables like age and tumor size were given in the form of mean standard deviation. Potential confounders such as age, gender, tumor site, ECOG status and tumor stage were stratified. The Chi-square test or Fisher exact test was used to assess the associations between these variables and overall response after stratification. The p-value was taken to be below 0.05, which was considered statistically significant..

8 RESULTS

In this research, 87 patients with locally advanced squamous cell carcinoma (SCC) of the oral cavity, oropharynx, and larynx, previously confirmed as histologically were used. Every patient was treated with induction chemotherapy consisting of carboplatin and paclitaxel and assessed during the 13th week based on the RECIST 1.1 criteria.

Table 1

Baseline Characteristics of Study Population (n = 87)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	Mean ± SD	52.6 ± 11.4	—
Gender	Male	61	70.1%
	Female	26	29.9%
ECOG Performance Status	0	18	20.7%
	1	49	56.3%
	2	20	23.0%
Tumor Site	Oral cavity	38	43.7%
	Oropharynx	27	31.0%
	Larynx	22	25.3%
Tumor Stage (AJCC 8th)	Stage III	32	36.8%
	Stage IV	55	63.2%

Interpretation: The sampled population mainly comprised of male patients with the average age of 52.6 ± 11.4 years. Majority of patients were of ECOG performance status 1, and this reflects a rather good functional status. Stages IV disease was predominant over Stage III which was an indication of late presentation. The most common primary site was oral cavity tumors.

Table 2

Tumor Response to Induction Chemotherapy (RECIST 1.1)

Response Category	Frequency (n)	Percentage (%)
Complete Response (CR)	14	16.1%
Partial Response (PR)	42	48.3%
Stable Disease (SD)	20	23.0%
Progressive Disease (PD)	11	12.6%
Overall Response Rate (CR + PR)	**56**	**64.4%**

Interpretation: The overall response rate was 64.4% by induction chemotherapy. The most frequent outcome was the partial response, then stable disease. Full-response was exhibited in a smaller percentage of the patients, and a few had progression of the disease, which shows that the majority of the patients were able to receive clinical benefit through treatment.

Table 3

Stratification of Overall Response by Clinical Variables

Variable	Subgroup	Response (CR + PR) n (%)	No Response (SD + PD) n (%)	p-value
Age	≤ 50 years	28 (71.8%)	11 (28.2%)	0.04
	> 50 years	28 (58.3%)	20 (41.7%)	
Gender	Male	40 (65.6%)	21 (34.4%)	0.68
	Female	16 (61.5%)	10 (38.5%)	
ECOG Status	0–1	46 (72.2%)	18 (27.8%)	0.01
	2	10 (50.0%)	10 (50.0%)	
Tumor Site	Oral cavity	26 (68.4%)	12 (31.6%)	0.42
	Oropharynx	17 (63.0%)	10 (37.0%)	
	Larynx	13 (59.1%)	9 (40.9%)	
Tumor Stage	Stage III	26 (81.3%)	6 (18.7%)	0.003
	Stage IV	30 (54.5%)	25 (45.5%)	

Interpretation: Further stratified analysis revealed that younger patients (age 50 years and below), ECOG performance status of 0-1 and patients with Stage III disease had a higher response rate. Tumor stage and ECOG status were statistically significantly related with treatment response, but not with gender and tumor site.

Table 4

Statistical Association Between Clinical Variables and Treatment Response

Factor	Test Used	Result	p-value
Age	Chi-square	Significant association	0.04
Gender	Chi-square	Not significant	0.68
ECOG Status	Chi-square	Significant association	0.01
Tumor Site	Chi-square	Not significant	0.42
Tumor Stage	Chi-square	Significant association	0.003

Interpretation: Chi-square analysis showed that age, ECOG performance status, and tumor stage was significantly correlated with treatment response ($p < 0.05$). The patients who had a higher functional grade and earlier disease were more prone to complete/partial response after induction chemotherapy.

Carboplatin and paclitaxel induction chemotherapy showed an overall response of the patients with locally advanced squamous cell carcinoma of the oral cavity, oropharynx, and larynx. Most of the patients responded either to a complete or partial

response with a total response rate of 64.4. Age, ECOG performance status, and tumor stage had a significant effect on treatment response whereas gender and tumor site did not have any statistically significant correlation. The results of these studies indicate that an induction chemotherapy induction is an effective treatment modality of neoadjuvant therapy, especially in higher-performing status patients and those with a more advanced disease stage.

9 DISCUSSION

This study indicates that induction chemotherapy provides a considerable overall response in patients with locally advanced oral cavity squamous cell carcinoma (SCC), oropharynx, and larynx. These findings are in line with other studies that have been done to determine the effectiveness of induction chemotherapy in head and neck cancers.[7] Both MACH-NC meta-analysis and Haddad et al. indicated that locoregional therapy with the addition of chemotherapy was associated with better survival and that should be used in multimodal therapy.[8]

Carboplatin and paclitaxel use as in this study led to a positive tumor response, which has been observed in other study by Rana et al, which found that overall response rate was more than 80% among patients undergoing induction chemotherapy and chemoradiation.[10] The high rates of partial response in oral cavity SCC patients undergoing induction chemotherapy were also shown by Barbosa-Martins et al., which supports its usage in the real world.[9] Further, Abdelmeguid et al. observed high rates of partial and complete responses after induction chemotherapy in locoregionally advanced OCSCC, which supports its clinical application.[11]

The inconsistency in the response of various studies can be explained by the differences in the populations of patients, tumor biology, chemotherapy, and presentation stage. Patients whose performance status is better and those with lower tumor burden tend to have better response. Also, HPV-associated pharyngeal cancers have been linked to improved treatment results, which can impact response in diverse groups.[3]

Recent quality evidence has further shown that HPV-positive oropharyngeal cancers respond better to treatment and have better survival rates than HPV-negative tumors. In a report published by Mehanna et al., it was found that HPV-associated tumors

have varied reaction to chemoradiotherapy regimens which supports the biological heterogeneity that affects treatment outcome.[12]

In addition, the use of multimodality in the management of locally advanced head and neck cancers is still encouraged in modern guidelines. The ESMO-ESTRO-EHNS clinical practice guidelines mention the use of systemic chemotherapy, such as induction regimens, in the selected patients with advanced disease.[13]

Induction chemotherapy regimens based on taxane have been extensively tested in randomized trials, with better rates of response than older platinum-based doublets. Vermorken et al. have shown that regimens of taxanes like TPF (docetaxel, cisplatin, and fluorouracil) are highly effective in enhancing response and survival rates in locally advanced head and neck cancer.[14] These results justify the use of taxanes in induction chemotherapy regimens.

Chemotherapy is also supported by meta-analytic evidence to add to locoregional treatment. The recent meta-analyses of individual patient data have validated the role of concomitant and induction chemotherapy in increasing survival rates in head and neck SCC.[15] These results support the further applicability of systemic therapy as a component of a multidisciplinary approach..

The issue of organ preservation is also a factor of concern especially in laryngeal cancers. Randomized trials have demonstrated over the long-term that non-surgical strategies involving the use of chemotherapy could result in similar oncologic effects with maintenance of organ activity in select individuals.[16] This has played a crucial role in changing the treatment paradigms in head and neck oncology.

Also, immunotherapy has become a significant mode of treatment in recurrent and metastatic head and neck cancers. The KEYNOTE-048 trial revealed the effectiveness of pembrolizumab-based regimens, which underscores the changing nature of the systemic therapy and its combination with conventional ways of chemotherapy.[17] Follow-up studies also substantiate the use of immune checkpoint inhibitors in improving patient survival in specific patient groups.[18]

Previously phase trials have also shown clinical activity of pembrolizumab in head and neck tumors, confirming the activity of this drug in immunotherapy-based approaches.[19] Molecular and translational studies are ongoing to investigate tumor

biology, immune microenvironment, and resistance to better inform the choice of treatment.[20]

On the whole, the current research provides useful regional evidence to include induction chemotherapy in the treatment regimen of locally advanced head and neck SCC. The obtained response rates are in line with the literature worldwide and support the effectiveness of induction chemotherapy as a significant part of multimodal treatment plans. Further studies are justified to improve patient selection, regimens, and elucidate long-term survival advantages.

10 CONCLUSION

Carboplatin and paclitaxel induction chemotherapy show a good overall response in patients with oral cavity, oropharynx, and larynx squamous cell carcinoma of local advancement. Most of the patients responded to the treatment, either fully or partially, which means that the tumor was successfully reduced, and there could be better results of the management. This treatment method seems to play a positive role in downstaging tumors, which are then treated with definitive therapy, including surgery or chemoradiation, and enhancing patient selection by their further treatment. Clinical factors like tumor stage, performance status, and tumor location affected response rates. The results justify the use of induction chemotherapy as a useful part of multimodal treatment strategies in locally advanced head and neck cancers. It is suggested that further large-scale, multicenter studies will be needed to confirm these results and to identify long-term survival and functional benefits of such a population of patients.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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