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RESEARCH ARTICLE

Unveiling the Challenge: Head and Neck Cancers in Teenage and Young Adult Population – A Tertiary Cancer Centre Experience

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Abstract

Background: Head and neck squamous cell carcinoma (HNSCC) in the Teenage and Young Adult (TYA) population (15-29 years) is under-reported in literature, especially in low-resource settings like India. This study aims to analyse the clinical characteristics, treatment patterns, and outcomes of HNSCC in this age group. **Methods:** A retrospective analysis was conducted on 46 TYA patients diagnosed with HNSCC at our institution between January 2011 and December 2013. Patients were evaluated based on clinical history, imaging, and biopsy, and treated as per multidisciplinary tumor board recommendations. Treatment modalities included surgery, chemo radiation, and palliative care. Survival outcomes were analysed using Kaplan-Meier curves. **Results:** Among the 46 patients, the majority were male (65%), with the most common primary sites being the oral cavity (39%) and hypopharynx (28%). Locally advanced disease (Stage III and IV) was predominant in 82% of cases. Tobacco use, especially in smokeless forms, was a significant risk factor, present in 39% of patients. Overall survival (OS) at 3 and 5 years was 50% and 48%, respectively, with oral cavity and hypopharyngeal cancers showing poorer outcomes. The most common toxicities were neutropenia and skin reactions, which were consistent with published data. **Conclusions:** HNSCC in the TYA age group is typically diagnosed at an advanced stage and is associated with poor outcomes. Tobacco consumption remains a major risk factor. Early detection through screening and public health campaigns to reduce tobacco use are critical to improving prognosis in this population.

Keywords: Head and neck carcinoma- Teenage and young adult- concurrent chemoradiation

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Introduction

Head and neck cancers account for 30% of all cancers in India, with 60-80% of patients presenting at an advanced stage compared to 40% in developed countries. In contrast to the West, where it is the 6th most common cancer, head and neck cancer is the most common cancer in men in India. Tobacco consumption, particularly smokeless tobacco, is strongly associated with oral cancers in developing countries like India, where the habit typically starts during teenage years, contributing significantly to oral malignancy. Every year, nearly 2,250 new cancer cases occur in the Teenage Young Adult (TYA) age group in Tamil Nadu, according to TYA statistics from 2015. Oral cancers, especially tongue cancers, are common in this group, with smokeless tobacco being the predominant form of use. Its incidence is slightly higher in women. Cancers in the young account for 4.3%-6.26% of the nation's total cancer burden. The GLOBOCAN 2018 report states that, of the annual cancer burden of over a million in India, 54,538 individuals aged 15-29 were diagnosed, and 30,286 (55%) died, indicating poor outcomes. According to the Tamil Nadu Cancer Registry Project (2012-2014), the five most common cancers

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in males were leukemia, lymphoma, bone tumors, oral cancers, and CNS tumors, while in females, the most common were leukemia, ovarian cancer, lymphoma, thyroid malignancies, and breast cancer. Data on TYA head and neck cancers are limited in the literature.

Materials and Methods

This was a retrospective study using individual case records of teenagers and young adults diagnosed with head and neck squamous cell carcinoma (HNSCC) between January 2011 and December 2013. Inclusion criteria included age between 15 and 29 years with squamous cell carcinoma of the head and neck (nasal cavity, paranasal sinuses, nasopharynx, oral cavity, oropharynx, larynx, hypopharynx). Exclusion criteria were patients with recurrent disease, non-squamous carcinoma, and cancers of the thyroid and salivary glands.

Patients were evaluated with detailed histories, clinical examinations, imaging (CECT of the head and neck), and biopsy. Treatment was initiated after discussion by the head and neck multidisciplinary tumor board. Early-stage oral cavity cancers were treated with surgery, followed by adjuvant therapy based on histopathology. Locally advanced oral cavity cancers, as well as oropharyngeal, hypopharyngeal, and laryngeal cancers, were treated with chemoradiation. Locally advanced nasopharyngeal cancers were treated with chemoradiation with three-weekly cisplatin for three cycles, followed by adjuvant chemotherapy (cisplatin and 5-fluorouracil) for three cycles. Toxicity was assessed using CTCAE version 4.0. Event-free survival (EFS) and overall survival (OS) were estimated from diagnosis to recurrence, death, or last follow-up using Kaplan-Meier curves. Statistical significance was set at a p-value of < 0.05. The study was approved by the Institutional Ethics Committee of the Cancer Institute (WIA).

Results

A total of 148 Teenage and Young Adult (TYA) patients were treated for head and neck cancers during the study period. Out of these, 46 patients diagnosed with head and neck squamous cell carcinoma (HNSCC) were included in the final analysis. The median follow-up duration was 36.5 months, ranging from 1 to 117 months. Baseline characteristics of the patients are detailed in Table 1.

Table 1. Baseline Characteristics (N=46)

Characteristics	Number (percentage)
Age in years median	15-29years
Male	30 (65.21)
Female	16 (34.78)
Tobacco exposure	18 (39.13)
Smoking tobacco	7 (39)
Smokeless tobacco	11 (61)
Alcohol	13 (28.26)
Performance status (ECOG)	
0	11 (24)
1	35 (76)
Site	
Nasopharynx	12 (26.08)
Tongue	11 (23.91)
Buccal mucosa	7 (15.21)
Hypopharynx	13 (28.26)
Larynx	3 (6.52)
Stage As per AJCC 7th	
I	4 (8.69)
II	2 (4.35)
III	14 (30.43)
IV a	24 (52.17)
IV c	2 (4.35)
Histological differentiation	
Grade I	4 (8.69)
Grade II	21 (45.64)
Grade III	21 (45.64)

Demographic and Clinical Characteristics

The majority of the patients (n=28, 60%) fell within the 25-29 years age group, while the remaining patients were spread across the younger age categories of 15-19 years (n=9, 20%) and 21-24 years (n=9, 20%). Males were the predominant gender, constituting 65% of the cohort (n=30), while females made up 35% (n=16).

The most common primary tumor site was the oral cavity, which accounted for 39% of the cases (n=18), followed by the hypopharynx (n=13, 28%) and nasopharynx (n=12, 26%). Among oral cavity tumors, the tongue was the most frequently affected subsite, representing 61% of oral cancers, followed by the buccal mucosa at 39% (Table 2-4).

Stage of Disease

The majority of patients (n=38, 83%) presented with locally advanced disease, with 52% (n=24) in stage IV and 28% (n=13) in stage III. Early-stage disease (stage I/II) was identified in only 6 patients (13%). Metastatic disease was observed in 2 patients (4%).

Lifestyle Factors

Among the 46 patients, 39% (n=18) reported tobacco consumption, primarily in the form of chewing tobacco (61%), while 28% (n=13) had a history of alcohol consumption. Smoking was less common, but still reported in 39% of the tobacco users, with cigarettes or beedis being the preferred form.

Treatment Modalities

Treatment approaches varied depending on the site and stage of the tumor.

Oral Cavity Cancers

Of the 18 patients with oral cavity cancers, four with stage I disease (tongue subsite) underwent wide

Table 2. 5 Years Interval Distribution

Site	15-20 years	21-24 years	25-29 years
Nasopharynx	6	2	4
Hypopharynx	2	4	7
Larynx	0	0	3
Tongue	1	2	8
Buccal mucosa	0	1	6

local excision and supraomohyoid neck dissection. Postoperative pathology revealed tumor sizes less than 2 cm with no lymph node involvement. Locally advanced cancers (n=12) were treated with concurrent chemoradiation. These patients received external beam radiotherapy (EBRT) with a total dose of 66 Gy using a 2D conventional technique, along with concurrent cisplatin (70 mg/m² intravenously, every 3 weeks for 3 cycles and bleomycin 10units S/C weekly twice). One patient with metastatic carcinoma of the tongue was treated with palliative radiation followed by oral metronomic chemotherapy.

Hypopharyngeal Cancers

A total of 13 patients had hypopharyngeal cancers. Ten of these patients with locally advanced disease were treated with definitive chemoradiation. Half of them (n=5) received 66 Gy using a 2D conventional technique, while the other five received 3D conformal radiotherapy. All patients received cisplatin 100 mg/m² intravenously every 3 weeks for 3 cycles. One patient with disease progression after 2 cycles of neoadjuvant chemotherapy (paclitaxel and 5-fluorouracil) was treated with concurrent chemoradiation. Another patient underwent laryngopharyngoesophagectomy (LPO) after preoperative radiation (50 Gy using 3D conformal technique) and chemotherapy.

Laryngeal Cancers

Among the three cases of glottic cancers, one patient with stage I disease was treated with definitive radiation (66 Gy using 2D conventional technique). Another patient with locally advanced disease and a third patient with subglottic extension were treated with chemoradiation, receiving 66 Gy of EBRT using 3D conformal therapy concurrent with cisplatin.

Nasopharyngeal Cancers

All 12 nasopharyngeal cancer cases were treated with concurrent chemoradiation. All patients were treated using IMRT technique. All patients received adjuvant chemotherapy with cisplatin and 5-fluorouracil. One metastatic patient also received palliative radiation and bisphosphonates for bone metastasis. 90 percent of patients received the full three cycles of cisplatin during the chemoradiation phase.

Survival Outcomes

The event-free survival (EFS) for the entire cohort was 41% at 3 years and 39% at 5 years. Overall survival (OS) was 50% at 3 years and 48% at 5 years (Figure 1). Survival outcomes varied based on the primary tumor site. The 5-year OS for patients with nasopharyngeal cancer was 58%, while EFS was 50%. For hypopharyngeal cancer patients, the 5-year OS and EFS were both 23%. The 5-year OS and EFS for patients with laryngeal cancer were both 100%. The 5-year OS for patients with tongue cancer was 55%, while EFS was 36%. For buccal mucosa cancer, the 5-year OS was 43%, with an EFS of 29%.

Toxicity

Treatment-related toxicities were evaluated using CTCAE version 4.0. Eight patients treated with concurrent chemoradiation developed grade I neutropenia, while three developed grade II neutropenia. Skin toxicity was observed in 4 patients (grade II) and 2 patients (grade III). Grade I emesis was reported in 5 patients. Among the nasopharyngeal cancer patients, one experienced grade III neutropenia, while 5 had grade II and 3 had grade I neutropenia. Grade I emesis was noted in 4 patients, and grade II skin reactions occurred in 5 patients. One patient had grade III neutropenia, while 3 had grade II and 3 had grade I neutropenia. Grade III skin toxicity was observed in 4 patients, and grade II skin toxicity was noted in 5 patients. Emesis (grade I) was seen in 4 patients. Among the three patients with laryngeal cancers, one developed grade II neutropenia, but no severe toxicities were noted. The toxicity profile in this cohort was comparable to data published in the literature for HNSCC treatment in similar age groups.

Discussion

TYA age group is a transition period from paediatric to adult age group, As per WHO, Teenage and young adult (TYA) age falls between 15 to 24 years of age, but in the united states, 2006 SEER program report used the 15- 29 years, Canada also uses same age to define AYA group,(Journal of Adolescent and Young adult Oncology). Less data is available on outcomes of Teenage and young adult HNSCC (15-29 years). Most of the available studies included 15-39 years as AYA age group and occurrence of squamous histology is more after 30 years of age. As per

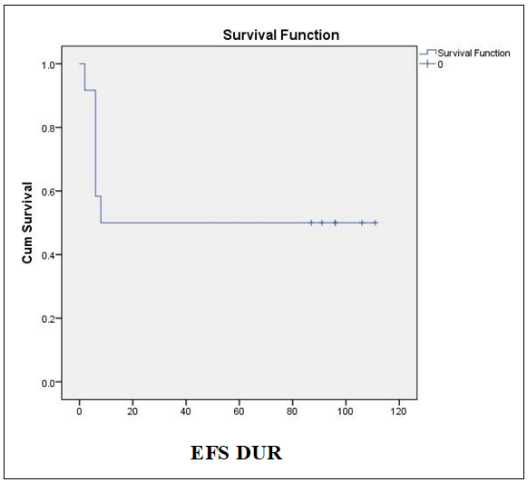

Figure 1. Kaplan- Meier Survival Analysis- Event Free Survival Of Entire Tya Cohort.

Table 3. Site and Age Distribution

Site	15-20 years	21-24 years	25-29 years
Nasopharynx	6	2	4
Hypopharynx	2	4	7
Larynx	0	0	3
Tongue	1	2	8
Buccal mucosa	0	1	6

the pattern of occurrence of head neck cancers between 15 to 29 years, thyroid cancers are more in number, followed by pharyngeal(hypopharynx, nasopharynx)cancers, oral cavity cancers and salivary gland cancers.

In literature there was article on Squamous cell cancers head and neck in AYA age group (15-39years), where they studied predominantly the influence of non clinical parameters on the outcomes. In this study it was documented that 73% of survival at 8 years follow up and insured candidates had benefited the most [1]. Head and neck cancers are a significant problem in our country contributing to one third of all cases, which is in contrast to 4-5% in the developed countries. Unlike the western population, most of them are non-insured. Pattern of occurrences also varies with the western population.

In this TYA cohort of 46 patients, males were 30, females are 16 in number. Among males, oral cavity cancer was predominant which constituted about 35%, followed by pharynx (26%). Among females, hypopharynx was the most common site accounting for 28% followed by oral cavity and larynx, both accounting for 1% each. 83 % of patients presented in locally advanced stage (Stage III/IV), 13% presented in early stage(I,II) and 4% of patients presented with metastatic disease. Most of the cases presented in 25 to 29 years of age (Table 5) which is comparable to the data published in south Asian journal of cancer regarding epidemiology of cancer in young in central India. They reported that maximum cases were seen in 25 to 30 years age group, with 3 fold of increasing trend from 15- 19 years age group to 25-30 years age group. This representation indicates that there is an increased incidence of squamous cell carcinoma with increasing age and most of them had presented with advanced stage of the disease [2]. In regard to the habits, tobacco consumption was mostly associated with oral cavity cancers (56%).

There is sparse data available on the treatment modalities and outcomes particularly between 15-29 years of age affected with HNSCC. All locally advanced head and neck Cancers (Stage III, IVa, IVb) with oral tongue and buccal mucosa subsites were treated with Concurrent Chemoradiation using Cisplatin 70mg/m^2, 3 weekly and Bleomycin 10 units S/C weekly twice. Adding Bleomycin has a shown favourable response. Our results are comparable with the trial conducted by Dr Shantha et al, at Cancer Institute (WIA) which showed better oncological outcomes (77% vs 20.9%) [3]. But oral cavity cancer patients did not have good results. But all the patients were inoperable oral cavity cancers. So it was expected to have bad outcomes. Patients with Tongue cancer had a 5 year OS was 40% and for buccal mucosa the 5 year OS was 43%. For nasopharyngeal cancers the 5 years overall survival as per SEER data was 63%. In our cohort, Nasopharyngeal cancers had a 5 year overall survival of 58%. For hypopharyngeal cancers the 5 years overall survival as per SEER data between 2012 to 2018 was 45%. In our cohort, the 5 year OS was 23%. 28% of patients were diagnosed with Hypopharyngeal cancer. All patients presented in advanced stage. Most of the patients were treated with concurrent chemo radiation (84%) and one patient was treated with neoadjuvant chemotherapy followed by chemo radiation. One patient was treated with neoadjuvant chemotherapy followed by surgery (LPO) and then adjuvant radiation. In our study 3 laryngeal cancer patients had a survival of 100%. But as per SEER data from 2012 to 2018, it was only 77%. But our results may not be comparable because of the very less number of patients in our study population and most of our patients were glottic larynx. Another explanation

Table 4. Site and Stage Distribution

Site	Stage I	Stage II	Stage III	Stage IVA	Stage IVB	Stage IVC
Nasopharynx	-	1	4	6	-	1
Hypopharynx	-	-	4	9	-	-
Tongue	4	-	3	3	-	1
Buccal mucosa	-	-	1	6	-	-
Larynx	-	1	2	-	-	-

Table 5. Treatment Details

Treatment modality	Nasopharynx	Pharynx	Larynx	tongue	Buccal mucosa
Surgery				4	
Chemoradiation	12	11	2	7	6
Radiation alone			1		
Induction-chemotherapy followed by chemoradiation		1			
Neoadjuvant-chemoradiation followed by surgery		1			
Palliative Radiation				1	

Nasopharynx site 1 case out of 12 patients received palliative radiation also

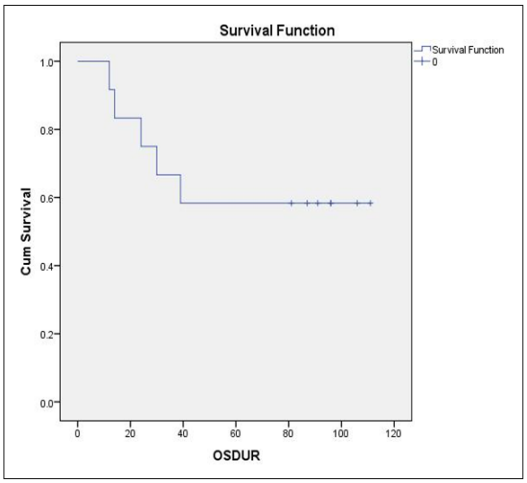

Figure 2. Kaplan- Meier Survival Analysis- of Overall Survival Duration of Entire Tya Cohort

is probably the occurrence of glottic cancer in 15 to 29 years was less.

Among the entire TYA cohort, 5 year overall survival was similar to the data published in developed countries in all stages ranging from 30 to 70% [4-6]. In this present cohort, we observed a 3 year and 5 year overall survival of 50% and 48% respectively (Figure 2). Mohammad Shahid Iqbal et al reported that 5 year overall survival outcomes of Primary concurrent chemoradiation in HNSCC was 60% [7]. Most of the patients in this age group present with locally advanced disease. This in turn decreases the overall survival. Our study has several limitations. It was retrospective in nature, most of the patients were treated with basic techniques of radiotherapy, some patients were treated with bleomycin along with cisplatin 70mg/m^2 which is not the standard of care and small number of patients. Our results show that still cancer awareness among the general population is quite less and the accessibility for them to quality cancer care is very low.

Limitations

This study has certain limitations that must be acknowledged. First, HPV (Human Papillomavirus) status, an important prognostic factor in head and neck squamous cell carcinoma, particularly for oropharyngeal cancers, was not assessed. This omission limits our ability to stratify outcomes based on etiologic subtypes. Second, the relatively small cohort size may reduce the statistical power of the study and restrict the generalizability of the findings. Third, many patients were treated using now-outdated radiotherapy techniques, such as 2D conventional planning, which may not reflect current clinical standards.

In conclusion, head and neck squamous cell carcinoma (HNSCC) in the Teenage and Young Adult (TYA) age group presents a unique challenge, with many cases diagnosed at advanced stages and a diverse range of cancer subtypes. Our study highlights the rising incidence of squamous cell carcinoma in the 25-29 age group, underscoring the impact of tobacco-related habits, especially in oral cavity cancers. Despite aggressive treatment approaches, survival outcomes in this group remain lower compared to older populations, particularly for hypopharyngeal cancers. These findings emphasize the need for increased awareness, early detection strategies, and tailored treatment protocols to improve survival and quality of life in this under-studied population. By focusing on TYA patients, we can drive progress in both understanding and treating head and neck cancers more effectively during this critical transition period.

Acknowledgments

Statement of Transparency and Principals

- Author declares no conflict of interest
- Study was approved by Research Ethic Committee of author affiliated Institute.
- Study's data is available upon a reasonable request.
- All authors have contributed to implementation of this research.

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