Prevalence of head and neck cancers in Ahmedabad, Gujarat

Jagruiti A. Patel · Forum G. Shah · Jagdish M. Kothari · Kaustubh D. Patel

Abstract

Introduction Head and neck cancer constitute one of the commonest cancers in India. Use of smokeless tobacco (*pan masala, gutka, zarda*, etc.) is the maximum in Gujarat, especially in and around Ahmedabad, and it is responsible for a large majority of these cancers.

Aim and objective The present study was carried out to study the patient's characteristics, prevalence, treatment modalities and histopathological subtypes of head and neck cancer in and around Ahmedabad.

Methods A cross-sectional and observational study was carried out at the Head and Neck Services Department of Aastha Oncology Associates, Medi-Surge Hospitals, Ahmedabad, from December 2006 to May 2007. Patients were made to fill up the Case Record Form (CRF) with their informed consent. Proforma of the CRF included patient's age, gender, income, education, family history, lifestyle, signs and symptoms, various investigations, treatment options and adverse effects during treatment and follow up. Preponderance of cancer was found in males (86%) with maximum prevalence in age group 41–60 years (69%). 58% cases were habitual tobacco chewers. Majority of head and neck cancers constituted the tongue, buccal mucosa and alveolus cancers. Radiotherapy and surgery were major

treatment options in 44% patients. Blood parameters profile in all the three treatment groups was found to be lower than the control group.

Conclusion We conclude that a properly structured and site specific data like this pin points to the magnitude and pattern of head and neck cancer problem in India and it can augment the National Cancer Registry Program.

Keywords Head and neck cancer · Radiotherapy · Chemotherapy · Prevalence

Introduction

Cancer of the head, face and neck is more common in Asians and is one of the commonest malignancies in India, accounting for 23% of all cancers in males and 6% in females [1, 2]. Head and neck cancer (HNC) includes squamous cell carcinoma of the oral cavity, pharynx, and larynx. Other major HNCs include skin and salivary gland tumors including parotid tumors, skin malignancies, basal cell carcinoma, etc. The incidence of HNC increases with age; most patients being older than age 50 [3].

The major risk factor for development of HNC is tobacco use [4]. The effect is both time and dose dependent. Use of tobacco and alcohol together increases the risk of oral cancer 15 times [5]. The aim of the present study was to study the prevalence of HNC in Gujarat. Also to study its demography, treatment modalities, adverse events profile, patient recovery data following therapy and also posttherapy complications in patients undergoing anti-cancer treatment or surgery.

Materials and methods

This study was a cross-sectional, observational and non-blind study. The panel of doctors at Aastha Oncology Associates, Medi-Surge Hospitals, Ahmedabad, approved

J. A. Patel¹ · F. G. Shah¹ · J. M. Kothari² · K. D. Patel²

¹Department of Pharmacology,
Institute of Pharmacy,
Nirma University of Science and Technology,
Sarkhej-Gandhinagar Highway,
Ahmedabad - 382 481, India

²Aastha Oncology Associates,
Medi-Surge Hospitals, Mithakhali Six Roads,
Ahmedabad, India

J. A. Patel (✉)
e-mail: jagruitiap@gmail.com

the study protocol. The duration of study period was from December 2006 to May 2007, whereby patients of HNC were enrolled for the study. Patients were made to fill up the Case Record Form (CRF) after obtaining their informed consent.

Inclusion criteria

The criteria for including the patients under study were:

- Patients of either sex
- Patients with confirmed diagnosis of head and neck cancer
- Patients with age 20 and above

Exclusion criteria

The exclusion criteria was:

- Patients whose biopsy reports showed pre-cancerous stages or lesions, patients with severe renal or hepatic failure, or those suffering from psychological depression or disorders.
- Patients who did not give the consent were excluded.

Study design

The patients coming for follow-up, treatment as well as new cases whose biopsy confirmed HNC, were interviewed to fill up details in CRF. The form consisted of normal demographic data such as age, sex, income, education, locality, habit and other information such as family history of patients, type of cancer, stage of cancer, treatment modality undertaken and also the dietary specifications/restrictions prescribed to patients along with any postoperative complications or any adverse effects observed.

Diagnostic tests: Physical examination of the patients included visual inspection of the oral and nasal cavities, neck, throat, and tongue using a telescope (90° Hopkins) and/or head lights and spatula. Endoscopy was performed to examine the nose, nasal cavity, throat and neck. Fine needle aspiration cytology, trucut (Coreneedle) biopsies, microcytoscopies were also performed seldomly in the outpatient clinic. If required patients were also subjected to specific diagnostic modes such as X-ray Orthopantomogram to look at the jaw and the teeth, Chest X-ray, ultrasonography (for thyroid, neck glands as well as abdominal metastasis), Computerized tomography scan, magnetic resonance imaging scan, bone scan to check whether the cancer had spread beyond the head and neck into nearby bones such as the jaw bone or distant bone sites. Other tests were performed occasionally to get further information about the extent of cancer. These included a barium swallow or positron emission tomography scans to detect residual or recurrent cancer.

Patient groups

The patients were divided into three major groups: those who had undergone i) surgery alone (S), or ii) radiotherapy

and surgery (R + S) or those undergoing iii) radiotherapy, surgery and chemotherapy (R + S + C). Also, we had a set of normal healthy volunteers (control group) whose blood parameter profiles were compared with the HNC patients in these three treatment groups.

Data collection and statistical analysis

The data of patients were collected and arranged in an excel sheet for further analysis. The data collected was subjected to basic statistics in order to find out the mean value and standard error of mean (SEM). The results were analysed using one-way ANOVA. The three treatment groups mentioned above were compared not only with control group but also with each other using Tukey's test (only if the *p* value in one-way ANOVA was found to be significant). The statistical software used for analysis was GraphPad Instat. The value of probability less than 5% ($p < 0.05$) was considered as statistically significant value. A confidence interval of 95% was considered for the reliability of the results.

Results and discussion

HNCs are a diverse group of diseases, each with its own distinct epidemiologic, anatomic, and pathologic features, natural history, and treatment considerations. Despite multiple modalities of treatment such as surgery, radiation, and chemotherapy, HNCs continue to have one of the lowest five year survival rates [6–9].

In the United States, the age-adjusted incidence rate of the cancer of the oral cavity and pharynx is 10.4 per 100,000 men and women per year and the death rate is 2.6 per 100,000 men and women per year [10]. The disease is more common in many other countries such as France, Hong Kong, Central and Eastern Europe, Spain, Italy, Brazil and in the Indian subcontinent. Global comparison shows that India has high incidence rates of cancers of oral cavity, pharynx and cervix. The important cancer sites among men are oral cavity, pharynx, larynx and rectum. Common forms of cancer in women are those of the mouth, esophagus, ovary, breast and stomach. [11–12].

Thus, cancers of the head, face and neck are more common in Asians and is one of the commonest malignancies in India. Over 90% of all head and neck cancers are observed to be squamous cell carcinomas [1, 13]. The incidence of head and neck cancer increases with age; most patients being older than age 50 [3].

In the present study 123 HNC patients were enrolled. From these, 10 patients were excluded from the study, as they were not found to be suffering from cancer (were showing precancerous lesions or stage), as indicated by their biopsies. Two other cases were also excluded from the study as they were suffering from posterior

(L/3) esophagus cancer that did not come under purview of HNC.

Gender and age-wise distribution of HNC patients

The commonest age-group was 51–60 years comprising 44 patients (40%). 16% cases were above 60 years of age, 29% were from the age group 41–50 years and 14% in 31–40 years range. Only 1% ($n=1$) cases were in the age group 21–30 years. Western literature reports median age at diagnosis as 63 years [14]. But in a study by Iyer SP et al. [13], 60% of patients suffered from oral malignancy before the age of 60. A study from Orissa also observed maximum cases in 4th to 5th decade of life [15]. However, in our study, the maximum number of cancer cases were from 41–60 years age group and about 16 (14%) patients were in age group 31–40, i.e. occurrence of HNC was also found in 3rd and 4th decade (earlier than usual occurrence that was normally found in 5th and 6th decade). This early occurrence may be due to the fact that smokeless tobacco consumption and/or smoking has increased in the younger age group in and around Ahmedabad. Also, 10 cases out of total 123 patients, did not confirm of cancer (as indicated from their biopsies) but, showed pre-malignant lesions or moderate to severe dysplasia (a stage prior to HNC) and hence were at risk of developing to further Stages, had they not been treated successfully, in time. Also, cessation of chewing tobacco or smoking was equally necessary to prevent disease progression in future (Table 1).

In the gender distribution, male cases were far more common than female comprising 96 males to 15 females (6.4:1) (Table 1). The male predominance may be attributed to the fact that males are exposed more to the habit of smoking and tobacco chewing, and also because of their increased awareness and accessibility to health-care service in the Indian social system. However, literature states an increased use of tobacco in women, resulting in a sharp decline in the male-to-female ratio from 5:1 to approximately 3:1 over the past 5 to 10 years [12]. Although alcohol use produces a modest independent risk, it exponentially potentiates tobacco risk [16, 17].

Table 1 Age and gender-wise distribution of head and neck cancer patients ($n = 111$)

Age (years)	Males (number of patients)	Females (number of patients)	Total number of patients (%)
21–30	1	0	1 (1%)
31–40	13	3	16 (14%)
41–50	26	6	32 (29%)
51–60	40	4	44 (40%)
Above 60	16	2	18 (16%)
Total	96 (86%)	15 (14%)	111 (100%)

Socioeconomic status

A larger percentage of patients belonged to upper middle class (50%), while the other 50% patients comprised other four classes. 2 (2%) patients were from lower class, 11 (11%) from upper, 15 (15%) were from lower middle class and 22 (22%) patients from upper lower class (Table 2).

Risk factors in HNC patients

A recent review showed heavy smokers to have a 5- to 25-fold higher risk of HNC than nonsmokers. For laryngeal cancer, the risk is 12 times higher among smokers. [18] In the present study, although a higher number of cancer sufferers [62 (58%)], were those with habitual tobacco chewing habit, smoking was the cause in 9 (8%) patients. Patients into the habit of tobacco as well as smoking comprised only 6 (6%) patients. On the other hand, 29 (27%) patients suffering from HNC were devoid of any habits and hence no cause or etiology of the disease could be ascertained (Table 3).

Heredity factors in HNC patients

There were few cases of inheritance ($n = 15$, 14%) while a majority of them showed no pattern or sign of heredity ($n = 90$, 86%). Precisely, there were only 4 cases out of the 15 patients whose first-degree relatives had HNC whereas other 11 patient's first- or second-degree relatives had can-

Table 2 Socioeconomic status of HNC patients as per modified Kuppuswami's scale ($n = 101$)

Serial No.	Score	Status	Number of patients	Percentage (%)
1	< 5	Lower	2	2%
2	5 to 10	Upper lower	22	22%
3	11 to 15	Lower middle	15	15%
4	16 to 25	Upper middle	51	50%
5	26-27	Upper	11	11%

Table 3 Risk factors in HNC patients ($n = 107$)

Habits	No. of patients	Percentage (%)
Alcohol	1	1%
Tobacco	62	58%
Smoking	9	8%
None	29	27%
Tobacco + smoking	6	6%
Total	107	

cer of other sites. Mutations and over expression of p53 genes occur in 40% to 60% of cancer patients and have been associated with a poor prognosis. [19, 20] A detailed genetic study of HNC patients must be undertaken to find out over expression of genes in HNC.

Staging and histopathological classification in HNC patients

Forty-two patients (44%) showed early stage disease (3% in stage 0, 27% in stage I and 14% in stage II), 14 cases (14%) had locoregionally advanced curable cancer (11% in stage III, 3% in stage IV), while 40 (42%) cases had locoregionally advanced incurable cancer (39% diagnosed in stage IVA, 3% in stage IVB). Not a single case was found in metastatic incurable cancer stage (i.e. stage IVC) (Fig. 1). Our results were in corroboration with that reported earlier. [13] In our study, 3 (3%) cases had locoregionally advanced incurable cancer, (3, 3% in stage IVB). Histopathologically, the highest occurrence was of squamous cell carcinoma (SCC)—moderately differentiated in 67 (68%) patients, followed by SCC—well differentiated in 19 (19%) patients and SCC—poorly differentiated in 5 (5%), as confirmed by their biopsy results. The least occurrence was that of undifferentiated carcinoma and the pre-malignant lesion, i.e. mild to moderate dysplasia, both including

Fig. 1 Staging in head and neck cancer patients ($n = 96$)

Table 4 Histopathological status in HNC patients ($n = 99$)

Histopathology	Number of patients	Percentage (%)
Mild to moderate dysplasia	1	1%
In situ SCC	3	3%
SCC, well-differentiated	19	19%
SCC, moderately differentiated	67	68%
SCC, poorly differentiated	5	5%
Undifferentiated carcinoma	1	1%
Papillary microcarcinoma	3	3%

SCC: Squamous cell carcinoma

1 (1%) patient each. In situ carcinoma (local HNC) and papillary microcarcinoma (thyroid cancer) each were present in 3 (3%) cases (Table 4). It was observed that many patients confirmed the presence of cancer by diagnosis at a very late stage, i.e. presented themselves late to the doctor either due to ignorance or unawareness of the symptoms occurring in HNC.

Major cancer sites and subsites in HNC

Oral cavity was the most common site observed in 93 patients (84%), followed by larynx in 7 patients (6%), pharynx in 5 patients (5%), 3 patients (3%) with thyroid (papillary cancer of thyroid gland) and only 2 patients (2%) had parotid gland (salivary gland) as the cancer site. The major cancer subsites present in oral cavity was buccal mucosa (54, 49%), whereas tongue cancer was present in 25 (23%) patients and alveolus and floor of mouth cancers were prevalent in 10 (9%) and 4 (4%) patients, respectively. Other subsites in larynx and pharynx region (showing lesser incidence than the oral cavity cancer) where cancer was found were glottis (6, 5%) tonsils (1, 1%) hypopharynx (3, 3%) and oropharynx (2, 2%) respectively (Table 5). In a similar study conducted by Iyer et al. [13], the most common sites of malignancy were buccal mucosa, tongue and alveolus (74.1%). The other sites involved by the lesions were larynx, maxilla, palate and floor of mouth.

Treatment undertaken by HNC patients

The therapy given to HNC patients depends on a number of factors such as stage, histopathology, primary site of tumor, extent of metastasis, local or distant metastasis, regional node involvement, tumor size as well as economic status of the patient. [21,22] In the present study, radiation therapy plus surgery dominated the treatment modalities (45, 44%), while chemotherapy was given mainly as adjuvant, neoadjuvant, concurrent or palliative chemotherapy (Fig. 2).

Fig. 2 Type of treatment undertaken in HNC patients ($n = 103$)

Complications associated with the therapy

Mucositis and blackened burnt skin were the side effects observed in patients with radiotherapy and surgery group (R + S group) as well as in patients undergoing radiotherapy, surgery and chemotherapy (R+S+C group) (Fig. 3). Symptoms of oral mucositis including redness, swelling, and ulceration was reported by other group also. [23]

Post-therapy complications

3 cases showed delayed swallowing and difficulty in opening mouth, 3 cases developed minor orocutaneous fistula, 2 cases developed pharyngocutaneous fistula, 1 case had ulcer with induration, 1 case had postoperative dehiscence,

Table 5 Major cancer sites and subsites in HNC patients ($n = 110$)

Type of cancer	Number of patients	Percentage (%)
1) Oral cavity cancer	93	84%
a) Buccal mucosa cancer	54	49%
b) Tongue cancer	25	23%
c) Alveolus cancer	10	9%
d) Floor of mouth cancer	4	4%
2) Larynx	7	6%
a) Glottis	6	5%
b) Tonsils	1	1%
3) Pharynx	5	5%
a) Hypopharynx	3	3%
b) Oropharynx	2	2%
4) Thyroid gland cancer	3	3%
5) Salivary gland cancer	2	2%

Fig. 3 Adverse effects in HNC patients in two treatment groups

1 patient had postoperative vocal cord palsy, 1 case had partial flap necrosis, 1 case had partial necrosis of skin paddle of outer lining of PM bilobe flap, 1 patient had 40% reduction in visualized growth compared to pre-chemotherapy status and 1 case of neck hematoma was found in HNC patients. One noteworthy finding was that these complications were present in patients undergoing either radiation therapy plus surgery or all of the three treatments. This may indicate that the recovery rate in these patients is slower and delayed than those undergoing any one of the therapies.

Effect of the treatments on blood parameters of the patients

As shown in Table 6, hemoglobin levels (g%) in all the three treatment groups were significantly lower (Group S: 12.088 ± 0.3267 g%, group R+S: 12.325 ± 0.3941 g% and group R+S+C: 11.844 ± 0.2685 g%) when compared with the control group (13.919 ± 0.3028 g%). The mean RBC counts of the patients undergoing all the three treatments i.e R+S+C group were significantly less when compared with the control group. On the contrary, either of the treatments did not alter the WBC counts of the HNC patients when compared to the control group (Table 6). Anemia can be a result of a chronic disease, such as cancer, or a side effect of treatment, such as chemotherapy and/or radiation. Severe anemia may delay the treatment or may compel for the reduction of dosage of treatment, possibly compromising optimal clinical outcomes of the patient. This may certainly mean, that patients opting for all the three modalities are

Table 6 Comparison of levels of hemoglobin, RBC and WBC counts between treated and control groups

Group	Hemoglobin (g%)	RBC (mill./cmm)	WBC (/cmm of blood)
Control group	13.919 ± 0.3028	4.767 0.1340	7005.0 ± 473.25
S group	$12.088 \pm 0.3267^{**}$	4.469 ± 0.1017	8364.3 ± 517.45
R + S group	$12.325 \pm 0.3941^{**}$	4.799 0.1562	7694.3 ± 677.47
R + S + C group	$11.844 \pm 0.2685^{***}$	$4.292 \pm 0.1501^*$	6850.0 ± 724.82

All values are expressed as mean

(S group = Surgery group, $n = 23$ (22%))

(R + S group = Radiotherapy + surgery group, $n = 45$ (45%))

(R + S + C group = Radiotherapy + surgery + chemotherapy group, $n=26$ (25%))

* Significantly less than the control group, $p<0.05$.

** Significantly less than the control group, $p<0.01$

*** Significantly less than the control group, $p<0.001$

likely to have a larger imbalance in the vital blood parameters, than those opting for either any one or any two of the conventional modalities. In a prospective study by Dubray et al. [24], moderate anemia prior to treatment was associated with poor local-regional control and survival after curative radiation therapy alone to treat HNC. It is not known whether anemia itself has a detrimental effect on tumor cure with radiation therapy or whether the presence of anemia reflects the effects of other prognostic factors. [24]

Conclusion

This study shows that the prevalence of HNC is significantly high in and around Ahmedabad, Gujarat. Majority of HNCs are histologically squamous cell carcinomas affecting the age group 41–60 years with males outnumbering the females. These findings are indicative of the fact that HNC is a very common cancer in this part of the country and it requires prompt attention. However, interpretation of data from a single hospital has its clear limitations. The present data reflects our specific patient population reporting to the hospital and not the community as a whole. From the present cross sectional study, one can conclude that there is a tremendous lack of awareness among people regarding the risk factors (tobacco and smoking) mainly responsible for the spread of the disease. There is an urgent need for an appropriate education program to revert the present trend of preventable HNCs. Other similar studies conducted recently at Bombay and Allahabad Cancer Registries [12, 25–26] found a statistically decreasing trend in the overall age-adjusted incidence rates in males during the period of 1986 or 1990 to 2000, with a yearly decrease of 1.7%. This decrease was significant for men above the age group of 40, but for young adult men below the age of 40, there was no significant decrease, the level being stable. In females, the overall decreasing trend in the age adjusted incidence rates of oral cancers was not significant, but in the 40–59 age group, a significant decline was observed. They attributed these findings to a decrease in the usage of pan and tobacco in their target population.

We hope to achieve the same results in our population by education and early diagnosis of precancerous and cancerous lesions. A multicentric study is planned to map the information regarding prevalence, magnitude, pattern etc. of this malignancy so that proper strategies for long term disease control, early detection and treatment can be laid down. Properly structured site-specific data like this supplemented with research inputs, continued analysis of a new genetic alterations, along with their temporal sequencing during initiation, promotion and progression may augment the National Cancer Registry Program and allow to identify new diagnostic and prognostic factors, leading to more rational and efficient treatment.

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