



Incidence of Oral Complaints Following Radiotherapy for Treatment of Oral Cancer

Sindhu Priya Kuppusamy Sundara Murthy¹, Mahathi^{*2}, Suresh³

¹Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai - 77, Tamil Nadu, India

²Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai - 77, Tamil Nadu, India

³Department of Prosthodontics, Saveetha dental college and hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai - 77, Tamil Nadu, India

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ABSTRACT

Radiation therapy is an important component in management of oral cancer. As a result, various uninvolved structures like salivary glands, oral mucosa, dentition, and jaws receive significant doses of radiation. Radiotherapy for oral cancer typically involves total doses of 6,000–7,000 cGy, delivered in daily fractions over 6–7 weeks and is known to cause a number of oral complications. These include oral mucositis, oral pain, hyposalivation, increased risk of dental caries, reduced mouth opening, and osteoradionecrosis. The aim of the study is to evaluate and identify the incidence rates of oral complaints following radiotherapy for oral cancer. Data samples required for study were taken from hospital records. All the collected data were cross verified and compiled together in an excel sheet. Compiled data were statistically analysed with help of SPSS software. In this study, a total of 51 patients of oral cancer underwent radiotherapy as a part of their treatment regimen. Higher percentage of patients reported back with no oral complaints of 58.82%. With an increase in age group, more patients had oral complaints after radiotherapy treatment, with p value of 0.114. More males had oral complaints compared to female patients with p value of 0.424. Within the limitations, it is significant that the maximum number of patients who underwent radiotherapy returned without any oral complaints.



*Corresponding Author

Name: Mahathi
Phone:
Email: mahathin.sdc@saveetha.com

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INTRODUCTION

Radiotherapy- induced damage in oral mucosa is the result of deleterious effects of radiation, not just on the oral mucosa, but also on the adjacent salivary glands, bone, dentition (Alvarino-Martin and Sarrion-Perez, 2014; Jesudasan et al., 2015). It lowers the immediate and long-term quality of life and leads to serious clinical disorders (Newman and Takei, 2002; Kumar, 2017b).

Some of the acute complications of radiotherapy are nausea, vomiting, mucositis, xerostomia, loss of taste sensation, trismus, secondary infections, desquamation of the skin. Inflammation and redness are the first visible symptoms on the

skin (Cheng *et al.*, 2001; Christabel *et al.*, 2016).

As the mucosa has a lower resistance than the skin, these oral complications occur faster on the mucosa. However, due to the high turnover rate in the mucosa than on the skin, the inflammation recovers faster on mucosa than on the skin (Carl, 1993; Marimuthu *et al.*, 2018).

The major salivary glands receive around 20-30 Gy of radiation. The most common complication is xerostomia. Patients receiving radiation on both parotid glands are more prone to xerostomia (Vissnik and Jasma, 2003; Packiri *et al.*, 2017). Due to decrease in salivary flow, self-cleansing activity is reduced, leading to dental caries (White and Pharoah, 2003; Kumar, 2017a).

Other complications are injuries to blood vessels, reduction in the activity of osteoblasts and osteoclasts, increase in adipose tissue and fibrotic connective tissue, which makes the bone marrow hypoxic. Saliva contains a large number of antimicrobial agents, but the ionising radiation from the radiotherapy reduces the host defence mechanism of the saliva giving rise to candidiasis and dental caries (Little and Falace, 2013; Patil *et al.*, 2017).

At doses of 30-40 Gy, hyperaemia and oedema occur and if it is severe, there is epilation leading to desquamation that occurs at 45-60 Gy. Complete hair loss occurs at more than 55 Gy (Andrews and Griffiths, 2001; Rao and Kumar, 2018).

The focus of this study is to find out the incidence of oral complications after radiotherapy.

Previously our team had conducted numerous clinical trials (9-15) and lab animal studies (15-20) and in-vitro studies (20-23) over the past 5 years. Now we are focussing on epidemiological surveys. The idea for this study stemmed from the current interest in our community.

MATERIALS AND METHODS

All the data of patients who underwent radiotherapy as a treatment were taken for the study as a sample. The study setting was a university setting. Exclusion criteria was case sheets with incomplete data, patients who did not undergo radiotherapy treatments postoperatively, and those patients who did not come for follow up visit when called (Abhinav *et al.*, 2019; Rahman *et al.*, 2017).

Data was collected from case sheets of patients who reported during the months of October 2019 and March 2020 from the hospital record management system where all the records of patients regarding their medical and dental history and

treatment done are stored. Cross verification was done to avoid bias by another examiner (Kumar and Rahman, 2017; Patturaja and Pradeep, 2016). To avoid missing any data, photographic evaluation was done. Approval from the Institutional Ethical Committee was obtained before the start of the study. All the data will be covered by the following ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320.

All the relevant data were retrieved and tabulated in excel sheet. Later, it was statistically analysed by IBM SPSS statistics, using the Chi-Square test. Independent variables are radiotherapy treatment, age and gender and dependent variables are oral complaints.

RESULTS AND DISCUSSION

The study consisted of a total of 51 patients, among which 34 patients were males, and 17 patients were females. All the 51 patients had undergone radiotherapy as a treatment, among which 21 patients returned with oral complaints and 30 had no oral complaints. The percentage of patients with oral complaints is 41.18% and without oral complaints is 58.82% (Figure 1). 5.88% from 30-45, 13.73% from 46-60 and 21.57% from >60 age groups had oral complaints. 13.73% from 30-45, 13.73% from 46-60 and 31.37% from >60 age groups had no oral complaints (Figure 2). 27.45% of males had oral complaints and the rest 45.10% had no oral complaints. The number of females who returned with and without oral complaints was the same (13.73%) (Figure 3). Age group above 60 had the largest percentage of patients returning with oral complaints after radiotherapy as treatment.

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The percentage of patients with oral complaints is 41.18% and without oral complaints is 58.82% (Figure 1). X-axis represents the patients with and without oral complaints and Y-axis represents the percentage of the patients. From the graph, it is evident that the percentage of patients with oral complaints after radiotherapy is 41.18% (blue) and without oral complaints is 58.82% (red).

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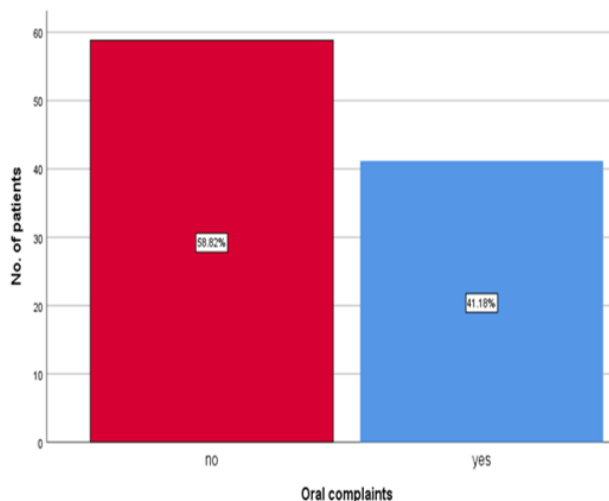


Figure 1: Bar graph represents the percentage of patients with and without oral complaints after radiotherapy as treatment

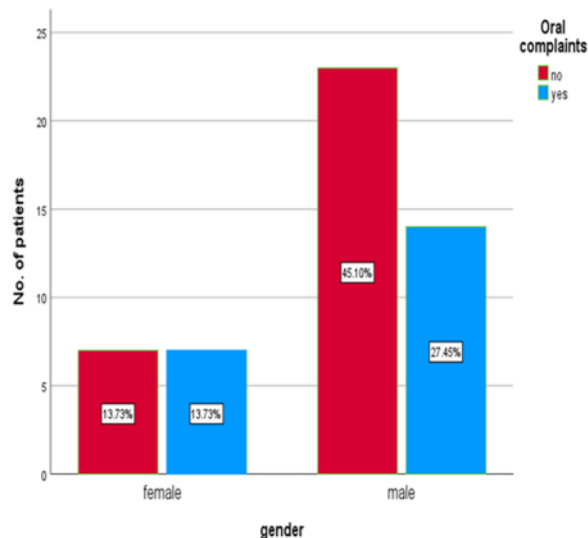


Figure 3: Bar graph represents the association between gender and presence or absence of oral complaints after radiotherapy

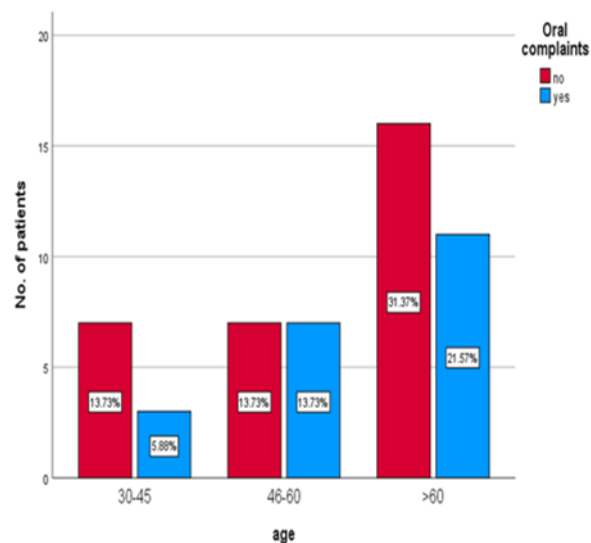


Figure 2: Bar graph represents the association between age and oral complaints after radiotherapy

axis represents the age groups of patients with and without oral complaints and Y-axis represents the percentage of patients with and without oral complaints. Majority of the patients who had complaints (21.57%) (blue) were above 60 years of age. Chi-square test was done and the association was found to be statistically significant. Pearson's Chi-square value: 0.114, DF:2, p value: 0.025(<0.05), proving with increase in age group, more patients had oral complaints after radiotherapy treatment.

27.45% of males had oral complaints and the rest 45.10% had no oral complaints. The number of females who returned with and without oral complaints was the same (13.73%) (Figure 3). X-axis

represents the gender of patients with and without oral complaints and Y-axis represents the percentage of patients with and without oral complaints. More males (45.10%) returned without any oral complaints (red) than females (13.73%). Chi-square test was done and the association was found to be statistically significant. Pearson's Chi-square value: 0.424, DF:2, p value: 0.025 (<0.05) proving that there is significant association between gender and absence of complaints after radiotherapy. Age group above 60 had the largest percentage of patients returning with oral complaints after radiotherapy as treatment.

In the present study, many patients did not report back with oral complaints following radiotherapy. In a study conducted by Taheri and Hashemi et al., one of the most prevalent oral complaints was xerostomia which severely affects the quality of life. This occurs due to the sensitivity of the parenchyma of the salivary gland. At the end of 2 weeks, all patients exhibited 100% xerostomia, according to the results of the study by Chung et al (Taheri et al., 2008; Hakineh et al., 2017).

In another study by Turner et al., mucositis was the most common and acute complication secondary to radiotherapy. Mucositis is considered as the erythema and ulceration of the oral mucosa. It occurs after a radiation dose of 10-20 Gy, due to direct destruction of cellular DNA in basal epithelial cells. It is usually accompanied by pain and burning sensation.

Oral ulcers are secondary complications to mucositis and xerostomia. In the study by Duncan et al. (2005), 29% of patients had oral ulcers during the

2nd week and 100% at the end of the session. This further increased secondary infections. Candidiasis is a common infection occurring after radiotherapy, 80% of patients get candidiasis according to [Saunders et al. \(2013\)](#); [Jain et al. \(2019\)](#). Because of all these symptoms, taste sensation can also be compromised, and in the study by Hakimesh and Soghra, 41.6% of patients reported with gustatory disturbances in the second week. Oral pain is a common complaint in this population, especially during and soon after Radiotherapy ([Bianchini et al., 2016](#)). During this period, oral mucositis is the largest contributor to oral pain, with patients typically needing systemic opioids to reduce pain. Another contributor to oral pain in this population, particularly before radiotherapy, is pain secondary to surgery, for patients whose tumours involve the oral cavity ([Ghavam, 2001](#); [Raber-Durlacher et al., 2010](#)).

Trismus can also occur in later stages, due to fibrosis and scarring of masticatory muscles and ligaments of TMJ. In a study by [Hashemipour \(2008\)](#), grade I of trismus occurred in 30.9%, grade II in 45.2% and grade III in 23.4%. In our study, the patients who returned with oral complaints had symptoms varying from mild to moderate but numbers were less than those without complaints differing from all the studies quoted earlier, maybe due to limited sample size. This study could be further improved by increasing the sample size and checking the symptoms of radiotherapy at regular intervals, to limit and prevent worsening of side effects of radiotherapy.

CONCLUSION

Radiotherapy is a common treatment for oral cancer, but it is associated with significant side effects. The purpose of this study was to evaluate the incidence of oral complaints the following radiotherapy to provide better prognosis and quality of life. To conclude, it is statistically significant that the majority of the cases had returned without oral complaints.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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