



## **Prevalence Of Mucositis And Candidal Carriage In Patients Undergoing Treatment For Head And Neck Cancers**

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***Abstract:***

*Aim: The present study is a pilot study which was carried out to evaluate the prevalence of mucositis and its grading in head and neck cancer patients undergoing chemotherapy, radiation therapy or combination. Also it evaluated the prevalence of candida colonisation and its species in cancer patients as opposed to healthy individuals.*

*Methodology: The pilot study consisted of 35 patients divided into three groups, Group A consisting of 15 oral cancer patients divided into 3 groups of 5 each undergoing chemotherapy, radiation therapy or a combination respectively. Group B consisting of 5 oral cancer patients who did not receive any treatment till then. . Group C consisting of 15 healthy patients without any oral lesions. The patients were then assessed for the prevalence of oral mucositis and graded according to WHO criteria .A oral swab was taken from the labial and buccal vestibule of each of the 35 patients including the two control groups*

*Results: 100 percent patient receiving radiotherapy showed xerostomia and mucositis. Candidal carriage increased with the increase in xerostomia. Candida albicans was the species found in all the samples..*

*Conclusion: The study emphasizes the need to investigate and clarify the role of antifungal and antiviral prophylaxis in the severity of oral mucositis, pain and xerostomia in head and neck cancer patients who receive RT with or without chemotherapy.*

***Key words:*** radiation, chemotherapy, mucositis, candida albicans.

### **1.Introduction**

Oral mucositis, also called stomatitis, is a common, debilitating complication of cancer chemo therapy and radiotherapy, occurring in about 40% of patients.<sup>1</sup> Mucositis is not an infectious process per se, but fungal, viral, and/or bacterial infections may co-exist with the mucositis and further exacerbate pain<sup>2</sup>. Candida infection is the most common oral fungal infection in myelosuppressed patients during and after radiotherapy (Heimdahl, 1999, Jansma, 1991, Lunn, 1998, Schubert et al., 1999). Reports show that 57% to 89% of patients with cancer have positive cultures for candida species Wilkes, 1998).<sup>3</sup>

Although candidiasis can develop secondary to malignancy, possibly due to impaired antifungal host defence due to mucosal damage, there is increasing evidence that Candida infection itself has carcinogenic properties and several reports have been published of increased incidence of oral and oesophageal squamous cell carcinoma in patients with chronic candidiasis. One important mechanism that has been proposed to underlie this phenomenon is the catalytic activity of Candida, which facilitates the production of carcinogenic nitrosamines such as nitroso-N-methylbenzylamine (NBMA) from their precursors.<sup>4</sup>

### **2.AIM**

The present study is a pilot study which was carried out to evaluate the prevalence of mucositis and its grading in head and neck cancer patients undergoing chemotherapy, radiation therapy or combination. Also it evaluated the prevalence of candida colonisation and its species in cancer patients as opposed to healthy individuals.

### **3.Protocol For Patient Selection**

Patient undergoing various treatment protocols for head and neck cancers were selected for the study. Only patients above 18 yrs of age willing to participate in the study were included and asked to sign an informed consent regarding the same. Ethical clearance was taken from Bharat Sevashram Sangh where the study was performed for cancer patients. Patients were divided into three groups in a number of 5 each receiving only chemotherapy, only radiation therapy or combination of both respectively. Criteria for selection of patients under chemotherapy included a combination of drug 5 fluorouracil plus cisplatin. Patient who completed atleast 3-4 cycles of chemotherapy were included. Criteria for the selection of patient under radiotherapy only, included patients who received a cumulative dose of 50-70 GY in a fractionated dose of atleast 2 Gy 5 times a

week for atleast 3wks. In all these patients the oral cavity and salivary glands were included in the field of radiation. For patients under combined therapy, concurrent chemotherapy of atleast 3 wks duration was considered. For determination of candida prevalence, two control groups were included. The first control group consisted of 5 patients with oral cancers who never underwent any therapy for the cancer and the second control group consisted of 15 healthy patients with no oral lesions.

#### **4. Materials And Methods**

The pilot study consisted of 35 patients divided into three groups, Group A consisting of 15 oral cancer patients divided into 3 groups of 5 each undergoing chemotherapy, radiation therapy or a combination respectively. Group B consisting of 5 oral cancer patients who did not receive any treatment till then. Group C consisting of 15 healthy patients without any oral lesions. Group A patients were conveniently selected for the study reporting to Bharat Sevashram Sangh, Navi Mumbai undergoing treatment for oral cancer. Complete medical and dental history was obtained including accompanying systemic conditions, ongoing medication, and prescribed therapy for their neoplastic lesion. The patients were then assessed for the prevalence of oral mucositis and graded according to WHO criteria. Also a detailed case history was taken and patients were assessed for xerostomia, change of taste, loss of weight, nausea, Temporomandibular joint disorders, periodontal problems, stress levels etc. A oral swab was taken from the labial and buccal vestibule of each of the 35 patients including the two control groups. For identification by light microscopy, a swab of the oral cavity was placed on a microscope slide. A single drop of 10% potassium hydroxide (KOH) solution was then added to the specimen. The KOH left the Candida cells intact, permitting visualization of pseudohyphae and budding yeast cells typical of many Candida species. For the culturing method, a sterile swab was used to take the saliva sample from vestibular area of labial and buccal mucosa. The swab was then streaked on a culture medium. The culture was incubated at 37°C for several days, to allow development of yeast or bacterial colonies. The characteristics (such as morphology and colour) of the colonies allowed initial diagnosis of the organism.

#### **5. Result**

In Group A, three out of five patients receiving only chemotherapy showed mucositis. Two were grade 1 and one was grade 2. One out of five was positive for candida i.e. 20%.

In patients receiving only radiation therapy, all the five patients showed mucositis. Two were grade1, two were grade2 and one was grade3. Three out of five patients were positive for candida i.e. around 60 percent. In patients receiving a combination of both, four out of five patients showed mucositis. Two were grade 1, one was grade2 and one was grade3. Three out of five patients were positive for candida prevalence i.e. around 60 percent. In control groups, in group B, one out of five patients was positive for candida. In group C one out of fifteen patients was positive for candida. Candida albicans was the species found in all the samples.

### 6.Statistical Analysis

The results were subjected to statistical analysis using cross tabulation and chi square test method as shown below. The mean age of study group was 46.66yrs.

	Subgroup		Total
Habits	RADIATION	COMBINATION OF CHEMO AND RADIATION	
Smoking	66.7%	33.3%	50.0%
Tobacco	33.3%		16.7%
Smoking and Pan		66.7%	33.3%

Table 1

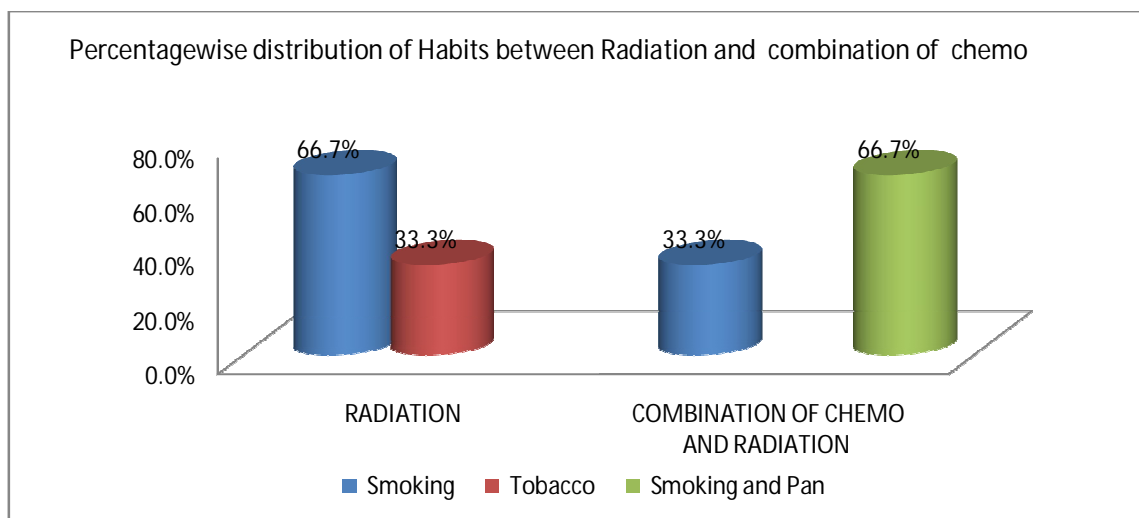


Figure 1

	Subgroup			Total
SORENESS	CHEMOTHERAPY	RADIATION	COMBINATION OF CHEMO AND RADIATION	
1 Yes	40.0%	100.0%	80.0%	73.3%
2 No	60.0%		20.0%	26.7%

Table 2

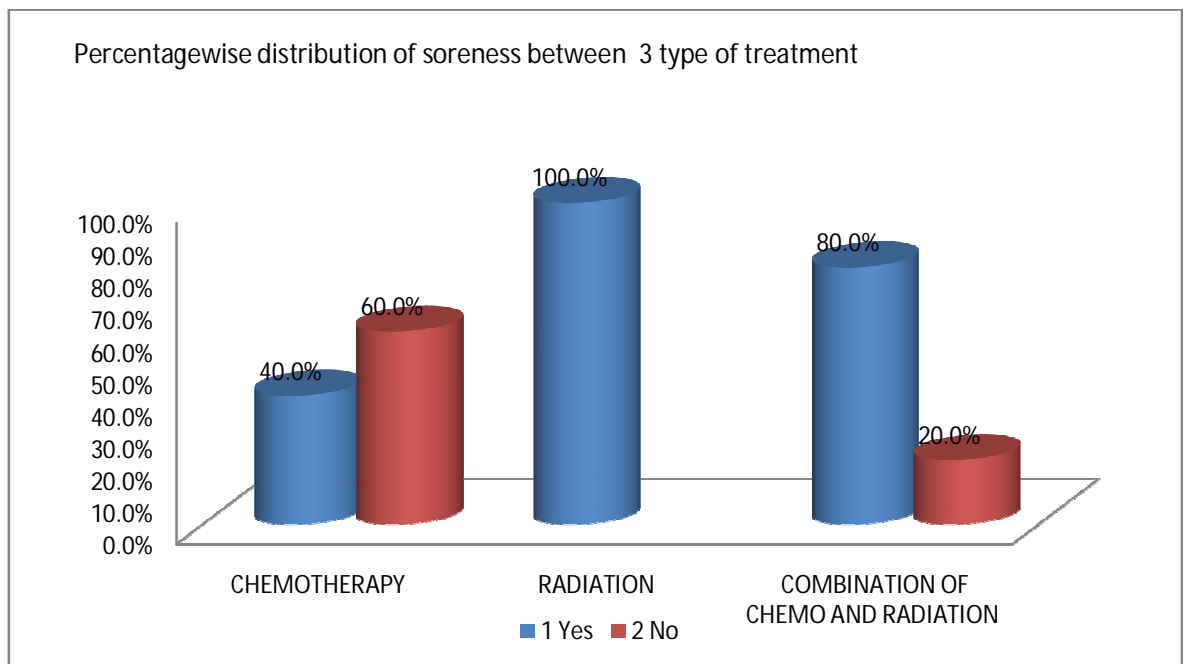


Figure 2

	Subgroup			Total
Burning_Erythema	Chemotherapy	Radiation	Combination Of Chemo And Radiation	
Yes	60.0%	100.0%	80.0%	73.3%
No	40.0%		20.0%	26.7%

Table 3

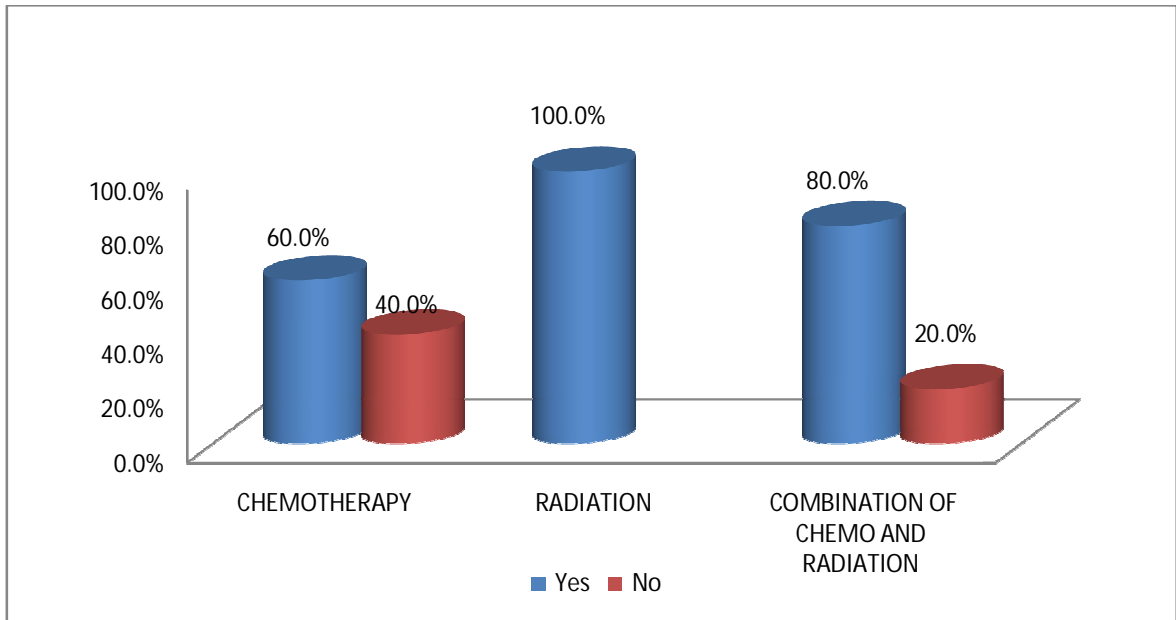


Figure 3

	Subgroup			Total
Difficulty Eating Solid Food	Chemotherapy	Radiation	Combination Of Chemo And Radiation	
Yes		20.0%	20.0%	13.3 %
No	100.0%	80.0%	80.0%	86.7 %

Table 4

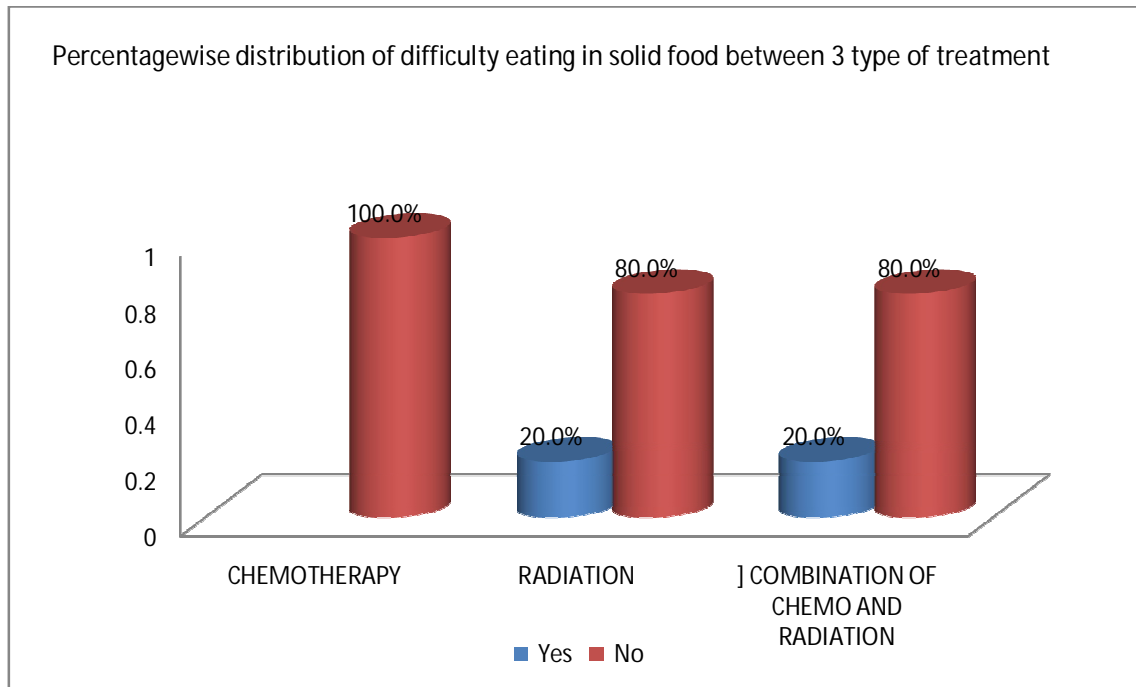


Figure 4

	Subgroup			Total
DRYNESS	CHEMOTHERAPY	RADIATION	COMBINATION OF CHEMO AND RADIATION	
Yes	40.0%	100.0%	80.0%	73.3%
No	60.0%	0.0%	20.0%	26.7%

Table 5

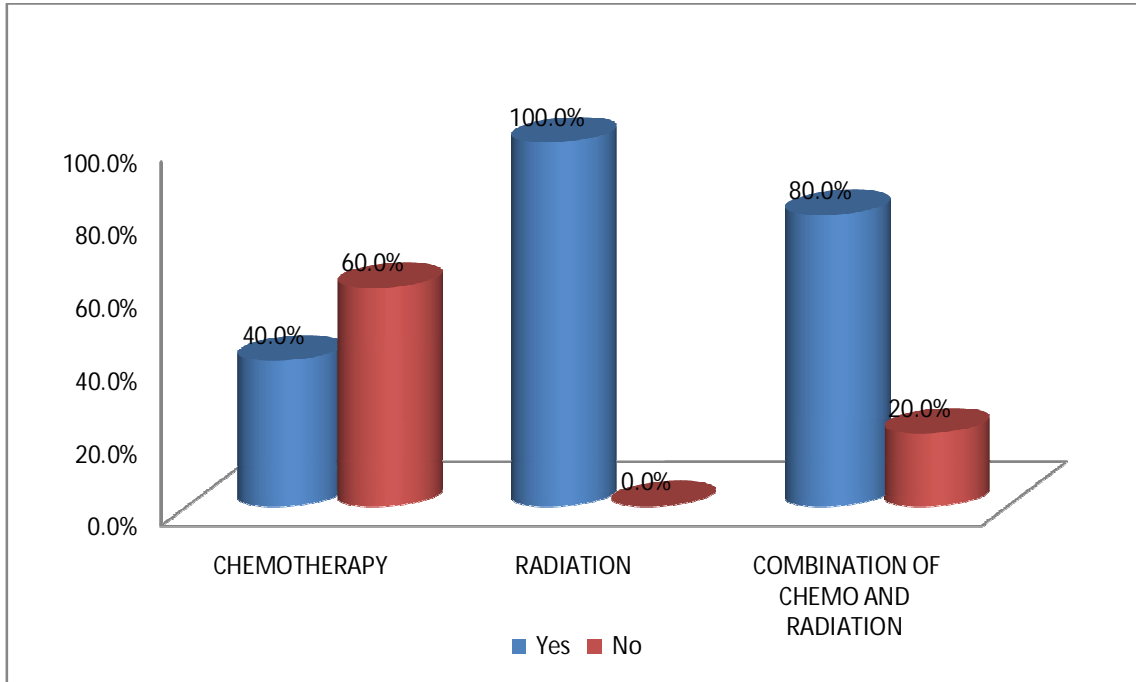


Figure 5

	Subgroup			Total
DYSGEUSIA	CHEMOTHERAPY	RADIATION	COMBINATION OF CHEMO AND RADIATION	
Yes	100.0%	100.0%	100.0%	100.0%

Table 6



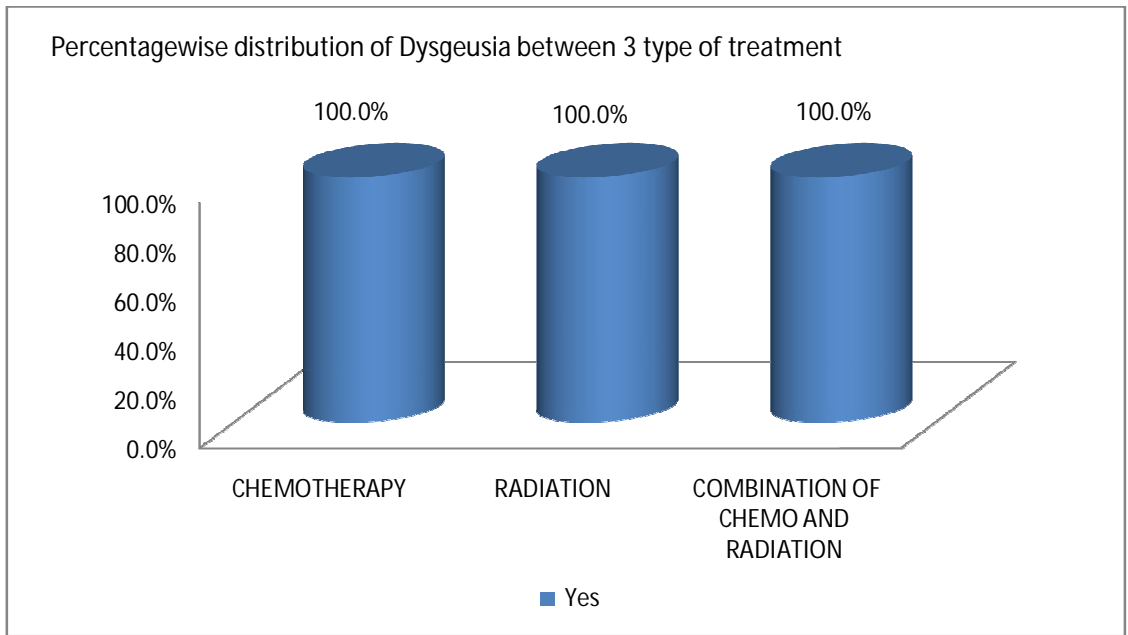


Figure 6

	Subgroup		
Mucositis_Grading	Chemotherapy	Radiation	Combination Of Chemo And Radiation
Grade 0	40.0%		20.0%
Grade 1	40.0%	40.0%	40.0%
Grade 2	20.0%	40.0%	20.0%
Grade 3		20.0%	20.0%

Table 7

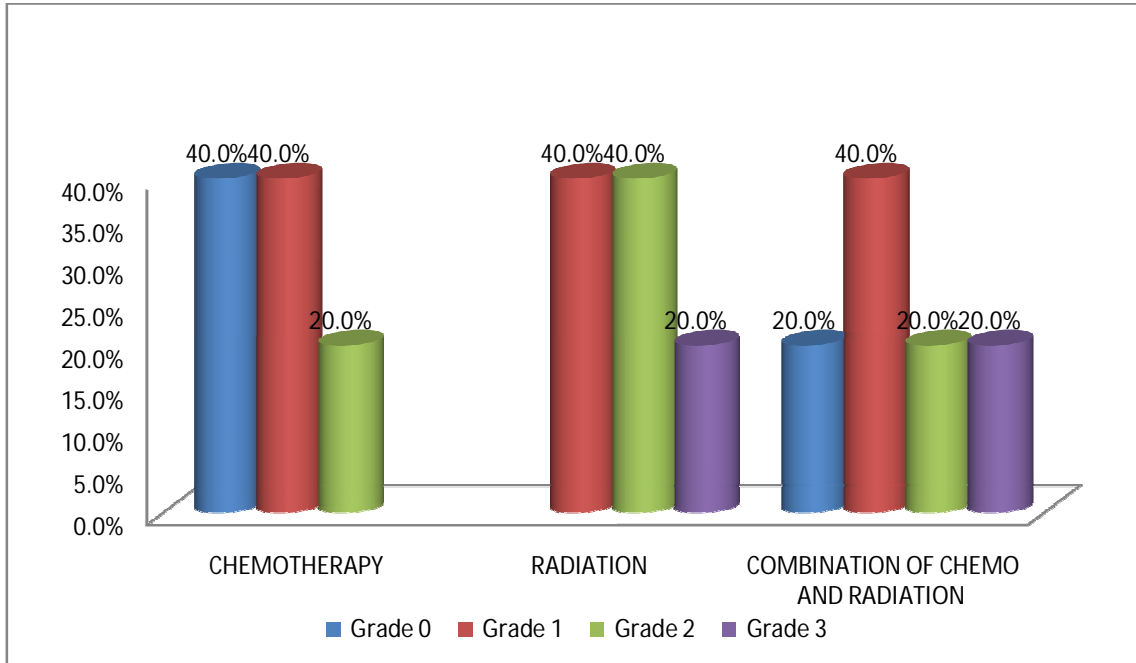


Figure 7

	Group		
CANDIDA_PREVALENCE	A Group	B Group	3 C Group
P	46.7%	20.0%	6.6%
N	53.3%	80.0%	93.4%

Table 8

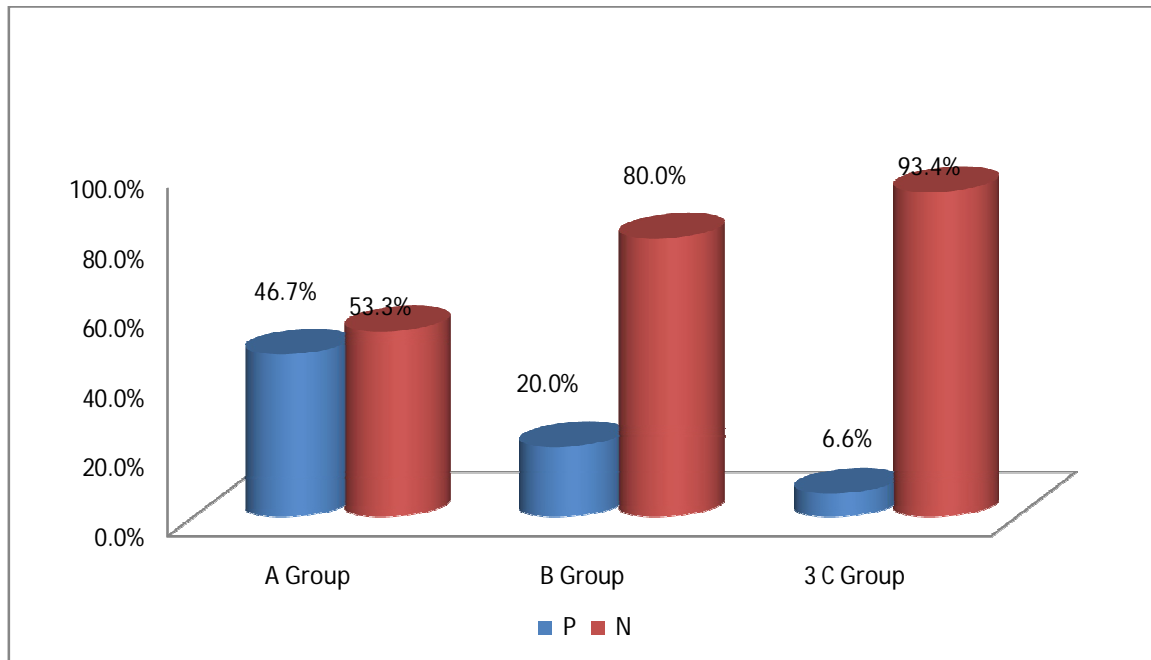


Figure 8

### 7. Other Findings

Overall incidence of oral mucositis was 85 %. High Stress was seen in 30% of patients and marked with visual analogue scale. Nausea was reported in 70 % with loss of body weight in 40 % of patients. Periodontitis was seen in 46.66% and mainly in group A2 and group A3.

Prevalence of oral candida increased with increase in grade of mucositis.

### 8. Discussion

External-beam radiation is a standard treatment modality for head and neck tumors, and the salivary glands are often within the field of radiation. Doses of  $\geq 50$  Gy will result in permanent salivary gland damage and symptoms of oral dryness. Acute detrimental effects on salivary function can be observed within a week after treatment is instituted at doses of approximately 2 Gy daily and patients will present with voice complaints as a result of oral dryness by the end of the second week. Typically, at doses  $> 50$  Gy, salivary dysfunction is severe and permanent.<sup>5</sup>

Our study also showed similar findings where all 100 percent patients receiving radiotherapy and 80 percent receiving combination showed dryness. Erythema was also significant in these patients. Loss of taste was also seen in 100 percent of the patients in study group. Mucositis was significant in patients with radiotherapy and combination

group as compared to only chemotherapy. The candidal carriage increased with the increase in xerostomia. The increase in candidal colonization in radiotherapy patient can be explained on the basis of, reduced salivary flow rates. Xerostomia is known to increase the susceptibility of the oral mucosa to colonization by candida species as the flushing action of the saliva removes the unattached or poorly attached Candida from the oral cavity. Qualitative and quantitative changes in the saliva following radiation treatments can also lead to reduction in the antifungal activity of saliva, which can also lead to increased candidal colonization<sup>6</sup> Candida albicans was the species derived from all the samples in our study.

### **9. Conclusion**

In conclusion, the significant reduction of the prevalence of severe oral mucositis, pain and xerostomia, during the RT, after the treatment and prevention of fungal and viral infections, denotes an important role of candidiasis in the severity of these complications during head and neck radiotherapy, with or without chemotherapy. These results conclusively suggest that radiation and chemotherapy definitely increases frequency of occurrence of candida prevalence. Although the causal role of a single parameter is not clear, persistently elevated Candida colonization should be taken into account therapeutically<sup>7</sup>. Further research is needed to explore predictors of oral complications like candida due to limited sample size. The present study is important because it presents the data outside the context of a clinical trial, it agrees with previous studies and it further emphasizes the need to investigate and clarify the role of antifungal and antiviral prophylaxis in the severity of oral mucositis, pain and xerostomia in head and neck cancer patients who receive RT with or without chemotherapy.<sup>8</sup>

**10.Reference**

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