

# **CHAPTER -5**

## **DISCUSSION**

## **5. Discussion**

The Present randomized controlled trial was conducted on 149 participants scheduled to receive radiotherapy in the region of the oral cavity. Out of these 111 completed the study and were analyzed.

### **5.1 Baseline characteristic data:**

#### **5.1.1 Gender**

The 86.48 % of participants were male while 13.51% of females contributed to the cancer load in the present study. Our results are similar to GLOBOCAN 2020 India fact sheet where the most common cancer in India is oral cancer amongst males.<sup>2</sup> Similar trend was also seen amongst the four-intervention group under trial. (Figure-2)

#### **5.1.2 Age**

In our study, the incidence of oral cancer increased with the progression of age peaking highest in the 4-5<sup>th</sup> decade of life with a mean age of  $49.11 \pm 11.36$  years.<sup>27</sup> Similar results were reported by Sharma et al in their summary of 29 clinical registries from various parts of India. They reported the highest incidence in the 6-7<sup>th</sup> decade for the overall population and 5-6<sup>th</sup> decade in the north region of India. (Table 1, Figure 1)

### **5.1.3 Site of cancer**

72% of participants had a diagnosis of oral cancer while 31 participants were diagnosed with cancer in the area close to the oral cavity including supraglottis, oropharynx, tonsils, parotid, etc. which received radiation in the region of the oral cavity. Among oral cancer, buccal carcinoma and tongue carcinoma contributed to the highest load followed by carcinoma of the alveolus, gingiva buccal, and retro molar trigone. These patients were included as the oral cavity came in the field of radiation affecting the major salivary glands.

### **5.1.4 Radiation Type and Dose**

110 participants in our study received radiotherapy by the 3DCRT technique. Felice et al. in their meta-analysis reported that radiation exposure to the organ at risk for 3DCRT is higher than the IGRT. It was also observed that IGRT has less xerostomia compared to 3DCRT.<sup>91</sup>

64.8% of the participants received a radiation dose of 60 Gy and 35.13% received a dose of 66 Gy. Walker et al. reported that when teeth are irritated with 60 Gy or more they have a ten-time higher risk of direct radiation damage as compared to those not irradiated. While with a radiation range of 30-60 Gy exposure the risk of direct tooth damage is 2-3 times.<sup>92</sup> In our study as all patients receive 3DCRT radiotherapy, both jaws received around 60 Gy of radiation and hence were are higher risk of decay. Due to the effective fluoride regime under SOCP, the DMFT scores in the present study had moderate increment, despite being irradiated by the 3DCRT technique, which has higher side effects including xerostomia.<sup>91</sup>

Hey et al. reported that the parotid gland when receiving radiation more than 26.5-33.9 Gy resulted in a generalized carious lesion as compared to minimal carious lesion when the parotid spared technique with 20 Gy of radiation was used.<sup>91</sup> In our study parotids received radiation in the higher range due to the non-sparing nature of 3DCRT and hence were at higher risk of xerostomia, despite this the increment in DMFT scores being in the low range.

### **5.1.5 Cancer Treatment modality**

72.0 % of participants in our study received surgery as primary treatment followed by radiotherapy. All patients received radiotherapy and 72 % of participants receive concurrent CT with radiotherapy. (Figure-7)

Pinna et al in their systematic review reported that patients who receive chemotherapy along with radiotherapy have worse scores for xerostomia and in turn increased risk for radiation caries.<sup>93</sup> It is seen that patients who get combined therapy for head and neck cancer compared to single-modality treatment have worse OHIP-14 scores.<sup>47</sup> In our study all of our participants received combination therapy including either surgery with chemo-radiotherapy or chemotherapy followed by radiotherapy. Hence they were at higher risk of developing poor oral health-related quality of life scores.

### **5.1.6 Histopathology**

More than ninety percent carcinoma of in oral and head & neck regions are squamous cell carcinoma. Similar findings were seen in the present trial with

93.69% of the participants with a diagnosis of squamous cell carcinoma.<sup>94</sup> Majority of squamous cell carcinoma were moderately differentiated. The remaining 6.31 % of carcinoma included mucoepidermoid, adenocarcinoma, and salivary gland carcinoma.

### **5.1.7 Tobacco, Smoking, and Alcohol**

In the present study, around 54 % of the participants were consuming some form of tobacco either smokeless or smoked, while alcohol consumption was around 28 %. Tobacco use either in smoke or smokeless form and alcohol combustion in our study was similar to the data reported from NFHS-4 and GATS-2 .<sup>30,34</sup>

Tobacco remains one of the most common etiological factors for oral cancer as per the addiction history of the participants. This finding is in accordance with the report that India was the second highest producer and third highest consumer of tobacco as per the WHO report in 2008.<sup>95</sup>The Million death study has reported that one million death in India has occurred due to tobacco.<sup>29</sup>Hence it becomes essential to identify these at-risk individuals and provide tobacco cessation counseling. For this reason, tobacco cessation counseling and reinforcement at every recall visit are an integral part of supportive oral care protocol (SOCP).<sup>10</sup>

### **5.1.8 Oral hygiene measures, Education, and Socioeconomic Status.**

Oral hygiene is a very important parameter for the overall health of the patient. Brushing is advised twice daily for maintenance of oral hygiene as per the recommendation of the American dental association and the US surgeon general.

Except for one all participants in the present trial were brushing at least once daily with 79.2 % using a toothbrush and only 19.8 % using a finger or a medicated stick for oral care. Similar results were reported by Oberoi et al. who also reported 79.2 % use toothbrushes for oral care.<sup>96</sup> Similarly Kapoor et al., Freire et al., and Jain et al. reported 90.3%, 97.6%, and 94.4 % of participants respectively in their study used toothbrushes to maintain oral hygiene.<sup>97-99</sup>

In general, nearly all participants of the study were aware of oral hygiene measures and were utilizing aids to maintain oral hygiene. This could be attributed to the education and socioeconomic status of the participants. 82.88 % of the participants were educated and 93.69% were earning at least 60 thousand annually. Oberoi et al. reported similar findings and Paula et al. concluded that education and good socioeconomic status have a positive effect on oral health.<sup>96, 100</sup>

Maupome et al. also reported similar findings and concluded that good financial status had a better understanding and following oral hygiene instructions and maintaining good oral health.<sup>101</sup> Olusile et al. in their study found that patients with good education levels have a higher incidence of using a toothbrush and have a good awareness of maintaining oral hygiene.<sup>102</sup>

## **5.2 Dental treatment needs and their impact**

### **5.2.1 Dental disease and Treatment burden**

Chronic generalized Periodontitis and poor oral hygiene had been documented by Komlos et al. and Moraes et al. in their case-control studies as risk

factors for the development of oral cancer.<sup>6,37</sup> Similarly Javed et al. and Gopinath et al. in their systemic review and meta-analysis have reported it to be an independent and associated factor for increased risk of oral cancer.<sup>7,8</sup> Poor oral hygiene in these patients can be attributed due to many causes such as general lack of awareness, poor oral hygiene practices, and low socioeconomic status.

Due to this poor oral health, there is an increased indication of extraction, restoration, and root canal treatment needs. Similar findings were found in the present study, participants had a higher dental disease burden, 44 % had tooth at least one tooth, which decayed beyond restoration and was extracted. Around 80.18% of participants received restoration in at least one tooth. Root canal treatment was limited to 18 % of participants who underwent root canal treatment on at least one tooth. (Table 7)

### **5.2.2 Trismus effect on Oro-dental care**

The inability to maintain oral hygiene in patients is either due to cancerous growth in the oral cavity or due to trismus induced by disease progression. The average mouth opening at baseline for all the participants was  $30.33 \pm 9.68$  mm measured at an inter-incisal distance measured by a digital vernier caliper. In the present study, all the participants had poor oral hygiene status despite a history of brushing at least once with a toothbrush and toothpaste. 75.7 % of participants in the present population had mouth opening of more than 20 mm. The minimal necessary inter-incisal opening necessary to undergo any dental prophylaxis as per our clinical experience during the trial was 20 millimeters. 24.3 % of the participants at baseline

had mouth opening less than 20 millimeters. This made it difficult for adequate oral hygiene procedures to be carried out efficiently.

Participants were divided into two groups at baseline, one with insufficient opening for oral care and another with opening sufficient for adequate oral care. DMFT scores were not statistically different among insufficient and sufficient mouth opening groups at baseline. The mean difference between the two groups was 0.47 points. This shows that DMFT scores did not depend on mouth opening.

### **5.2.3 OHIP-14 scores**

Mean and SD of  $20.67 \pm 9.54$  for OHIP-14 score was seen in Participants with insufficient mouth opening group. While for sufficient mouth opening group OHIP-14 scores of Mean and SD was  $12.87 \pm 9.89$  at baseline. There was on an average eight-unit reduction in OHIP-14 scores which was statistically highly significant with a p-value of  $<0.001$ . Similar results were reported by Gondivkar et al. in their cross-sectional study of the effect of trismus on oral health-related quality of life score OHIP -14.<sup>103</sup>

Similar findings were reported by Pauli et al., lee et al., Wetzels et al., and Steiner et al. all reported that trismus in head and neck cancer is a definitive and independent risk factor for worsening oral health-related quality of life score. They recommended that trismus should be addressed by appropriate preventive and therapeutic oral care measures to stabilize and improve its progression in head and neck cancer patients.<sup>104-107</sup>



#### **5.2.4 Economic burden due to Oro-dental care (SOCP)**

The economic burden due to SOCP was also assessed to see the practicality and feasibility in a resource-limited setting population. It was observed that the majority of the participants across all intervention groups had to spend 10-20 thousand rupees annually on oral care from the time of enrollment in SOCP to the end of cancer treatment. A majority of patients in our study receive combination therapy, the treatment cost ranged from 1.5 - 2 lakhs. On this estimate oral supportive care was around 10 percent of the total cost of cancer treatment. This oral care cost is divided over a period of one year. This cost was further reduced for the coming years, as just maintenance was needed. (Figure-8)

Due to the inclusion of SOCP in our randomized clinical trial, there was not a single extraction needed and no sign of osteoradionecrosis (ORN) was seen. Also, it was seen that there were low OHIP-14 scores and low DMFT scores at one-year recall. Thus as per our results from the present trial we recommend that SOCP is an economical, effective oral supportive protocol that is ideal for a resource-limited setting like our population. This improves the quality of life without putting an undue financial burden on the participants. SOCP is recommended as an essential care protocol for all oral and head & neck cancer patients to be enrolled at the time of diagnosis of cancer till lifelong follow-up to improve their QOL.

#### **5.3 Validation of SOCP**

Validation of SOCP was done with fifteen dental oncology experts with inputs from six oncology experts. The protocol was accepted on 99.04% of the components, the

validation experts were selected across India, who were actively providing oral-dental rehabilitation care to head and neck cancer patients. The protocol was designed focusing on the specific needs of our population and their oral disease burden and published after validation.

Our study shows that patients who are enrolled in SOCP improve their dental and quality of life parameters significantly over the one-year duration of the study. The inter-rater agreement was very high ranging from 0.9 to 1 amongst the reviewers. To the best of our knowledge, there is no other structured supportive oral care for head and neck cancer patients in the Indian population, which enrolled them at the point of diagnosis of cancer till lifelong recall. (Table 49,50)

Based on the finding of our study we recommend the integration of SOCP in head and neck cancer patients in oncology treatment. And dental oncology experts as an integral part of the multidisciplinary oncology care team.

#### **5.4 DMFT index and Fluoride**

Oral hygiene is compromised in patients with oral cancer. This increases the dental disease burden and compromised normal oral functions causing a modification of diet. Patients with cancerous growth are not able to eat more fibrous food and modify their diet with easy to chew, calorie-dense carbohydrates. This shift in the diet of high complex carbohydrates results in an increased incidence of dental caries.<sup>108</sup> Many patients with carcinoma of buccal mucosa; retromolar trigone and gingivo-buccal sulcus also develop trismus. Carbohydrate loaded diet, trismus,

low awareness for oral care and previous coexisting periodontal disease make this patient a prime candidate for increased dental disease.<sup>51</sup>

Dental caries constitute the most common disease burden in patients diagnosed with head and neck cancer including oral cancer. Radiation decay is a specific type of decay that is characteristic in patients who have received radiotherapy as a part of cancer treatment in the head and neck region.<sup>21</sup>

#### **5.4.1 DT scores**

The present study reported a high score for decayed teeth (DT) score at baseline for all four-intervention groups. As part of SOCP, all the carious teeth at baseline were identified and restorative procedures were initiated to remove all carious lesions. Fluoride releasing restorative materials such as glass ionomer restoration resin and modified glass ionomer restoration were used for the restoration of the tooth. It is reported that restoration with fluoride release is efficient in reducing secondary decay in patients at high risk for caries.<sup>82</sup>

As all the carious lesions were restored before starting radiotherapy, participants across all four groups had no active lesion at one-month recall. Only a few new carious lesions developed over a period of one year. This was documented and restored at the recall visits of one month, six months, and one year. It was seen that between all four groups the type of fluoride did not significantly affect new carious lesion development. Present findings are similar to the recommendation of the American dental association which has shown that types of fluoride i.e. fluoride gel and vanish have similar cariostatic properties and both are recommended for

caries prevention.<sup>22</sup>These recommendations were based on data from healthy adolescents and children. These findings were extrapolated to an adult population who has received radiotherapy considering them at high risk for decay. Our study finding thus validates these recommendations, as the present randomized controlled trial was conducted on patients with a diagnosis of oral and head & neck carcinoma post-radiotherapy. Randomized control trial evidence is the highest level of evidence in evidence-based medicine and hence used to formulate strong recommendations along with meta-analysis and systematic review of many such RCTs.<sup>109</sup>

To the best of our knowledge, the present study is the only randomized controlled trial that evaluated the role of fluoride type and frequency on the prevention of carious lesion in a population one-year post CT-RT for patients with Oral and Head & Neck carcinoma. There was no significant difference observed between the two frequencies of fluoride application suggesting both monthly and quarterly application of fluoride are equally beneficial for caries prevention. Hence a quarterly application frequency can be adopted for better compliance. On the contrary monthly application frequency, patients had the advantage of more frequent oral hygiene reinforcement.

Though the frequency of fluoride application did not differ significantly but based on clinical judgment monthly application for the first year post-radiotherapy provided better rehabilitation for oral care. During the first year, xerostomia sets in, and a strict oral care protocol with frequent reinforcement at recall visits helps in forming life long habit of self-oral care regime. Kumar et al. also in their clinical

guideline reported that most of the tooth destruction takes place in the first year post-radiotherapy and emphasized a structural protocol for dental tissue damage control.<sup>65</sup> As there are no established guidelines for fluoride applications specific to the patient with Oral carcinoma post-radiotherapy, we recommend monthly fluoride application for the first year post-radiotherapy.

After completing the first year post-radiotherapy, quarterly application of fluoride should be done lifelong. These all should be supplemented with fluorinated toothpaste and fluoride mouth rinses to be used twice daily as included in our SOCP.

Based on clinical experience from the trial, for patients with insufficient mouth opening (less than 20 mm), a monthly application of varnish is recommended. These patients require enhanced care, as oral hygiene aids are not efficient due to trismus. A sustained releasing varnish is easy to apply and provides a longer cover against decay in such patients.

DT scores at baseline, one month, six months and one year were statistically significant in all four-intervention groups. The DT scores reported a minimal increase from one-month to one-year recall. These values were calculated by subtracting one-month DT sores from one-year scores. For this duration amongst AV, AG, BV, and BG groups the increment was 0.29, 0.15, 0.61, and 0.38 respectively. There was a major reduction in DT scores from baseline to one-month recall, the same method was used to calculate this reduction by subtracting baseline values with one-month DT scores. Mean DT scores decreased for this duration

amongst AV, AG, BV, and BG groups and were 1.11, 1.19, 1.89, and 0.59 respectively. After Bonferroni correction reduction in DT scores were significant with  $p < 0.05$ , for AG, BV, and BG group between one-month to six-months recall. (Table 11,13,15)

The decay load seen at baseline was due to poor oral hygiene. The sudden and significant decrease was due to active restorative treatment of carious lesions with glass ionomer restoration as per SOCP. This significant decrease in DT score at the first month of recall and thereafter a low significant increment shows the effectiveness of SOCP and fluoride intervention respectively.

The new carious teeth progression was very low, but significant only between one month and six months for the monthly gel application group and quarterly gel and varnish application group. Comparing baseline to year recall and six-month to year recall for DT scores the caries increment was not statistically significant. This shows that long-term application of fluoride prevented the development of new carious lesions and fluoride application is effective in stopping the progression of new carious lesions.

#### **5.4.2 MT scores**

MT scores depict the past dental disease burden in patients, missing teeth that are lost due to decay are considered while calculating this score. The mean and standard deviation at baseline scores for missing teeth ranged from  $1.59 \pm 2.14$  to  $2.04 \pm 2.14$ , on average the interquartile range for missing teeth was from 0 to 4 teeth in four intervention groups.

MT scores were constant for all recall visits across all four-intervention groups. This was due to the SOCP effectiveness, as no tooth was decayed to the extent, which would indicate its extraction. SOCP does not allow for the extraction of the tooth due to the risk of osteoradionecrosis, which is a known complication in irradiated jaws. Osteoradionecrosis is most commonly seen in the mandible as compared to the maxilla due presence of cortical bone as compared to the cancellous bone of the maxilla. Patients, who received the 3DCRT technique for radiation therapy, have higher doses in organ at-risk, compared to those who have been treated with the IGRT technique of radiotherapy.

#### **5.4.3 FT scores**

FT scores depict the previous dental disease burden along with MT scores. It also represents the restorative status of the patients, awareness, and ability to afford dental treatment. The FT showed a statistically significant rise from baseline to one-year follow-up. As per SOCP, all carious lesions were identified at baseline and were restored with glass ionomer reinforced restorations hence the FT scores were higher just at a one-month recall visit. This sudden increase was due to the restoration of the entire previous carious lesions. The values of FT scores further increased at a constant rate from one-month recall to six months and one year. This low rate of increase shows that the active lesions were identified and restored at the recall visit to make sure the decay does not progress resulting in the extraction of teeth and thus risk of developing osteoradionecrosis.

FT scores when analyzed for inter-group comparison showed that there was a statistically significant difference at a six-month recall visit for restored teeth. Between the quarterly gel application group (BG) and quarterly varnish application group (BV) a significant difference was observed with a p-value of 0.038. The mean and standard deviation for BV and BG intervention groups were  $2.04 \pm 2.27$  and  $0.79 \pm 1.17$  respectively. This shows that participants in the quarterly fluoride varnish group had statistically significantly higher scores for filled teeth compared to the quarterly fluoride gel group at the six-month recall visit. (Table 26)

Within-group comparison for FT scores at four-time intervals was seen, it was observed that baseline to one-year increase in FT scores was statistically highly significant with a p-value of  $<0.001$  across all groups. (Table 18,20,22,24).

The highly significant increase in FT scores one year from baseline shows that the patients have received dental treatment to control the dental disease. It also acts as an indicator of patient awareness of oral health care and acceptance of our protocol.

#### **5.4.4 DMFT scores**

DMFT scores are considered a valid tool to assess the dental disease burden in a population. Mean and standard deviation scores for DMFT were calculated by taking the average of the four intervention group DMFT scores at baseline to see the dental disease burden in these patients. This average was  $3.51 \pm 3.36$  which was similar to a retrospective study in the Indian population by Dholam et al. who reported DMFT scores as  $4.12 \pm 4.35$ .<sup>110</sup>



DMFT scores were taken at recall visits at baseline, one month, six months, and one year for each group. While comparing these scores at four intervals there was no statistically significant difference between the groups. These results show that fluoride the type and the frequency of application did not affect DMFT score in the four-intervention group.

The effect of fluoride on all the intervention groups was seen, it was observed that DMFT score significantly increased from baseline to one-year follow-up. A significant difference in DMFT scores increment was seen in baseline to six months, baseline to one year, and one-month to one-year recall in the present study. Though the results were significant the increase in average DMFT scores at one year recall was limited to 1.5 -2.5 average points and the standard deviation was nearly similar in all groups. This minimal increase in average DMFT scores shows the effectiveness of fluoride in controlling DMFT score despite radiation-induced xerostomia. Similar results were seen by Dholam et al. who reported a 1.02 increase in DMFT scores at 15 month recall.

Daly et al. and Horiot et al. reported the incidence of dental caries increment post-radiotherapy at 2.5 per month.<sup>111, 112</sup> In the present study an incidence of dental caries increment from baseline to one year, across all four-intervention groups ranged from 0.11 to 0.15 per month. This was calculated by subtracting the DMFT scores at one-year recall from baseline scores and taking average for one year. These increment rates were more than reported by an landmark randomized controlled trial by Dreizen et al., who reported a 0.03 per month increment for DMFT scores in a group with fluoride oral care and diet control.<sup>113</sup>

Many authors have studied the incidence of dental decay in head and neck irradiated patients, which do not mention the use of specific fluoride protective regime. Among these; Prcic et al. also reported a higher monthly increment of DMFT scores to a value of 3.5.<sup>114</sup> Meng et al. reported an increment of 1.1 at six-months post radiotherapy and Bachok et al. reported a 1.55 increase in DMFT score three-month post radiotherapy.<sup>115, 116</sup> Moore et al. in their meta-analysis of fifteen studies, pooled data for proportions of patients with dental caries post-radiotherapy and reported a caries incidence of 0.29.<sup>11</sup>

### **5.5 OHIP-14 scores and Fluoride (SOCP)**

Oral health-related quality of life (OHRQOL) have been used for a long time to assess oral disease burden and its effects on the physical, psychological and functional aspect in patients with oral diseases including oral cancer. Many oral health-related questionnaires have been used to assess QOL. This includes the European organization for research and treatment of cancer quality of life questionnaire (EORTC: H&N-35), the University of Washington Quality Of Life Questionnaire (UWQOL), Functional Assessment of Cancer Therapy Head and Neck Module (FACT H&N V 4.0), Oral Health Impact Profile -14(OHIP-14) and Oral Cancer Quality of Life Questionnaire (QOL-OC).

OHIP-14 is considered a valid and easy-to-use scale for head and neck cancer patients to understand oro-dental challenges before, during, and after initiation of cancer therapies. OHIP-14 is a consolidated version of OHIP-36. It has

been validated across many populations and languages including Hindi for use in head and neck cancer patients to assess QOL status.<sup>117, 118</sup>

In the present study, OHIP-14 scores were accessed at four-time points for all the four intervention groups. It was seen that OHIP-14 total scores at baseline amongst intervention groups were in the range of 11-15 for median and in the range of 12.5 -16.7 for mean.

OHIP-14 scores statistically and significantly doubled at one month recall from baseline, this was due to the accumulation of acute side effects of radio-chemotherapy including oral mucositis, altered saliva, candidiasis, and trismus. The average mean scores ranged from 31.4 to 35.1 and median scores in the range of 29-35 amongst intervention groups at one-month post-radiotherapy. This doubling of scores at one-month post-radiotherapy shows how adversely the oral health parameters are affected by acute side effects of chemotherapy, radiotherapy, and surgery.

In six-month and one-year recall it was seen that OHIP scores gradually, statistically, and significantly decreased from one-month scores. There was around a 50% decrease in OHIP-14 score at six months of recall. This further decreased by another 50% from six months to one year recall. This decline in OHIP-14 scores is the result of supportive oral care protocol (SOCP) efficiency in managing the acute and late-onset side effects and toxicities of radio-chemotherapy.

OHIP-14 scores did not differ between the intervention group indicating that the type and frequency of fluoride application do not affect the OHIP -14 scores

when compared to the type of intervention. While OHIP-14 scores were statistically highly significant within each intervention group for Baseline to one month, baseline to one year, one month to six-month, and one month to one year.

Barrios et al. have worked on OHIP-14 scores in head and neck cancer patients in various studies. In one of their cross-sectional study, they found that patients with oral carcinoma have 11.6 times worse OHIP-14 scores as compared to healthy controls. They reported that at six-month post-radiotherapy recalls a mean score of OHIP-14 of  $18.9 \pm 11.8$  was seen.<sup>26, 44</sup> In our study the mean score at six-month post-radiotherapy was in the range of 6.6 -7.5 with a standard deviation in the range of 6.4-9.8. The median score ranged from 3 to 6 with an Interquartile range (IQR) of 0-12. The low OHIP-14 scores in our study represent the effectiveness of our SOCP and fluoride protocol.

To the best of our knowledge, there is no study reported which evaluates the effect of oral care at various time intervals in terms of OHIP-14 scores. The present randomized controlled trial provided a high level of evidence study evaluating our SOCP for oral health-related quality of life scores such as OHIP-14 in patients with head and neck carcinoma including oral cancer.

Contrary to the majority of findings by various authors pace et al. reported patients with oral cancer have similar OHIP-14 scores as compared to healthy controls.<sup>119</sup>

A meta-analysis by Yuwanti et al. concluded that oral health-related quality of life scores seen by OHIP-14 was significantly higher in patients across various

population variables. This finding suggests that regardless of what type of treatment is received for cancer OHRQOL scores worsen in head and neck cancer patients.<sup>47</sup>

We recommend that oral health assessment and oro-dental intervention at the time of diagnosis, during cancer treatment, and post-cancer treatment is essential by a dental expert to maintain a healthy functional, and efficient oral health. Aguilar et al and Spalthoff et al. made a similar recommendation in their works.<sup>120, 121</sup>

In the present study, there was no correlation between DMFT scores and OHIP-14 scores at baseline across all intervention groups with an insignificant p-value. The correlation between OHIP-14 and DMFT has not been studied to the best of our knowledge in oral cancer patients. These two parameters were correlated in hospitalized sick patients and adolescent workers and they reported significant relation among them.<sup>122, 123</sup>

OHIP-14 scores are dependent on various factors including the type of cancer, oral disease burden, need for oral prosthesis, and type of surgery. Patients with the resected maxilla, absolute trismus, and Hemi-mandibulectomy have poor scores as compared to those who do not receive surgery as part of cancer treatment. Hence a well-integrated SOCP, which has fluoride as an essential module should be an integral part of the care of oral and head & neck cancer patients for good OHRQOL scores.