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CHEMO-RADIOTHERAPY INDUCED ORAL COMPLICATIONS AND THEIR CARE IN CANCER PATIENTS

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Abstract

The purpose of this study was to evaluate a randomized control trial protocol to assess the effectiveness of an oral care protocol on chemotherapy- and/ or radiation therapy-induced oral complications in cancer patients. It was a randomized, outcome assessor blinded study. Patients were randomly allotted to a control and intervention group. Out of 68 patients 25 patients were treated only by radiotherapy, 32 patients were treated only by chemotherapy and 11 patients received both radio and chemotherapy. Most of the patients developed sensitivity, altered taste, oral thrush, mucositis, trismus and xerostemia during and after palliative treatment. Here patients having pain during therapy 22.01% and 30.09% before therapy, patients had a change of taste after therapy86.8% and 63.2% had a change of taste during therapy, patients had developed mucositis before therapy 4.4% and 64.7% had developed mucisitis during therapy, patients had developed trismus before therapy 8.8% and 42.6% had developed trismus during therapy. Here most of the respondents had inadequate knowledge and practice about oral care but there was no correlation between family histories of cancer. Under this study 27 staff nurses were working in radiation/chemotherapy oncology areas from the tertiary levels of hospitals. Here 51.3% nurses had a very poor knowledge regarding oral care and the major (81.0%) groups of them were suggested for training in the specific area. On the basis of survey report the respondent groups of nurses provided information are the main source of oral care information. The association between selected demographic factors data on age and education were also recorded. The result shows there was no correlation between family history of cancer patients and enough knowledge of the respondent groups. From this study it may be suggested that proper knowledge should be provided to the peoples to prevent major oral diseases specially for cancer in future in Bangladesh.

Key words: Cancer patients, chemotherapy, oral care protocol, oral complications, radiotherapy

Introduction

Oral cavity is the main host to carrying a huge number of microorganisms. Mucositis is the painful inflammation of mucous membrane usually as an adverse effect of chemotherapy and radiotherapy. Oral mucositis increases leading to infection and life-threatening condition. The local bacterial flora having an epithelial barrier in the mouth freely enters the bloodstream leading to a possible systemic infection (Koistinen et al. 2020). The patients who are getting radiotherapy for cancer at head and neck region it developed certain mucositis for near about all patients and more than 45% patients develop severe mucositis. More than 35% patients develop severe mucositis of the patients treated with chemotherapy/radiotherapy both (Sonis 2004, Quinn 2009).

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The patients getting standard-dose chemotherapy or radiotherapy develop more than 20-45% of mucositis, xerostomia and altered taste. The reported incidence of mucositis with standard-dose chemotherapy varies widely. The incidence of mucositis has been reported to be as low as 10% - 20% and as high as 40% - 70% (all grades) for various mucotoxic chemotherapies. (Khader et al. 2021, Bhatt et al. 2010). Most patients suffered from mucositis that was between grades II and III (22.9% and 47.5%, respectively) (Scully et al. 2006, Al Barmawi 2018). Oral complications increase in severity with primary tumors in the oral cavity, oropharynx or nasopharynx, treated with concurrent chemotherapy, total doses greater than 5000 Centigray, and treated with modified fractionated radiotherapy schedules (Carter et al. 2009, Kotronia et al. 2021).

Oral complications can be more severe and disturbing at cancer affected area. Pain and other complications gradually increasing more due to these oral problems which lead to difficulty to eat and swallow of the patients. Some local and systemic infections could be involved due to changes of oral mucosa (Potting et al. 2008). It could be increased the morbidity, increase the number of hospital visit, even interrupt the cancer treatment only for these oral complications. It can add physical, emotional and financial costs for these overall conditions and in some cases lead to death (Lee et al 2021, Singh et al. 2007).

Mainly nurses taken care of the patients and also follow all instruction of doctors for applying to the patients. Nurses inform to the patients about the oral complications and how to take care to cure the problem (Öhrn et al. 2000, Mainali et al. 2011). Development of oral care protocols for oral health during cancer treatment requires multidisciplinary team approach (Barker et al. 2005, Eilers 2004).It was reported by all nurses that they need to upgrade their knowledge in oral care of cancer patients (Southern 2007, Shejila et al. 2015).The main goal of this study is to assess several aspects of oral status, oral health and its relation to quality of life, and oral care among patients treated with radiotherapy or chemotherapy and also to determine the level of knowledge and education among enrolled nurses working with radiotherapy or chemotherapy of oral health status and oral care of respective patients.

Materials and Methods

Study design and study area

This was a cross-sectional descriptive study conducted at the National Institute of Cancer Research and Hospital, Mohakhali, Dhaka, Bangladesh. A total of 68 respondents who's met the eligibility criteria. Before collecting the information it had been taken a written consent agreement from all individual patients. The patients who were suffered with cancer and advised with radio or chemotherapy, those patients were included in the study. Data was collected in three steps (before therapy, during therapy & after therapy). Patients were included in the study whose gave their full information in all three steps and excluded in the study whose could not give information in all three steps. Eligible patients, were assessed by the attending palliative care physician, were approached by the principal investigator (PW) and asked for their willingness to participate. The study consisted of three parts; the first being a semi-structured interview supplemented by the completion of a self- report symptom and knowledge assessment tool, the second being a clinical oral examination and the third being a semi structured questionnaire for assessing oral care knowledge of clinical staffs dealing with radiotherapy and chemotherapy patients. Pretesting of the questionnaire and checklist was done to ensure its adequacy, appropriateness & quality.

Data analysis

SPSS 23.0 for Windows (SPSS Inc., Chicago, Il, USA) was used for data analysis. Variables were described by means, standard deviation and percentages. For the Univariate analysis, chi-square tests and t-tests were used as appropriate. P-value of 0.05 or less was taken to indicate statistical significance.

Results

On basis of descriptive statistical analyses, the findings of socio-demographic information including patient's age, monthly family income and expenditure, expenditure for cancer treatment purpose are showin Table 1. As shown in the table, mean age of patients was 44.60 ± 14.259 years with a range of minimum 20 years and maximum 68 years. The mean monthly family income was Tk.6617.65 ± 2539.417 with a range of minimum 3000 and maximum 18000Taka. The mean value of the monthly family expenditure was 6073.53 ± 1895.133 Taka with a range of minimum 3000 and maximum 15000 Taka. The mean value of monthly expenditure for cancer treatment purpose was 2338.24 ± 745.340 Taka with a range of minimum 1000 and maximum 5000 Taka.

Table 1: Descriptive statistics of age, monthly income and expenditure.

Options	Maximum (Tk.)	Minimum (Tk.)	Mean ± SD
Age (in years)	68	20	44.60 ± 14.259
Monthly family income (in BDT)	18000	3000	6617.65 ± 2539.417
Monthly family expenditure (in BDT)	15000	3000	6073.53 ± 1895.133
Average monthly expenditure for cancer treatment (in BDT)	5000	1000	2338.24 ± 745.340

Data of gender, religion, educational qualifications, residence, marital status and occupation are shown in Table 2. In terms of gender and religion, patients were split 30.90% were male and 69.10% were female; regarding religion distribution 79.40% were Muslim, 14.70% were Hindu, 4.40% were Christian and 1.50% were Buddhist. About 69.10% were either illiterate or had an educational qualification up to primary level, 14.70% had completed secondary education, 13.20% completed for their HSC and 2.90% were either graduate or post-graduate; Among 68 cancer patients 20.60% were from urban area and where 79.40% came from rural area; About 80.90% were married, 16.20% were unmarried and rest 2.90% were either divorced or separated or widowed; regarding occupation 35.30% were businessman, 11.80% were service holder or laborer and rest 52.90% were either housewives or jobless.

Table 2: Distribution of patients on the basis of various socio-economic aspects.

Options	Answers	Frequency (n)	Percent (%)
Gender	Male	21	30.9
	Female	47	69.1
Religion	Muslim	54	79.4
	Hindu	10	14.7
	Christian	3	4.4
	Buddhist	1	1.5
Educational qualification	Primary and below	47	69.1
	Up to SSC and equivalent	10	14.7
	Up to HSC and equivalent	9	13.2
	Graduation and Post-graduation	2	2.9
Residence	Urban	14	20.6
	Rural	54	79.4
Marital status	Married	55	80.9
	Unmarried	11	16.2
	Divorced/ separated/ widowed	2	2.9
Occupation	Business	24	35.3
	Service/ labour	8	11.8
	Student/ housewife/ unemployed	36	52.9
	Total =	68	100.00

Information regarding respondents existing medical conditions, smoking habits, and alcohol intake are among the findings of the current study and these have been presented in Table 3. Data presented in Table 3 displays the patients' other current medical conditions, with 20.60% having conditions other than cancer while 79.40% were determined to have no other current medical illnesses. Thus, 63.20 percent of all patients had never smoked, 10.30 percent had abstained from smoking for more than two years, and 26.5 percent were smokers. Additionally, 4.40% of patients had alcohol addicted, while 95.60% did not. Patients' tooth numbers, restorations, prostheses, pre- and post-operative pain/ discomfort, sensitivity, swelling, altered taste, caries, gingivitis, oral thrush, mucositis, trismus, and xerostemia-associated data are among the findings of information connected to oral health.

Table 3: Patient's information on other medical conditions other than cancer smoking habits and alcohol intake (n = 68).

Options	Answers	Frequency (n)	Percent (%)
Other existing medical condition	Present	14	20.6
	Absent	54	79.4
Smoking status	Never smoked	43	63.2
	Non-smoker for more than 2 years	7	10.3
	Smoker	18	26.5
Alcohol consumption status	Yes	3	4.4
	No	65	95.6
	Total =	68	100.00

Table 4 shows the descriptive statistics of tooth number of the patients where the mean tooth number before palliative treatment was 29.16 ± 2.853 with a range of minimum 21 teeth and maximum 32 teeth (n= 68); And the mean tooth number during and after palliative treatment was 26.86 ± 3.267 with a range of minimum 23 teeth and maximum 32 teeth (n= 59). Moreover 42.60% patients had restorations and 20.60% patients had prostheses in their mouth.

Table 4: Intraoral examination findings (n = 68).

Descriptive statistics of tooth number			
	Maximum	Minimum	Mean ± SD
Tooth number before chemotherapy/ radiotherapy	32	21	29.16 ± 2.853
Tooth number during chemotherapy/ radiotherapy	32	23	26.86 ± 3.267
Tooth number after chemotherapy/ radiotherapy	32	23	26.86 ± 3.267

Distribution of patients by their age, gender, residence, level of education, occupation and monthly family income			
	Answers	Frequency (n)	Percent (%)
Presence of restorations	Yes	29	42.6
	No	39	57.4
Presence of prostheses	Yes	14	20.6
	No	54	79.4
	Total =	68	100.00

Table 5 displayed the patients' oral health condition in several areas before, during, and after palliative care; there were 30.90% and 22.10% of patients who reported oral pain prior to and during care, respectively, but no patients reported oral discomfort following care. Preoperative tooth sensitivity affected 4.4% of patients, while 22.10% of patients experienced sensitivity both during and after treatment. Pre-, intra-, and post-operative intraoral edema were present in a total of 75.00%, 42.60%, and 20.60% of patients, respectively.

In 68 cancer patients, 4.45% reported having a changed taste prior to treatment, but during and after therapy follow-up, 63.25% and 86.80% of them reported having a changed flavor, respectively. Before, during, and after radiotherapy or chemotherapy, 22.10%, 20.60%, and 44.10% of patients received a caries diagnosis, whereas 72.10%, 63.20%, and 63.20% of patients were found to have gingivitis. Before chemotherapy or radiotherapy, about 4.40% of people had oral thrush, whereas 22.10% were found to have it both during and after treatment. Another 4.40% of patients experienced oral mucositis prior to chemotherapy or radiation therapy, whereas 64.70% and 63.20% had it during and after palliative care, respectively. Regarding opening of mouth before, during, and after therapy, trismus occurred in 8.80%, 42.60%, and 64.70% of patients, respectively. Before treatment, about 8.80% of patients complained of dry mouth, while during and after chemotherapy and/or radiotherapy, 63.20% of patients complained of xerostemia.

Table 5: Oral health status of the patients (n = 68).

Oral health indicators	Before therapy (%)		During therapy (%)		After therapy (%)	
	+	-	+	-	+	-
Pain/ Tenderness	21.0	47.0	15.0	44.0	0.0	59.0
	30.9	69.1	22.1	64.7	0.0	86.8
Sensitivity	3.0	65.0	15.0	44.0	15.0	44.0
	4.4	95.6	22.1	64.7	22.1	64.7
Swelling	51.0	17.0	29.0	30.0	14.0	45.0
	75.0	25.0	42.6	44.1	20.6	66.2
Altered taste	3.0	65.0	43.0	16.0	59.0	0.0
	4.4	95.6	63.2	23.5	86.8	0.0
Caries	15.0	53.0	14.0	45.0	29.0	30.0
	22.1	77.9	20.6	66.2	42.6	44.1
Gingivitis	49.0	19.0	43.0	16.0	43.0	16.0
	72.1	27.9	63.2	23.5	63.2	23.5
Oral thrush	3.0	65.0	15.0	44.0	15.0	44.0
	4.4	95.6	22.1	64.7	22.1	64.7
Mucositis	3.0	65.0	44.0	15.0	43.0	16.0
	4.4	95.6	64.7	22.1	63.2	23.5
Trismus	6.0	62.0	29.0	30.0	44.0	15.0
	8.8	91.2	42.6	44.1	64.7	22.1
Xerostemia	6.0	62.0	43.0	16.0	43.0	16.0
	8.8	91.2	63.2	23.5	63.2	23.5

The results of research into patients' oral care knowledge include information on patients' knowledge of teeth cleaning techniques, recommended toothbrushes, daily tooth brushing frequencies, daily tooth brushing durations, recommended diets, changed toothbrushes, tooth brushing motions, and dentist-related data. Patients' knowledge of oral care is shown in Table 6, where 70.60% correctly identified the teeth-cleaning technique, 33.80% correctly identified the recommended toothbrush, 42.60% correctly identified the number of times per day that they should brush their teeth, 29.40% correctly identified the length of time they should brush their teeth, 61.80% correctly identified the proper rinse to use after chemotherapy or radiotherapy, 27.90% correctly identified the suggested diet, and 51.50% correctly identified the correct answer regarding diet. Patients' general well-being, physical health, psychological health, familial relationships, cognitive health, economic health, sexual and personal ability, optimism and belief, informational support, patient-physician relationships, body image, and quality of life (QOL) score related data are among the findings of quality of life-related information.

Table 6: Knowledge of patient about oral care.

Options	Correct (%)	Incorrect (%)
Which is the best option to clean teeth?	48.0	20.0
	70.6	29.4
What type of toothbrush is recommended?	23.0	45.0
	33.8	66.2
How much time(s) a patient should brush teeth daily?	29.0	39.0
	42.6	57.4
What is the recommended duration for each brushing?	20.0	48.0
	29.4	70.6
Following radio or chemotherapy which should be used for rinsing?	42.0	26.0
	61.8	38.2
Recommended diet for patients?	19.0	49.0
	27.9	72.1
How often toothbrush should be changed?	35.0	33.0
	51.5	48.5
What is the right motion of tooth brushing?	33.0	35.0
	48.5	51.5
How often should mouth be checked by dentist?	36.0	32.0
	52.9	47.1

Fig.1 shows the quality of life of the patients in different areas, such as general well-being, physical well-being, psychological well-being, family relationships, mental well-being, economic well-being, sexual and personal ability, optimism and belief according to table 3.5.4, a total of 70.60% of cancer patients had a low quality of life, and 29.40% of cancer patients had a very bad quality of life.

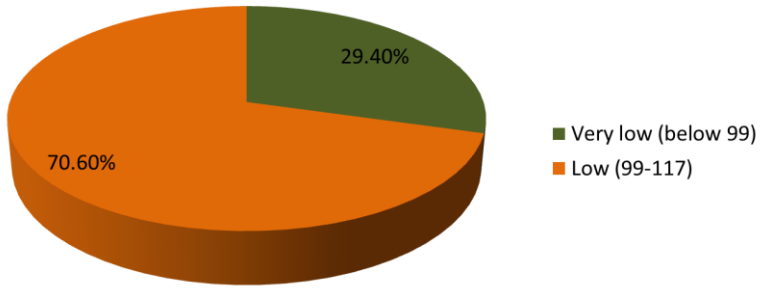

Fig.1: The quality of life of the patients in various dimensions.

Discussion

The information is compared in the study to demographic factors such age, education, and family history of cancer. There was a correlation between the respondents' knowledge and the material supplied about oral hygiene, as well as between knowledge and practice in this area. The results showed that there was an association between respondents' age, education, and knowledge. The findings of this study demonstrated that there was no meaningful relationship between knowledge and either education level or age.

The present study shows the maximum age of the sample of cancer patients was 68, and the majority of them were female (n = 47), followed by male (n = 21), with a percentage of 30.9% males and 69.1% females. Almost same outcomes were attained by Paska et al. (2009). They discovered that there were 53 participants, or 71% women. A maximum of 54 rural patients in the current study had finished their secondary school. Furthermore, graduate degrees had been earned by at least 14 urban patients. According to the survey, 69.86% of patients are illiterate, while 14.19% have completed secondary school, 13.21% have passed the high school diploma exam, and 02.34% have earned their graduate degrees. These findings are similar with findings from other studies (Paska et al. 2009).They discovered that 32% had high school diplomas or the equivalent, 13% had not finished high school, and 55% had completed some form of college. However, they showed that 36.2% of people lacked literacy.

In the current study (n = 68), it was discovered that 22 cancer patients underwent radiotherapy, 32 underwent chemotherapy, and 14 underwent both radiotherapy and chemotherapy. Chemotherapy had a 47.66% success rate and radiation a 32.62% success rate. Better patient care derives from improved doctor-patient communication, which also helps patients adjust to their sickness and treatments and enhances medical procedures. Even though special attention is given to patients undergoing chemotherapy or radiotherapy, oral issues are nonetheless inevitable due to a lack of understanding and experience.

Based on computed indicators, caries, gingivitis, oral thrush, mucositis, trismus, and xerostemia were the key factors affecting oral health indicators. Other factors were sensitivity, swelling, altered taste, pain/tenderness, sensitivity, and sensitivity (He et al. 2019). Indicators of oral health were compared before, during, and after treatment. Statistically significant changes were discovered after data analysis for the following variables:

pain/tenderness, sensitivity, swelling, altered taste, caries, gingivitis, oral thrush, mucositis, trismus, and xerostemia. After treatment, patients' pain/tenderness considerably decreased, with 22.09% (n = 15) of cancer patients reporting pain throughout treatment compared to 30.9% (n = 21) before to therapy. However, 86.8% (n = 59) of the patients experienced a change in taste after therapy, as opposed to 63.1% (n = 43) during therapy.

According to Guidry et al. (1997) before cancer treatment, the most common symptoms were dry mouth, sore mouth, sore mouth and difficulty swallowing. These four symptoms were the most common during cancer treatment, only at high rates. Both dry mouth and mouth pain increased from 2 participants before treatment to participants before treatment. Mouth sores increased from 12 to 18 participants, while difficulty swallowing increased from 8 to 10. Among the 10 participants, the most common symptoms at all stages of radiation therapy include dry mouth, sore mouth, sore mouth, and difficulty swallowing. When comparing these early symptoms and others to the level of education given prior to treatment, those who have symptoms experience a lack of education (Pai et al. 2015). These patients were already experiencing painful oral care symptoms that may worsen during and after treatment, they are not receiving the education necessary to correct their behavior.

In our result about one third (42.6%) 29 respondents has given correct answer to brush their teeth whereas only (39.2%) 57 respondents have given incorrect answer to brush their teeth. The majority (70.03%) of patients said they needed dental care and 29.05% said they did not. Only (52.03%) of the patients visited to the dentist whereas 47.05% did not go to the dentist frequently. Oral symptom reports reflect the patient's opinion and are independently validated by the results of the evaluation by the dentist or staff/nurse. Patient reports are valuable for communication with patients and between nursing and dentist or staff. Previous studies have shown that patients do not always report their oral symptoms which may cause problems with oral care. Previous studies have reported that patients are less likely to have treatment-induced problems than those with cancer. Current results explain that patients experience a number of oral symptoms and there is a good agreement between patient reporting and recording by staff/nurse.

There was a significant difference among ability to perform oral hygiene, pain, gingival condition, dysphagia and feeling of a clean mouth symptom. Here, it has been observed that radiotherapy produces more oral symptoms than chemotherapy. Similar oral symptoms have been reported in oral symptoms related to mucosa. Significant differences were observed among mouth dryness, salivary viscosity, lip dryness, taste alteration and ability to talk. Among cancer patients receiving radiotherapy and chemotherapy, there is a significant correlation between saliva and all aspects of oral symptoms next to oral hygiene and dysphagia which is consistent with other studies (Pai et al. 2019). Dry mouth and salivary viscosity are significantly related to the rate of taste change. These relationships were more pronounced in patients receiving radiotherapy than in chemotherapy. Furthermore, there was a correlation between mucosa score and dryness of the lips and rate of taste change and ability to speak.

Conclusion

The study showed that radiotherapy and chemotherapy patients who visited the hospital had a low quality (29.40%) of life and little knowledge (63.8%) about oral care. Along with chemotherapy and radiotherapy, other oral alterations were also noticed during and after those treatments. The relationship between dental care education, age, oral care knowledge, and respondents' knowledge was significant. Additionally, there was a link between oral care practice and knowledge. Since there is no difference in information regarding whether there is a family history of cancer, it is concluded that knowledge about dental care is crucial for getting sufficient knowledge and for the practice of oral care. Giving palliative care patients access to an oral health education program may assist patients gain more knowledge and improve their oral health condition.

Conflict of interest: The authors hereby declare no conflict of interest regarding the publication of this article.

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