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Attitude and Knowledge of Iraqi Sample Dentists Toward Anti-cancer Therapy Patients

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Abstract

Aim of the study: to assess dentists' attitudes and knowledge regarding dental and oral care for patients undergoing cancer treatment. **Method:** A study was conducted among general practitioners and specialist dentists working in governmental specialist dental centers and dental clinics in hospitals in Mosul City- Iraq. A self-reporting survey was provided, comprising questions related to demographic characteristics and sections evaluating the dentists' attitudes and knowledge about cancer-treated patients. Data were analyzed using Chi-square, ANOVA test, Kruskal Wallis test and Pearson correlation coefficients. **Results:** a total of 213 respondents. There was no significant relation between demographic characteristics on one side and attitude and knowledge on the other side. Except the mean score of dentists` knowledge was significantly influenced by work experience, P= 0.03. In summation, a positive attitude toward dealing with cancer therapy patients was 55.1%. Dentists' level of knowledge was 52.5%. The dentists with a higher knowledge score had a less positive attitude toward dealing with anti-cancer therapy patients. However, statistically, there was no significant correlation between attitude and knowledge among dentists. **Conclusion:** Although the dentists had a slightly higher than moderate level of knowledge, they mostly displayed a positive attitude towards the anti-cancer therapy patients. Therefore, an intervention educational program is indicated.

Keywords: attitude; cancer therapy; general practitioner dentists; knowledge; Mosul; specialist dentists.

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Introduction:

Non-surgical cancer treatment -like radiotherapy, chemotherapy, and immunotherapy- has progressed nowadays, this evolution in treatment is increasing cancer survival overall (American Cancer Society, 2021; National Cancer Institute, 2022; Miller et al, 2022; PDQ Supportive and Palliative Care Editorial Board, 2024). It likely leads to the increased incidence of complex interplay side effects, one of which is oral complications that affect patients` quality of life (Hong et al, 2019; Nolazco and Chang, 2023; National Cancer Institute, 2024).Therefore, oral care interventions are important to all cancer patients to promote oral comfort during and following cancer therapies and for prevention and reduction of the incidence and severity of oral complications (Tauji et al, 2015; Hong et al, 2019; Pai et al, 2019; National Cancer Institute, 2021; Yong et al, 2022; Gufran et al, 2023). The National Cancer Institute (NCI) and American Dental Association (ADA) consider routine, effective oral hygiene important in cancer treatment patients. They recommend that the dentist is one of the multidisciplinary teams that is required to work in close collaboration with the team to regularly evaluate, prevent, and treat oral complications of cancer therapies (Pai and Ongole 2015; Yong et al 2022; American Dental Association, 2022; Gufran et al, 2023; National Cancer Institute, 2019; 2024). Dentists must possess a comprehensive understanding of the reasoning and goals behind dental assessment, as well as the distinct factors that are specific to different anti-cancer therapy methods (Jensen and Peterson, 2021; National Cancer Institute, 2022; Yong et al, 2022; American Dental Association, 2022; Nolazco and Chang, 2023).

In Mosul City (which is one of the biggest cities in Iraq), dental and oral care for cancer-treated patients is one of the most neglected issues in dental units. The evidence-based dentistry is an essential issue in managing patients, however, the hypothesis; we expect a gap between dentists and the evidence available for anti-cancer treatment complications. This study is an effort to estimate and bridge this gap. It will give a comprehensive real picture as this study addresses the attitude and knowledge of dentists in Mosul city to anti-cancer therapies and evidence-based clinical practice guidelines for dental management. We conducted the study to use the findings for integrating (the dental care for cancer patients) programs into dental school curricula, continuous medical education lectures, and to improve communication skills. Thereafter to provide the best dental care to that important category of patients.

Methods:

Ethical clearance: this study was approved by the Ethics Committee for Research at the Training & Human Development Center, Nineveh Health Directorate, Iraqi Ministry of Health. With reference number 23675 on 11/6/2023.

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Study design: descriptive and inferential study.

Study setting: the questionnaires be collected from 10 July to 30 September 2023.

Study participants: there were three governmental specialist dental centers and six hospitals in Mosul city that deals with cancer patients.

Sample size: Before gathering data, the researcher coordinated with the Researches Departments in the institutes to provide the number of dentists affiliated in the institute. There were 243 specialist dentists and general practitioner dentists who work in those governmental health institutes. The study picked up all dentists according to the criteria:

Inclusion criteria: 1-dentists age must be more than 27 years. 2- dentists must have more than 5 years of dental experience.

Exclusion criteria: 1- dentists with less than 5 years of dental experience. 2- dentists with a Ph.D. degree in oral medicine. 3-dentists with Ph.D. and FRCS degree in oral and maxillofacial surgery. 4- Dentists who were had long vacations (more than three months) were not contacted.

Participation in this study was voluntary. The researcher gave the questionnaires to the dentists during their workday, from 10 AM to 12 PM. They were instructed to fill out the surveys on the same day. It was stressed that the questions should be answered honestly without seeking advice from colleagues or conducting searches on Google. Figure 1 showed flow chart of data collection.

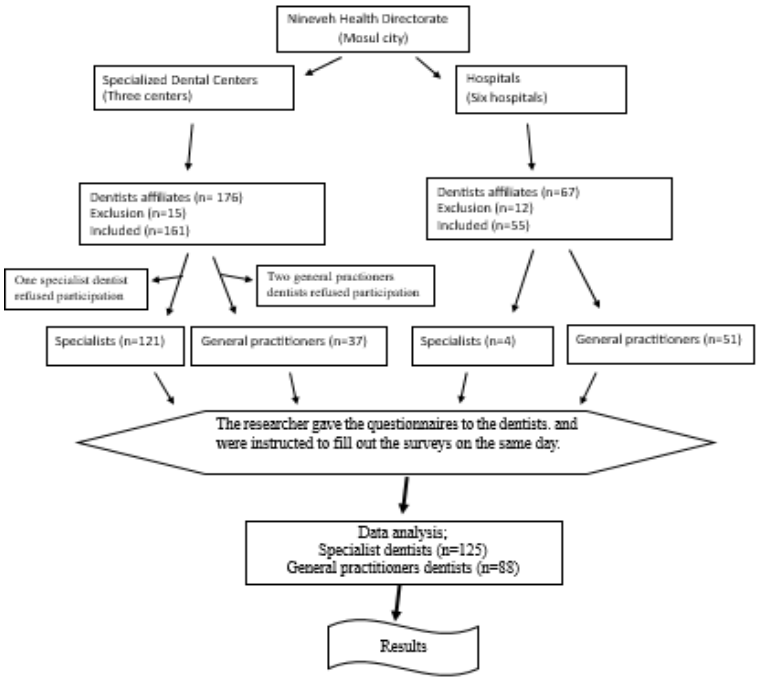

Figure 1. The flow chart demonstrates who to collect the data.

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Data collection tools: A self-administered questionnaire was prepared to collect the data (appendix 1). The questions were formulated according to the standards provided by the National Cancer Institute (NCI) and the American Dental Association (ADA) for managing patients undergoing anti-cancer medication. The first part of the questionnaire included demographic information of the dentist: gender, age, degree (educational level), dental work experience, and work in private clinic, it also included questions about if their institutes treat anti-cancer therapy patients.

The second part is about attitude of the dentists toward cancer patient management. It comprised 6 questions that were selected based on a three-point Likert scale ranging from: agree = 3, uncertain= 2 to disagree = 1. A negative attitude was defined as a response of "disagree". A positive attitude was defined as a response of "agree". A response of "uncertain" was equal to indecision or uncertainty. The validity of the questionnaire was evaluated by experts in dental and clinical experience in cancer patients care and public health practitioners.

The third part of the questionnaire is about the level of knowledge regarding dental care and management for patients undergoing anti-cancer therapy, Contents validity of the questionnaire is based on a review of NCI and ADA references, guidelines, and two experts' opinions. It was 9 questions that were assessed using a close-ended and self-designed questionnaire. The score of questions asked about the dentists' knowledge of three possible responses: (correct answer= 3 points, don't know= 2 points, and incorrect answer = 1 point).

Statistical analysis: data entry was done on an Excel sheet, Windows 2019, and analyzed by descriptive and analytical statistics. Using ''Statistical Package for the Social Software (SPSS)'', version 25. The summation of knowledge section points made up the score of knowledge for respondents. The nominal levels of knowledge were considered as good= more than 50%, moderate= 50%, and poor less than 50% correct answers. The test for significance to find out if there is any difference between various variables was done using the Chi-square test. The analysis of variance (ANOVA) test was employed to evaluate the disparities in mean scores of attitude and knowledge based on the frequency of years of work experience. Kruskal Wallis test was used among the work of experience group by measuring median of frequency of non-parametric scores of attitude and knowledge.

An analysis of the mean scores of dentists' attitudes and knowledge is conducted, taking into account their demographic and work-related variables. The mean scores for attitude and knowledge were computed using the total points obtained divided by the number of values. The association between attitude and knowledge mean scores, and how they correlate to gender, age, degree, and work in the clinic, this was done by analyzing Pearson correlation coefficients. A significance level of $P \leq 0.05$ was

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deemed significant for all statistical analyses.

Results:

There were 243 specialist dentists and general practitioner dentists who work in governmental three specialist dental centers and six hospitals. A total of 213 respondents engaged with the survey, from a total of 216 participants included in this research who were contacted (three dentists refused participation), yielding a response rate of 98.6%. Females were 58.7% and the same percentage had a post-graduate degree (specialists). The majority of dentists were between 27-50 years old (83.1%).

Dentists of (5-15 years) of work experience was 43.7%, 38% was between 15-25 years and the lowest percentage (18.3%) were dentists with more than 25 years of experience. The dentists employed in the private clinics were (64.3%). Most of the dentists (72.8%) answered that their institute didn't treat (anti-cancer therapy) patients.

The demographic and work characteristics of the dentists are shown in Table 1.

The dentists' attitudes toward anti-cancer therapy patients are presented in table 2. About 48.8% of them believed that they were able to provide dental treatment plans according to the needs and preferences of the cancer-treated patients. 63.4% were able to plan preventive care for the cancer-treated patients respectively. Also, 46.5% thought that uncertain if they could manage the medical emergencies of cancer-treated patients and almost 25.8% could manage those cases. The majority of dentists (88.3%) were able to express a sense of empathy for cancer-treated patients. Further less; 16.9% had enough experience to manage the complexities of treating the cancer patients. A high percentage of dentists (87.8%) believed (agreed) that patients should receive dental treatment in specialized clinics (preferred to refer the cancer-treated patients to the specialist).

Recoding the summing of all scores of attitudes, higher scores meant a more positive attitude regarding dealing with anti-cancer therapy patients (good; 55.1%). Negative attitude statements, the dentists' score of attitude was 14.9%, while uncertain attitude statements were 29.9%.

Knowledge: The subjects showed a relatively high level of knowledge on the five questions from nine (table 3). For example, their knowledge of the definition of oral mucositis was 61.0%, xerostomia is a reversible reaction of chemotherapy (79.3%), and avoidance of elective dental treatment during active anti-cancer therapy (76.5%). The majority of the subjects showed a relatively high level of knowledge on questions about superficial mucosal Candida infections are best treated with topical antifungals other than systemic agents in cancer-treated patients (81.7%). The lowest score of knowledge was which plan is routine in many cancer centers in dental clearance protocol prior to cancer therapy, as only 17.4% answered partial dental clearance protocol.

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On summing, the percentage of correct answer scores of knowledge was good (52.5%). On the other hand, incorrect answers were 28.2%, while 19.1% of the dentists stated that didn't know the answers.

Statistical results:

Tables 4-a, 4-b presented a statistical comparison of the average scores of dentists' attitude and knowledge, categorised by their demographic and occupational characteristics.

Attitude: based on the attitude, there was a negative association observed between the age of dentists and their employment in private clinics. The correlation coefficient values were -0.27 and -0.05, respectively. The majority of participants (n= 155) reported that their institution did not provide treatment for anti-cancer therapy patients. The mean score for this response was 2.37±0.35, indicating a negative relationship with attitude (r = -0.08). Statistically, there was no significant difference in the mean score of attitudes among dentists depending on their gender, age, degree, dental experience, or work setting in private dental clinics (P values greater than 0.05).

Knowledge: females had a higher mean knowledge score compared to males (r= 0.02). The amount of expertise was positively correlated with both the age and degree of dentists (r= 0.08, 0.07 respectively). The higher knowledge presented in dentists work in private clinics (r= -0.08). However, when comparing the mean scores of knowledge among dentists, taking into account their gender, age, educational degree, and whether they operate in a private clinic, there were no significant differences in the mean scores of knowledge across dentists. The mean score of dentists' knowledge was significantly impacted by their job experience, as determined by an ANOVA test with a P-value of 0.03. According to answers of dentists, the Kruskal Wallis test (table 5-a), there was no significant differences in attitude among groups of dentists according to years of experience. Nevertheless, there was highly significant differences among dentists` knowledge those answered correctly (table 5-b). Dentists with 5-15 years of experience (mean= 19.17) had more knowledge than other two groups (15-15, >25) mean= 15.89; 6.94 respectively. P equal 0.003.

Overall of this study: the Pearson correlation analysis revealed that there was no statistically significant relationship between knowledge and attitude among dentists. However, it is worth noting that dentists with better knowledge scores tended to have a little less positive attitude towards working with anti-cancer therapy patients, although this association was not statistically significant (r= -0.07, P= 0.26), table 6.

Discussion:

The current study conducted main large multicentric institutes in Mosul city to explore communication and health messaging between dentists and anti-cancer treated patients and to examine dentists' knowledge regarding anti-cancer therapy side effects. This is the first study on the attitude and

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knowledge regarding anti-cancer treated patients in dental settings in Iraq. To our knowledge, no studies have addressed questions on dentists' anti-cancer therapy knowledge. Therefore, no literature is available to support the same, and further research in this direction is required.

There was a higher response rate (98.6%), which is considered a good collaboration from eligible participants. The results revealed that dentists' attitude and knowledge levels about anti-cancer treated patients were shown to be 55.1% had positive attitude and 52.5% had good knowledge. However, there was no statistically significant link seen between knowledge and attitude among dentists. However, it was found that dentists with a higher knowledge score tended to have a less positive attitude towards care to cancer-therapy patients, as indicated by a negative correlation coefficient of -0.07 (P= 0.26). The study conducted by Gufran et al (2023) made similar observations, but focused only on physicians. The researchers noted that the majority of clinicians had limited understanding of the oral health complications that arise in cancer patients following radiation and chemotherapy.

Attitude: According to the findings of this study, women exhibited a greater inclination towards a positive attitude compared to men. Tahani and Manesh (2012) contended that the elevated attitude scores observed in women may be attributed to their heightened levels of empathy and emotional sensitivity. However, the statistical difference was not significant. Dentists aged between 25-50 years had more attitude toward treatment of patients with cancer than older dentists this may be due to the decreased passion for dealing with complicated cases by old dentists. Longer work experience and those high graduations displayed better attitude, this agreed with Nagpal et al study (2018). The attitude of dentists working in private clinics was shown to be better compared with other dentists because this work gave additional experience than dentists working only in public institutes. The same result in the study applied on dentists' attitudes and knowledge, regarding human immune deficiency virus (HIV) infection where the positive attitude towards HIV infected patients was influenced by workplace (private clinic and dental office), (Rostamzadeh et al, 2018). But statistically, the mean score of attitudes was not significantly different on level of dentists` gender, age, degree, dental experience or even work in private dental clinics. So there needs to be motivation and a change in attitude of the dentists toward this field in dentistry. A large number of the dentists (72.8%) believed that dentist their institute didn't treat anti-cancer therapy patients, this result reflected the negative correlation with attitude (r= -0.08). It may be believed that dental clinics in the institutes have covered cancer patients' dentistry inadequately, moreover, given the lack of standards and facilities required to provide services to those types of patients. However, only 27.2% of the dentists were interested in providing services to cancer-treated patients and believed that

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their institutes had received those types of patients.

The attitudes of 63.4% of the dentists towards preventive care were more than the attitude toward planning dental treatment according to the needs and preferences of the cancer-treated persons (48.8%). Dentists in previous study showed positive attitudes toward prevention in general dentistry and reported to be routinely offering a range of preventive measures but they lack some core preventive knowledge (Yusuf et al, 2015). Lower dentists` attitude toward managing medical emergencies and toward treating the complexity of cancer-treated patients reflects the inability of dentists to deal with urgent cases with dental problems. This may be due to the low promotion of "cancer therapy" clinical education in dental schools and in continuous dental education postgraduation. Anyhow, fortunately, the majority of dentists (88.3%) in current study were able to express a sense of empathy to cancer-treated patients. Also, a high percentage of dentists (87.8%) believed that patients should receive dental treatment in specialized clinics and preferred to refer the cancer-treated patients to a specialist. General physicians had other common perceptions in a study conducted on them, the majority of physicians were unaware of the various specialties in dentistry and they believed that all dental and oral issues could be dealt by the general dentist (Gufran et al, 2023).

Knowledge: The mean score of knowledge was slightly higher in females than in males (r = 0.02). However, a correlation between gender and knowledge of cancer patients and their treatment was found to be not significant. A result supported by Yusuf et al, 2015 and Rostamzadeh et al, 2018 studies. An increasing level of knowledge was increased with dentists` age and degree. However, the same statistical results were obtained when comparing the age and level of education of the participant dentists. In a previous study, younger dentists tended to engage more frequently in preventive practices (Yusuf et al, 2015).

Dentists who had private clinics revealed a higher level of knowledge than those who didn't work in private clinics, but statistically, there were no significant differences between the two groups. The low Awareness of evidence-based dentistry among private dental clinics is observed in Gowdar et al study in 2023. The dentists answered their institute treat anti-cancer therapy patients had more knowledge than dentists answered (no). As most of the dentists believed that their institute didn't treat (anti-cancer therapy) patients, this result reflected the negative correlation with the knowledge as the same with attitude. This result may be attributed to the dentists who didn't understand the question clearly or may be comparing their dental units with the hall institute that working in them.

The years of experience had a significant effect on the knowledge of dental care of cancer patients (P = 0.03). Dentists with 5-15 years of experience answered correctly and had more knowledge compared to the groups 15-

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25; >25 years of experience. Updating information and recent education in the younger group may be causative points in a higher level of knowledge than the other groups. Higher knowledge in the younger group of experience agreed with Nagpal et al, 2018, and with Rostamzadeh et al, 2018 that showed longer work experience (>10 years) was associated with higher knowledge.

According to the knowledge questionnaires, oral mucositis is a severely debilitating inflammation characterized by ulcerations of the oral mucosa (Hong et al, 2019; Mc Guire et al, 2013; Treister et al, 2022; Skallsjo et al 2023). In this study, 61% of the participants could choose the correct answer to the mucositis definition and 26.8% of participants answered incorrectly. Another complication of anti-cancer therapy is xerostomia. Cancer chemotherapy causes acute toxicities to the gland tissue that resolve following discontinuation of therapy and healing of damaged tissue, it is a reversible side effect (Porter et al, 2004; Pinna et al; 2015; American Dental Association, 2023) and 79.3% of participants knew this fact.

Bone-modifying agents (bisphosphonate) and angiogenesis inhibitors (bevacizumab) have serious side effects of osteonecrosis of the jaw bone that correlate with dental treatment (Boudjelall et al, 2020; Jensen and Peterson, 2021; British National Formulary, 2023; PDQ Supportive and Palliative Care Editorial Board, 2024). A study done in Japan showed that 50% of dentists and 24% of physicians were familiar with the adverse reaction of medication-related osteonecrosis of the jaw (Yamri et al, 2021). But in this study, only 29.1% answered correctly. Most of the participants' dentists didn't know the second drug (bevacizumab) and its side effects. This obvious that behavior of most of the dentists was insufficient to enable medical and dental cooperation for the treating cancer patients taking these medications.

Different biological agents used in cancer therapy can produce various side effects like stomatitis (Radfar et al, 2015; Villa et al, 2023). 45.5% of dentists knew the side effects and 39% didn't know these therapeutic drugs and their side effects on oral mucosa.

During anti-cancer therapy, elective dental treatment should be avoided because the incidence of oral and systemic complications increases with the grade of anti-cancer therapy (Tsuji et al 2015; Treister et al, 2022; Yong et al, 2022). This study's findings showed that the majority of individuals (76.5%) are knowledgeable regarding avoiding elective dental treatment during active anti-cancer therapy.

Oral candidiasis is common complication in patients undergoing head and neck radiation and/or chemotherapy, superficial mucosal Candida infections are best treated with topical antifungals other than systemic agents to decrease the risk of side effects and drug interactions (Freifeld et al, 2011; Jensen and Peterson 2021; British National Formulary, 2023). The current study revealed that the level of this knowledge among most of the

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surveyed participants is regarded as good (81.7%).

A complete blood test may be required to evaluate the indication for antibiotic prophylaxis before invasive dental treatments. While suggestions may range among various centers. The standard criterion used to assess the necessity of antibiotic prophylaxis when absolute neutrophil count is less than ‘’1 × 109/L (<1000/mm3)’’ (Freifeld et al, 2011; Zimmermann et al, 2015; Ullmann et al, 2016). Unfortunately, only 23% answered correctly and 45% of dentists didn’t know this topic of treatment guidelines. This indicates antibiotic abuse by dentists in the cancer community. The misuse of antibiotics for dental diseases agreed with many studies that showed dentists' knowledge variability about antibiotic prescriptions and inappropriate use therapeutically and prophylactically (Bhuvaraghan et al, 2021; Mahdi and Ibrahim, 2023; Sbricoli et a,l 2023). The widespread antibiotic prescriptive heterogeneity among dentists resulted from lacking international evidence-based guidelines and lacking awareness of medication pharmacology in clinical practice. It is an essential step to understand the scope of proper use of antibiotics protocol, increasing knowledge on the issue, and raising awareness to decrease the development of antimicrobial resistance (Bhuvaraghan et al, 2021; Bratti et al, 2023).

Recently, there has been a development in dentistry literature about the introduction of partial dental clearing techniques before initiating anti-cancer medication (Tsuji et al, 2015; Hong et al, 2018; Yong et al, 2022; Skallsjo et al, 2023). The current strategy for treating cancer involves addressing any existing dental and mucosal problems. This treatment protocol is less aggressive and may be suitable when there is not enough time for a thorough dental clearance regimen. Whenever feasible, it is preferable to adhere to the whole therapy clearance process (Hong et al, 2018). The minority of dentists (17.4%) in this study are knowledgeable regarding partial protocol management. And 69% of dentists chose complete dental clearance protocol, this is not wrong, however, according to the NCI, and ADA there is no universally accepted pre-cancer therapy dental protocol because of the lack of clinical trials evaluating the efficacy of a specific protocol (National cancer Institute, 2022; American Dental Association, 2022). Immunotherapy drugs stimulate the body’s immune system in cancer patient but they can harm cells of the mouth, lips and throat causing sore symptoms (National Cancer Institute, 2021; American Cancer Society, 2021; PDQ Supportive and Palliative Care Editorial Board, 2024). 59.6% of the study participants were knowledgeable regarding side effects of this type of cancer therapy.

At all, the dentists in this study had a positive attitude toward anti-cancer therapy patients. They had almost comparable than moderate levels of knowledge. the relation is negative when the low attitude not reflect the higher knowledge. Nevertheless there were no significant differences between

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knowledge of dentists about this important subject and their attitude toward those type of patients.

Limitations:

The study was conducted in one city. the participants were from one particular region; hence the results could not be generalized to the entire country. In addition, the study included only dentists who work in specialized centers and public hospitals and neglected dentists who work in primary health care centers and academic institutes, this may limit the generalizability of the findings to dentists practicing in Mosul city.

Conclusions:

The dentists in this study had a positive attitude toward anti-cancer therapy patients. They had good but slightly higher than moderate levels of knowledge and ability to deal with the dental problems of those patients. To provide the best dental care for that important category of patients, dentists' skills with cancer patients' oral care need improvement.

The author recommends that general dentists and specialists be made necessary to examine the dental and oral cavities of cancer patients pre and during cancer therapy to evaluate oral health. And should be aware of the dental complications and associated diseases in cancer patients. Applying evidence-based interventions in the care of cancer patients undergoing cancer therapy by attending lectures and seminars in continuous medical education programs. Finally, recognition of oral medicine dentistry by referring needy anti-cancer therapy patients has been suggested.

Conflict of interest

The authors reported that they have no conflicts of interest.

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Table 1: Demographic and work characteristics of the dentists.

Demographic and work characteristics	Answer	No.	%
Gender	Male	88	41.3%
	Female	125	58.7%
Age	27-50 years	177	83.1%
	more than 50 years	36	16.9%
Degree	Bachelors (BDS.)	88	41.3%
	Postgraduate	125	58.7%
Dental experience	5-15 years	93	43.7%
	15-25 years	81	38.0%
	more than 25 years	39	18.3%
Do you have private clinic?	Yes	137	64.3%
	No	76	35.7%
Does your institute treat (anti-cancer therapy) patients?	Yes	58	27.2%
	No	155	72.8%

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Table 2: Attitude of the dentists toward anti-cancer therapy patients.

Questions	Answer	N0.	%
Q1 I am able to provide dental treatment plan according to the needs and preference of the cancer treated patients.	Agree	104	48.8%
	Uncertain	90	42.3%
	Disagree	19	8.9%
Q2 I am able to plan preventive care for the cancer treated patients	Agree	135	63.4%
	Uncertain	59	27.7%
	Disagree	19	8.9%
Q3 I am able to manage the medical emergencies of the cancer treated patients	Agree	55	25.8%
	Uncertain	99	46.5%
	Disagree	59	27.7%
Q4 I am able to express the sense of empathy to cancer treated patients.	Agree	188	88.3%
	Uncertain	17	8.0%
	Disagree	8	3.8%
Q5 I have enough experience to manage the complexities of treating the cancer treated patients.	Agree	36	16.9%
	Uncertain	102	47.9%
	Disagree	75	35.2%
Q6 I prefer to refer the cancer treated patients to the specialist. (Patients should receive dental treatment in specialized clinics).	Agree	187	87.8%
	Uncertain	15	7.0%
	Disagree	11	5.2%

Table 3: Knowledge of the dentists toward anti-cancer therapy patients.

Questions	Answer	No.	%
Q7 Oral mucositis is:	correct	130	61.0%
	I don't know	26	12.2%
	incorrect	57	26.8%
Q8 Xerostomia is reversible side effect of chemotherapy.	correct	169	79.3%
	I don't know	12	5.6%
	incorrect	32	15.03 %
Q9 Osteonecrosis of the jaw, is serious side effect of ……. drug(s).	correct	62	29.1%
	I don't know	70	32.9%
	incorrect	81	38.0%
Q10 Biological therapies: are cancer therapy that cause stomatitis side effect	correct	97	45.5%
	I don't know	83	39.0%
	incorrect	33	15.5%
Q11 During active anti-cancer therapy, elective dental treatment should be avoided.	correct	163	76.5%
	I don't know	13	6.1%

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	incorrect	37	17.4%
Q12 In cancer-treated patients; superficial mucosal Candida infections are best treated with topical antifungals other than systemic agents to decrease the risk of side effects and drug interactions	correct	174	81.7%
	I don't know	24	11.3%
	incorrect	15	7.0%
Q13 ……. dental clearance protocol prior to (anti-cancer therapy) is routine in many cancer centers.	correct	37	17.4%
	I don't know	29	13.6
	incorrect	147	69%
Q14 In cancer patients, the need for antibiotic prophylaxis prior to invasive dental procedures when:	correct	67	23.0%
	I don't know	97	45.5%
	incorrect	49	31.5%
Q15 Infections and mouth sores are common side effects of……..... drugs.	correct	73	59.6%
	I don't know	13	6.1%
	incorrect	127	34.3%

Table 4-a: Correlation of dentists' attitude and knowledge based on their demographic and work characteristics.

Parameter		Attitude						Knowledge					
		Mean	S.D.	Correlation		Test Value for frequency differences		Mean	S.D.	Correlation		Test Value for frequency differences	
				r*	P-V**.	χ^2 ***	P-V.			r	P-V.	χ^2	P-V.
Gender	Male (88)	2.63	0.50	0.19	0.07	4.13	0.38	2.12	0.36	0.02	0.85	0.19	0.90
	Female (125)	2.44	0.60					2.16	0.36				
Age	27 - 50 (177)	2.54	0.52	-0.27	0.10	3.08	0.21	2.18	0.38	0.08	0.63	0.24	0.61
	> 50 (36)	2.44	0.65					1.97	0.16				
Have a Private Clinic?	Yes (137)	2.58	0.55	-0.05	0.67	0.60	0.74	2.14	0.37	-0.08	0.45	0.58	0.44
	No (76)	2.42	0.52					2.14	0.35				
Degree	BDS (88)	2.48	0.56	0.03	0.77	2.15	0.70	2.10	0.30	0.07	0.51	0.44	0.50
	POST (125)	2.55	0.54					2.17	0.40				
Institute treat anti-cancer therapy patients	Yes (58)	2.46	0.37	-0.08	0.51	72.45	0.74	2.27	0.23	-0.06	0.63	80.61	0.07
	No (155)	2.37	0.35					2.23	0.25				

*correlation; **P value; ***Chi square test

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Table 4-b: Comparison of dentists' attitude and knowledge based on their years of dental experience by ANOVA test.

Parameter		Attitude				Knowledge				
		Mean	**S.D.**	**ANOVA**	**P-Value**	**Mean**	**S.D.**	**ANOVA**	**P-Value & Duncan Test**	
Dental Experience	5-15 (93)	2.52	0.52	1.28	0.28	2.20	0.40	3.38	0.03 • (● Sig. at P ≤ 0.05)	B
	15-25 (81)	2.58	0.52			2.13	0.34			AB
	> 25 (39)	2.41	0.63			2.02	0.27			A

Table 5-a: Difference of attitude in dentists` groups according to years of experience:

Year of experience	5-15 years	15-25 years	> 25 years	Kruskal Wallis	Sig.
Agree	9.42	10.25	3.83	0.217	0.897 NS*
Uncertain	11.83	10.50	6.17	3.719	0.156 NS*
Disagree	10.75	11.25	6.50	2.874	0.238 NS*

Table 5-b: Difference of knowledge in dentists` groups according to years of experience:

Year of experience	5-15 years	15-25 years	> 25 years	Kruskal Wallis	Sig.
Correct answer	19.17	15.89	6.94	11.438	0.003 HS**
I don't know	15.67	14.22	12.11	0.922	0.631 NS*
Incorrect answer	16.06	15.50	10.44	2.738	0.254 NS*

HS** = High significant difference, NS* = Non-significant difference

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Table 6: Correlation between dentists' attitude and knowledge at all:

Correlations		
		Knowledge
Attitude	Correlation	- 0.076
	Sig. (2-tailed)	0.269

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Appendix 1: Questionnaire form

Knowledge and Attitude of dentists regarding (anti-cancer treated) patients:

Dear Dr.; This is an anonymous survey; precious information will be kept confidential. Please tick in the point provided.

Demographic:

1. Gender: Male Female

2. Age: 27-50 years More than 50 years

3. Degree: Bachelors (BDS.) Post Graduate

4. Dental experience: 5-15 years 15-25years More than 25 years

5. Do you have private clinic? Yes No

6 Dose your institute treat (anti-cancer therapy) patients? Yes No

Attitude:

1. I am able to provide dental treatment plan according to the needs and preference of the cancer treated patients.

Agree Uncertain Disagree

2. I am able to plan preventive care for the cancer treated patients

Agree Uncertain Disagree

3. I am able to manage the medical emergencies of the cancer treated patients

Agree Uncertain Disagree

4. I am able to express the sense of empathy to cancer treated patients.

Agree Uncertain Disagree

5. I have enough experience to manage the complexities of treating the cancer treated patients.

Agree Uncertain Disagree

6. I prefer to refer the cancer treated patients to the specialist. (Patients should receive dental treatment in specialized clinics).

Agree Uncertain Disagree

Knowledge:

7. Oral mucositis is:
A. Oral mucosal infection caused by *Staphylococcus aureus* bacteria
B. Oral mucosal infection caused by *Candida albicans* fungus.
C. Inflammation of oral mucosa due to break down mucosal lining of the mouth.
D. I don't know

8. Xerostomia is reversable side effect of chemotherapy.
A. True B. False C. I don't know

9. Osteonecrosis of the jaw, is serious side effect of ..... drug(s).
A. Bone modifying agents (bisphosphonate) B. Angiogenesis inhibitors (bevacizumab)
C. Both A & B D. I don't know

10. Biological therapies: are cancer therapy that cause stomatitis side effect.
A. True B. False C. I don't know

11. During active (anti-cancer therapy), elective dental treatment should be avoided.
A. True B. False C. I don't know

12. In cancer treated patients; superficial mucosal Candida infections are best treated with topical antifungals other than systemic agent to decrease risk of side effects and drug interactions.
A. True B. False C. I don't know

13. ..... dental clearance protocol prior to (anti-cancer therapy) is routine in many cancer centers.
A. Partial B. Complete C. Both A &B D. I don't know

14. In cancer patients, the need for antibiotic prophylaxis prior to invasive dental procedures when:
A. absolute neutrophil count less than 1000/mm3.
B. platelet count less than 60,000/mm3.
C. Both A & B
D. I don't know

15. Infections and mouth sores are common side effects of..... drugs.
A. Hormonal therapy B. Immunotherapy C. Both A & B D. I don't know

Thanks for your response