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RESEARCH ARTICLE

THE EFFECT OF ORAL CARE GUIDELINES ON THE INCIDENCE OF ORAL MUCOSITIS AMONG PATIENTS UNDERGOING HEAD AND NECK RADIOTHERAPY

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Abstract

Back ground: Oral mucositis (OM) occurs due to impaired function and integrity of the oral mucosa due to the toxic effects of cancer therapy which causes direct damage to the DNA of basal epithelial cells. Oral care guideln es are healthcare intervention designated to address the various barriers that patients may encounter as they move through the healthcare system. Oral care guidelines include adequate nursing assessment and providing instructi ons about oral care, dietary modifications and pain management. It has been found that maintenance of oral hygiene is one of the most effective ways to lower the risk of oral mucositis and minimize its progression.

Aim: This study aimed to evaluate the effect of oral care guidelines on the incidence of oral mucositis among patients undergoing head and neck radiotherapy**.**

Research Design: A Quasi-experimental research design was used to achieve the aim of this study.

Sample: A purposive nonprobability sample of 100 patients of both genders diagnosed with head and neck cancer were chosen and divided into two groups, study group (I) will receive nursing guidelines, and the control group (II) will receive the routine hospital care.

Setting: This study was conducted at the Head and Neck Radiotherapy department at National Cancer Institute (NCI), Cairo University (CU).

Tools: five tools used in the current study (I)Patients' Structured Interview Questionnaire, (II) Patients' Self-reported Oral Care checklist, (III) Oral Health Assessment Tool, (V) American National Cancer Institute Scoring for mucositis (NCI-CTC V5), (VI) The Pain Numeric Rating Scale (NRS-11).

Results: Thestudy revealed that there was a significant difference in knowledge, self-care practice, incidence and severity of oral mucositis and pain among study group.

Conclusion: The application of oral care guidelines is effective on reducing the incidence and severity of oral mucositis among head and neck cancer patients.

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Recommendations: Replication of the current study on larger probability sample is recommended to achieve generalization of the results.

Introduction:-

Radiation-induced oral mucositis (RIOM) is one of the most frequent complications in head and neck cancer (HNC) patients undergoing radiotherapy (RT). It is a type of mucosal injury associated with severe pain, dysphagia, and other symptoms, which leads to the interruption of radiotherapy and other treatments. Factors affecting Radiation-induced oral mucositis include individual characteristics of head and neck cancer patients, concurrent chemoradiation therapy, and radiotherapy regimen, among others (Liu, et al., 2021).Nurses play a key role in managing mucositis, requiring strong knowledge, skills, and the ability to educate patients on minimizing its effects. As effective treatments remain limited and preventive measures are few, management focuses on symptom relief through systematic oral hygiene and multidisciplinary protocols. Essential care steps include risk assessment, proactive intervention, continuous monitoring, and addressing related issues such as vomiting, dietary challenges, and oral infections. (Botti, et al., 2024).Evidence-based oral care guidelines play a key role in reducing oral complications from radiotherapy. By including oral care routines, patient education, nutritional support, and regular assessments, these guidelines help improve patient comfort and treatment adherence. Nurses' active involvement has become essential in the supportive care of cancer patients. (Zhang,et al., 2024).

Operation definition:

Oral care guidelines: It is the basic information and self-oral care practices provided to patients undergoing head and neck radiotherapy sessions which aimed to decrease the incidence and severity of oral mucositis and improved the patients' level of knowledge and self- oral care practices such as teeth brushing, mouth rinsing with baking soda, using dental floss, and sucking ice cubes.

Oral care solution: The researcher prepared an oral care solution (sodium bicarbonate) based on evidence-based practice(Brown & Gupta, 2020; Naibaho, et al., 2020)containing ½ a teaspoon of baking soda and ½ a teaspoon of table salt in 1 cup of warm water. The patients were instructed to perform mouth rinsing and teeth brushing with the baking soda solution according to the oral care guidelines.

Significance of the study:-

Egypt had one of the highest overall incidence rates of cancer of oral cavity and pharynx among Middle East countries **(**Leeman, et al, 2020**).**Radiation-induced oral complications occur in up to 80% of head and neck cancer irradiated patients and reach up to 100% in patients with altered fractionation head and neck cancer (Nirban, et al., 2021).Patients undergoing head and neck radiation therapy have reported oral problems as the most disturbing symptoms. Oral complications can cause increased health-care cost, supportive care, and length of hospital stay and lead to unplanned treatment interruptions and/or dose reductions of radiotherapy. For this reason, this study will be conducted to evaluate the effect of nursing guidelines on the incidence of oral complications among patients with head and neck radiotherapy

Aim of the study:-

1. Assessing knowledge and reported self-care practice regarding the oral cavity among patients with head and neck radiotherapy
2. Designing and implementing oral care guidelines related oral mucositis for patients undergoing head and neck radiotherapy.
3. Evaluating the effect of oral care guidelines on knowledge and self-care practice regarding oral mucositis among patients undergoing head and neck radiotherapy.
4. Evaluating the effect of oral care guidelines on the incidence and severity of oral mucositis among patients undergoing head and neck radiotherapy.

Research hypothesis:

1. Patients who received the oral care guidelines, will have high satisfactory level of knowledge than patients who will receive routine hospital care after head and neck radiotherapy sessions.
2. Patients who received the oral care guidelines, will have high satisfactory level of self-oral care practice than patients who will receive routine hospital care after head and neck radiotherapy sessions.

3. Patients who received the oral care guidelines, will have lower incidence& severity of oral mucositis than patients who will receive routine hospital care after head and neck radiotherapy sessions.
4. Patients who received the oral care guidelines, will have lower severity of oral health complications than patients who will receive routine hospital care after head and neck radiotherapy sessions.

Research design:
Quasi-experimental research design was used in this study.

Research Setting:
The study was conducted at Head and Neck Radiotherapy department in National Cancer Institute, affiliated with Cairo governmental University, Egypt.

Research Subjects:
A purposive nonprobability sample of 100 patients from both sex who diagnosed with primary head and neck cancer and undergoing radiation therapy but don't have oral complications due to it from exclusion criteria. The study subjects were divided randomly into groups: study group (50 patients) who received oral care guidelines and routine hospital care; and control group (50 patients) who received only the routine hospital care.

Inclusioncriteria:

- Adult male and female conscious patients.
- Diagnosed with primary head and neck cancer and undergoing radiation therapy
- Agreement to participate in the study.

Exclusioncriteria:

- Patients who already have oral complications.
- Patients who had current chemotherapy.
- Patients had a history of previous radiotherapy/chemotherapy.
- Patients with chronic debilitated diseases such as cardiac, renal, etc.,

Tools for data collection:
Five tools are utilized to collect data during the study period:
Tool I: Patients' Structured Interview Questionnaire (Appendix I): It was developed by the researcher and was written in English language and translated into Arabic language based on literature of review (Balgobind, et al., 2024;Pai, et al., 2024; Ward, et al., 2024). It was consisted of three parts:Part (I): Patient's Demographic assessment tool,Part (II): Patient's medical history assessment tool,Part (III):Patient knowledge assessment questionnaire

The scoring system for patient knowledge assessment questionnaire: The correct answer of patients' knowledge was scored by 1, while the incorrect answer scored by zero. Total score was 23 degrees, and it was classified into two levels based on statistics cut of point**:**

- Satisfactory knowledge ≥ 60 % (≥ 14 degrees)
- Unsatisfactory knowledge < 60 % (< 14 degrees) (Zuo, et al., 2024)

Tool II: Patients' Self- reported Oral Care checklist (Appendix II): It was developed by the researcher in a simple Arabic language based on the related literature (American National Institute of Dental and Craniofacial Research, 2024; World Dental Federation, 2019) to assess patients' ability to perform skills related to self- reported oral care practices.It included 19 steps related to teeth brushing, mouth rinse with baking soda, dental floss and sucking ice cubes before and after radiotherapy sessions.

The scoring system for patients' self- reported oral care: If the step wasdone correct and complete, it was scored 2, while if the step was done correct but incomplete, it was scored 1,while if the step wasn't done or done incorrectly it scored zero. The total score of patients' self- reported oral care practices was 38 degrees based on statistics cut of point, classified into two levels:

- satisfactory patients' self- reported oral care ≥ 60 % (≥ 11 points).
- unsatisfactory patients' self- reported oral care < 60 % (< 11 points).

Tool III: Oral Health Assessment Tool OHAT (Appendix III): It was adapted from (Dickinson, et al., 2001;Chalmers, et al., 2005; Simpelaere, et al., 2016). Then, it was modified by the researcher in a simple Arabic language based on the related literature (Qamar, et al., 2024; Karlsson, et al., 2024).It used to assess the patient's oral cavity and its functions according to patient's description before start the radiotherapy sessions and after.

This tool consisted of two parts as follows:

- **Part (I):** Oral cavity Assessment: it provides a systematic way to assesspatient's oral cavity through (lips, gingival, tongue, palate, saliva, mucous membranes, natural teeth and oral cleanliness).
- **Part (II):** Oral Function assessment: It was used to assess patient's oral cavity problems. It includes four categories(swallowing, taste, speaking and chewing).Each point has the following alternative responses and it is ranged from one to four score as: Not difficult, slightly difficult, Moderate difficult and Severe difficult.

The scoring system for Oral Health Assessment Tool OHAT:

- (0) Indicates not difficult or normal
- (1) slightly difficult
- (2) moderate difficult
- (3) severe difficultDickinson, et al., (2001); Chalmers, et al., (2005)

Tool V:American National Cancer Institute Scoring for oral mucositis NCI-CTC V5 (Appendix V): It was adopted from American National Cancer Institute (2018).it was valid and reliable tool version 5 that included objective measures of oral mucositis severity. It included five grades for assessing severity of oral mucositis, ranged from grade zero which indicates no oral mucositis to grade four which indicate ulcers, alimentation not possible (due to mucositis).

The scoring system for tool V (NCI-CTC V5):

- (0) indicates No oral mucositis(1) Mild
- (2) Moderate (3) Severe
- (4) Life-threatening A**merican NCI (2018)**

Tool VI:Pain Numeric Rating Scale NRS-11(Appendix VI): It was adopted from Breivik et al.,(2008). It was a widespread clinical used tool for assessing a patient's level of pain on a scale from 0 to 10,where 0 represents "no pain" and 10 represents "the worst pain possible. It was a valid and reliable measure (**r** = 0.63), suitable for using in adults and older adults.

The scoring system for Pain Numeric Rating Scale (NRS-11) questionnaire was from zero to ten which distributed as the following:

- (0) Indicates no pain
- (1-3) Mild pain
- (4-6) Moderate pain
- (7-10) Severe pain**Breivik et al.,(2008)**.

Operational item:
Included preparatory phase, content validity and reliability, pilot study and field work.

The preparatory phase:
It included reviewing the recent related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals, and magazines in order to develop and modify the data collection tools.

Tool's Validity and Reliability:-
Testing validity refers to how well a scientific tool measures what it is intended to measure, and in this study, both face and content validity were employed to evaluate the proposed tools. Face validity involved inspecting the items to determine whether they appear to measure the intended concepts. Content validity were ascertained by a group of five experts from medical-surgical nursing department, Faculty of Nursing, Helwan university. Their opinion was elicited regarding the format, layout, consistency, accuracy and relevance of the tools and modification was

done.Testing reliability of the proposed tools was done statistically by Cronbach alpha test for the total items. It was used to examine whether the study tools had internal consistency.

Pilot study:
A pilot study was conducted on 10 %of subjects (10 patients) to test the applicability and feasibility of the study tools as well as time needed to fill this tool. Obtained results used as a guide to reconstruct the changes needed in the data collection tools and those subjects were excluded from the study sample.

Field work:-
The actual work of this study started and completed withineight months from beginning of September (2024) to the end of April (2025). Data were collected by the researcher two days per week, at the morning and afternoon shifts in the previous mentioned setting.Subjects were divided into two groups; control and study group, each group consisted of 50 patients who undergoing head and neck radiotherapy. Study group included patients who received oral care guidelines with baking soda and cryotherapy in addition to routine hospital care while control group included patients who received routine hospital care only. The fieldwork of the current study was conducted through three phases;assessment phase, implementation phase and evaluation phase.

Assessment Phase:
During this phase, Patients in the head and neck radiotherapy department who met the study criteria were included in the study after explaining the purpose of the study and obtaining their oral and written consent before any data collection. The first 50 patients were selected to be a control group, while the second 50 patients were selected to be a study group. The researchers collected the data during the morning and afternoon shifts in head and neck radiotherapy department at two days/ week. Data was collected firstly from the control group to prevent contamination of data. Once data collection for the control group was completed, the researcher proceeded to collect data from the study group.

For the control group, data collection started by the interviewing process by filling the Patients' Structured Interview questionnaire tool (I) part 1, 2 and 3 which took about 25 minutes to collect patients' demographic data, patients' medical history and patients' knowledge. then, the researcher asked the patient using Tool (II) Patients' Self-reported Oral Care checklist about how perform mouth rinsing, teeth brushing and flossing which took about 15 minutes. After that, the researcher using oral health assessment tool (III) to evaluate the patients' oral health status which took about 25 minutes. finally, the researcher using American national cancer institute scoring for oral mucositis tool (V) and pain numeric rating scale tool (VI) to assess severity of oral mucositis and evaluate the patients' level of pain. Each assessment session took about 15 to 30 minutes to complete for each patient. The researcher reviewed each point in front of patient to be sure that no points are missed. While for the study group data collection started also by the same sequence as the control group which took also the same time to be filled.

Implementation Phase:
During this phase, the researcher implemented the oral care guidelines for each patient in the study group in small group from 3-5 patients and continued during radiotherapy sessions according to each patient’s individual needs, lifestyle, level of education, and expectations, promoting better comprehension and adherence to the recommended the practical part of self-reported oral care practice. The oral care guidelines were presented in theoretical and practical sessions;The theoretical part was conducted through lectures, and sharing discussion, distributed a colored educational booklet to each patient or their accompanying relative and clarified each item in the guidelines for every patient which was taken in 2 sessions (each session about 25-30 minute). The researcher stressed on definition of head and neck cancer, oral mucositis, radiotherapy, its action, and its side effects on oral cavity.

Patients were advised about the importance of integrating knowledge with practical oral care strategies to minimize complications during radiotherapy. Patient education begins with understanding head and neck cancer and the impact of radiotherapy on oral tissues, including the risk of developing oral mucositis characterized by erythema, ulceration, pain, and impaired oral function. Understanding the pathophysiology of mucositis and its impact on nutrition, hydration, and quality of life helps patients recognize the importance of proactive oral care. Educating patients on oral care guidelines ensures they are better prepared to minimize these side effects, reduce infection risk, and enhance overall treatment tolerance. Knowledge-based interventions not only raise awareness but also foster patient engagement and adherence to daily oral hygiene practices that are vital during radiotherapy.Oral care guidelines form the cornerstone of prevention and management, focusing on consistent mouth rinsing with non-

irritating solutions such as baking soda (sodium bicarbonate) to maintain mucosal moisture and reduce microbial load. Regular teeth brushing with a soft-bristle toothbrush and toothpaste helps prevent dental caries and secondary infections, while flossing, when tolerated, supports gingival health and plaque control. Comprehensive education and reinforcement of these practices empower patients to actively participate in their care, ultimately improving oral health outcomes and quality of life during cancer treatment.

The practical part was conducted through demonstration, re-demonstration, using real materials. They were taken in 3 sessions (each session about 35-45 minute), in this part each patient had explanation by the researcher about how to apply oral care guidelines using prepared baking soda solution (1/2 teaspoon of baking soda on a glass of warm water) for mouth wash 4-6 times per day.Firstly, the researcher started to demonstrate oral care practice using self-reported oral care checklist (tool II) that consist of 19 steps distributed as follows; some steps related to teeth brushing, mouth rinse with baking soda, dental floss and sucking ice cubes. Then, each patient allowed to re-demonstrate oral care practice under supervision of the researcher, taking feedback about techniquesof special brushing and flossing, mouth rinse with baking soda according to each patient needs. at the end, patients were informed to be in contact with the researchers by telephone for any guidance.

Evaluation phase: It was emphasized on:

1. Evaluating the effectiveness of the oral care guidelines on patients' knowledge through the comparison between the control and study group before starting radiotherapy sessions course and at the end of implementation of oral care guidelines (week 7) using tool (I) part (III).
2. Evaluating the effectiveness of the oral care guidelines on patients' knowledge and self-reported oral care practice through the comparison between the control and study group before starting radiotherapy sessions course and at the end of implementation of oral care guidelines (week 7) using tool (II).
3. Evaluating the effectiveness of the oral care guidelines on the incidence & severity of oral mucositis and pain through the comparison between the control and study groups starting after 2 weeks from first radiotherapy session, follow every week using time series until the end of implementation of oral care guidelines (week 7) using tools (V-VI).
4. Evaluating the effectiveness of the oral care guidelines on oral health assessment through the comparison between the control and study groups starting after 2 weeks from first radiotherapy session and at the end of implementation of oral care guidelines (week 7) using tool (III).

Ethical Considerations:

The research approval was obtained from scientific research ethical committee in the faculty of nursing at Helwan University (10/12/2023) before initiating the study work. The researcher clarified the objectives and aim of the study to patients or their families included in the study before starting. The researcher assured maintaining anonymity and confidentiality of the subject's data. Patients or their families were informed that they are allowed to choose to participate or not in the study and that they have the right to withdraw from the study at any time without giving any reason. Ethics, values, culture and beliefs were respected.

Administrative item:

An official permission was obtained from the director of the National Cancer Institute and head of the head and neck radiotherapy department in which the study was conducted. A letter was issued to them from the faculty of nursing; Helwan University explains the aim of the study for obtaining permission for data collection.

Table (1A):illustrates the demographic characteristics among studied patients. The mean age of participants was slightly higher in the study group (39.6 ± 0.44 years) compared to the control group (37.3 ± 0.42 years), with no statistically significant difference between them ($p = 0.233$). Regarding gender, males represented 54.0% of the study group and 60.0% of the control group ($p = 0.545$), indicating homogeneity between groups. In terms of marital status, married participants predominated in both groups without a significant variation ($p = 0.147$). Concerning educational level, most of the studied patients were illiterate (60% in the study group and 56% in the control group), showing no significant difference across educational categories ($p = 0.519$) comparability.Finally, there was no statistically significant difference between two groups regarding their demographic characteristics.Figure (2): Illustrates that the distribution of cancer locations among the studied patients indicates that the oral cavitywas the most affected site in both groups, with 78% in the study group and 76% in the control group. Cancer of the pharynxwas more common in the study group (10%) compared to the control group (4%). Conversely, laryngeal cancer appeared in only 12% of the study group with (20%) in the control group p-value >0.05.

Table (5): presents the frequency and percentage distribution of patients' knowledge regarding head and neck cancer and radiotherapy after the intervention. There was a highly significant improvement in the study group compared to the control group in most knowledge items, including the definition, causes, symptoms, and complications of head and neck cancer ($P < 0.001$). Similarly, knowledge related to the aim, types, side effects, and complications of radiotherapy showed a significant enhancement among the study group ($P < 0.001$). However, no significant difference was observed regarding the "treatment" and "definition of radiotherapy" items ($P > 0.05$).Figure (6):illustrates the mean total knowledge scores regarding oral mucositis and oral care among the study and control groups after implementation of oral care guidelines (n = 100). there was a marked improvement in the study group.

The mean knowledge score for oral mucositis increased from 1.10 to4.50, representing an improvement of approximately 309%, while oral care knowledge rose from 1.86 to 5.28, an increase of about 184%. In contrast, the control group showed only slight improvement, with oral mucositis knowledge increasing from 1.55 to 1.90 (around 22%) and oral care knowledge from 1.62 to 2.52 (around 56%).Figure (8):illustrates the post-intervention comparison of total self-reported oral care practice between the study and control groups. The study group showed a markedly higher level of satisfactory practice, with 84% of patients reporting satisfactory oral care compared to only 16% who remained unsatisfactory. In contrast, the control group demonstrated much lower improvement, with only 36% achieving satisfactory practice, while the majority **(**64%**)** continued to exhibit unsatisfactory practice. Overall, the figure clearly demonstrates that the intervention had a strong positive impact on the study group's oral care practices, whereas the control group showed minimal progress.

Table (12B): Shows a clear improvement in oral cavity status among patients who received the intervention. In the study group, 54% achieved a normaloral cavity condition compared to only 14% in the control group. Mild issues were similar between groups (30% vs. 28%), but moderate problems were far less frequent in the study group (10%**)** than in the control (36%**).** Likewise, **s**evere cases were markedly lower in the study group (6%**)** compared to the control group (22%). The mean oral cavity assessment score further highlights this difference, with the study group showing a much better outcome (1.51±0.76) compared to the control group (4.42±1.68). The difference was statistically significant ($p < 0.001$), indicating a strong positive effect of the intervention on oral cavity health.Figure (12):showed data After the intervention, In the study group, the proportion of patients with normal oral function increased markedly from 10% to 58%, while those with mild impairment represented 26%. Meanwhile, moderate and severe dysfunction decreased dramatically to 12% and 4%, respectively.

In contrast, the control group showed only modest improvement after the intervention, with normal cases increasing from 16% to 20%, mild from 14% to 24%, moderate decreasing from 40% to 34%, and severe cases slightly declining from 30% to 22%Figure (13):The figure illustrates the mean total scoring for mucositis related to oral complications among studied patients. At week 2, the mean mucositis score was 2.74 in the study group compared to 4.57 in the control group, indicating a milder onset of mucositis symptoms among those who followed the oral care intervention. Over the subsequent weeks, the study group showed only a slight increase in mucositis severity, peaking at 3.67 in week 4, before slightly decreasing and stabilizing around 3.19–2.9 from weeks 5 to 7. In contrast, the control group exhibited a continuous and significant rise in mucositis scores throughout the treatment period. The mean score increased progressively from 4.76 in week 3 to 5.16 in week 4, 5.84 in week 5, and reached 6.79 by week 7, reflecting a steady worsening of oral mucosal conditions.

Figure (14):The figure illustrates the mean pain scores (Pain Numeric Rating Scale) among studied patients. At week 2, the mean pain score for the study group was 2.23, whereas the control group recorded a higher mean of 3.56, indicating that pain was already more pronounced among patients without the intervention. Over time, the study group demonstrated minimal changes in pain levels, fluctuating slightly between 2.08 and 2.54 throughout the treatment period and ending at 2.07 in week 7, showing a slight overall decrease. Conversely, the control group showed a progressive increase in pain intensity across all weeks. The mean pain score rose steadily from 4.18 in week 3 to 4.67 in week 4, then sharply to 5.61 in week 5, reaching 6.12 by week 7. This pattern represents a nearly 72% increase in pain severity over the treatment duration among patients who did not receive oral care guidance.Table (22): The table shows that there was a positive correlation between total practice and total knowledge in both groups. Regarding the control group, a weak correlation was found at the pre-phase ($r = 0.102$, $P = 0.569$) which became statistically significant in the post-phase ($r = 0.218$, $P = 0.042$*). In the study group, a moderate positive correlation was observed at the pre-phase ($r = 0.240$, $P = 0.064$) and a highly significant strong positive correlation in the post-phase ($r = 0.520$, $P < 0.001$*).

Table (23): The table illustrates a negative correlation between total knowledge and both oral cavity and oral function in the control and study groups. In the control group, weak negative correlations were noted during both pre- and post-phases without statistical significance (P > 0.05). In contrast, the study group demonstrated moderate negative correlations during the pre-phase (r = –0.238, P = 0.068 and r = –0.255, P = 0.052 for oral cavity and oral function respectively)Table (24): The table shows that there was a negative correlation between total practice and both oral cavity and oral function in the control and study groups. In the control group, weak negative correlations were found at both pre- and post-phases without statistical significance (P > 0.05). Meanwhile, the study group showed moderate negative correlations at the pre-phase (r = –0.235, P = 0.079 and r = –0.249, P = 0.058 for oral cavity and oral function respectively) which became strong and highly significant in the post-phase (r = –0.514, P < 0.001* and r = –0.538, P < 0.001*).

Table (25): The table shows a negative correlation between total knowledge and both Severity of Oral mucositis (NCI) and Pain Numeric Rating scores in the control and study groups. In the control group, weak negative correlations were found in both pre- and post-phases without statistical significance (P > 0.05). On the other hand, the study group revealed moderate negative correlations during the pre-phase (r = –0.242, P = 0.066 and r = –0.258, P = 0.054 for Severity of Oral mucositis (NCI) and Pain Numeric Rating respectively), which became strong and highly significant in the post-phase (r = –0.521, P < 0.001* and r = –0.547, P < 0.001*).Table (26): The table presents a negative correlation between total practice and both Severity of Oral mucositis (NCI)and Pain Numeric Rating scores among the control and study groups. In the control group, weak negative correlations were detected in both pre- and post-phases with no statistical significance (P > 0.05). Conversely, the study group demonstrated weak negative correlations during the pre-phase (r = –0.212, P = 0.096 and r = –0.202, P = 0.169 for Severity of Oral mucositis (NCI)and Pain Numeric Rating respectively), which became strong and highly significant in the post-phase (r = –0.509, P < 0.001* and r = –0.532, P < 0.001*).

Table (1A): Frequency and Percentage Distribution of Demographic Characteristics of the Studied Patients (n=100).

Demographic- Characteristics	Study (n=50)		Control (n=50)		Chi-square	
	No.	%	No.	%	X^2	P-value
Age (Years)						
20 < 35	5	10.0	11	22.0	2.914	0.233
35 < 50	35	**70.0**	32	**64.0**		
≥50	10	20.0	7	14.0		
Mean± SD	**39.6 ± 0.44**		**37.3 ± 0.42**			
Gender						
Male	27	**54.0**	30	**60.0**	0.367	0.545
Female	23	46.0	20	40.0		
Marital status						
Married	35	**70.0**	28	**56.0**	2.102	0.147
Unmarried	15	30.0	22	44.0		
Level of education						
Cannot Read and write	30	60	28	**56**	2.265	0.519
Basic	10	20	7	14		
Secondary	5	10	5	10		
University	5	10	10	20		

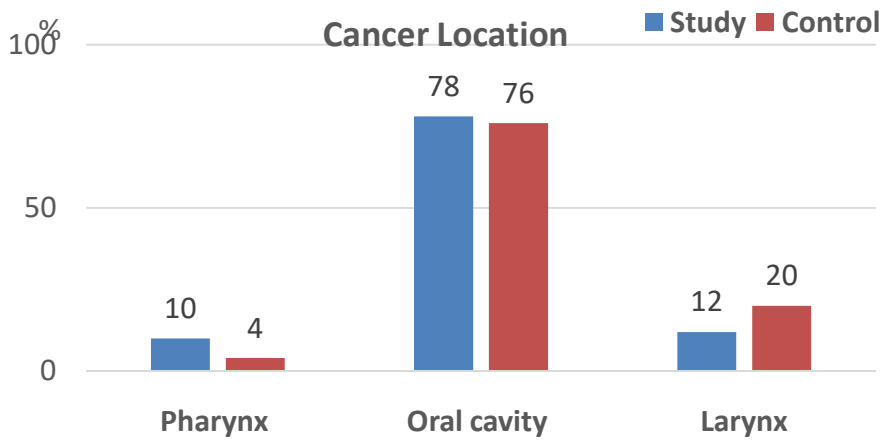

Figure (2): Percentage Distribution of Studied patients Regarding to Cancer Location (n=100)

Table (5): Frequency and Percentage Distribution of Studied Patients Regarding Knowledge of Head and Neck Cancer and Radiotherapy Post-Intervention (n=100).

Items	Post-intervention				Chi-square	
	Study (n=50)		Control (n=50)		X^2	P-value
	No.	%	No.	%		
Head and Neck Cancer:						
Definition	48	96	28	56	21.930	<0.001*
Causes	50	100	25	50	33.333	<0.001*
Symptoms	44	88	20	40	25.000	<0.001*
Stages	42	84	30	60	7.143	0.008*
Methods of diagnosis	45	90	36	72	5.263	0.022*
Treatment	47	94	42	84	2.554	0.110
Complications	49	98	25	50	29.938	<0.001*
Radiotherapy:						
Definition	40	80	42	84	0.271	0.603
Aim	44	88	20	40	25.000	<0.001*
Types	44	88	20	40	25.000	<0.001*
Side effects	46	92	25	50	21.418	<0.001*
Complications	43	86	25	50	14.890	<0.001*

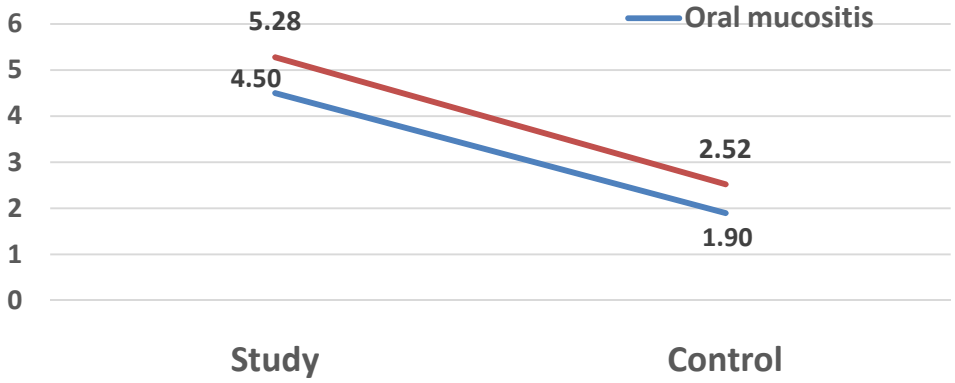

Figure (6): Mean oftotalKnowledge among studied patients regarding Oral Mucositis and oral care Post of oral care guidelines (n=100).

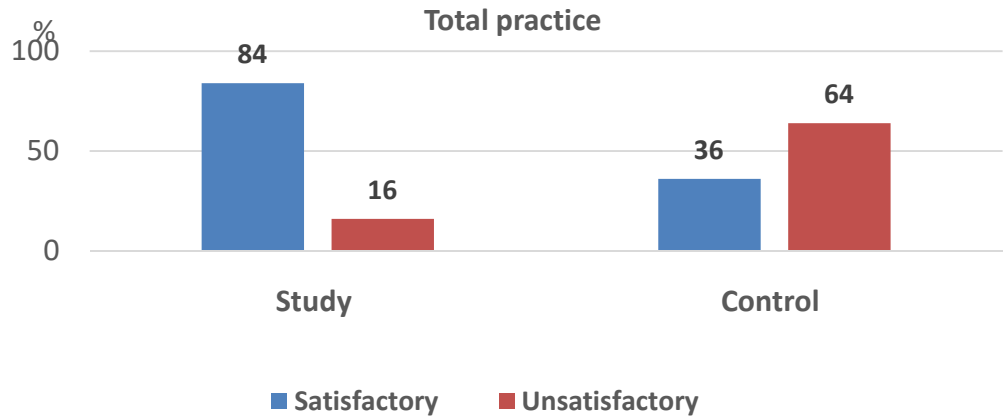

Figure (8): Percentage Distribution of Studied patients regarding patients' Total self-reported oral care, Post Intervention (n=100).

Table (12B): Frequency and Percentage Distribution of Studied patients Regarding Total Oral Cavity Assessment, Post Intervention (n=100).

Total Oral cavity		**Post**			
		Study(n=50)		Control (n=50)	
		No.	%	No.	%
Normal		27	54	7	14
Mild		15	30	14	28
Moderate		5	10	18	36
Sever		3	6	11	22
Mean ± SD		1.51±0.76		4.42±1.68	
Chi-square	**X^2**	23.718			
	P-value	<0.001*			

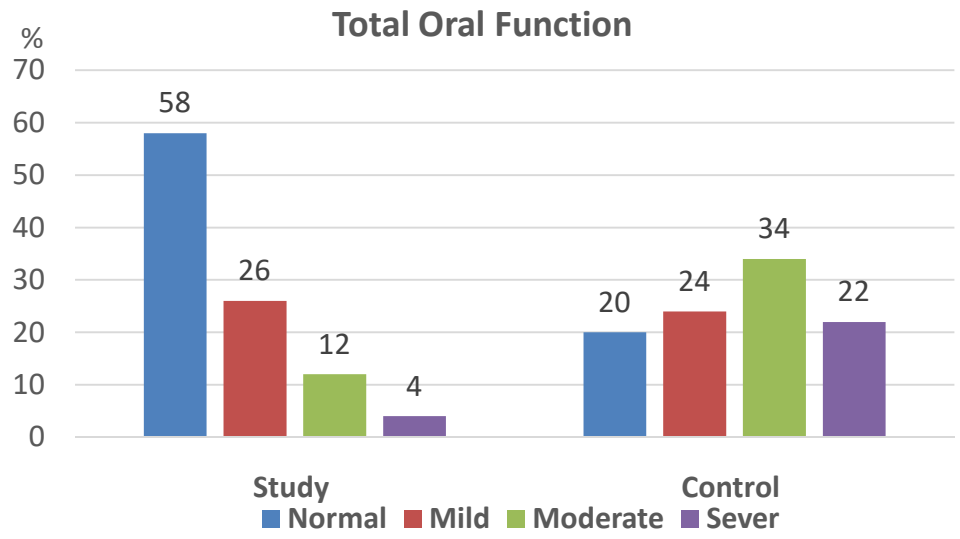

Figure (12): Frequency and Percentage Distribution of Studied Patients Regarding Total Oral function, Post Intervention (n=100).

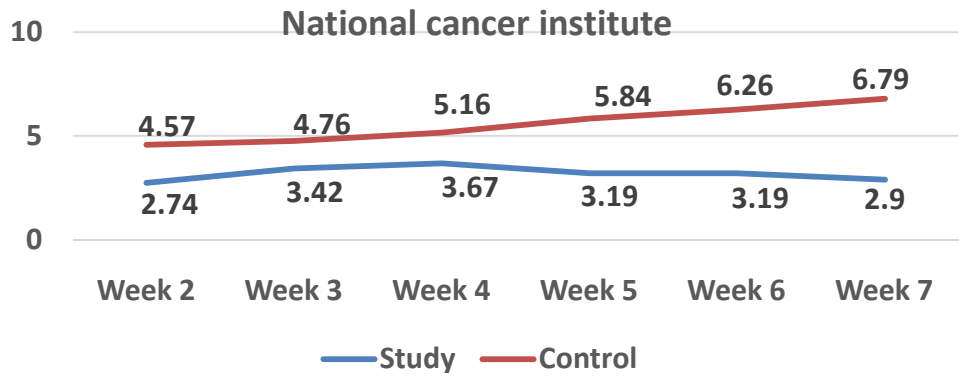

Figure (13): Frequency and percentage distribution of studied patients regarding their Total Scoring for Mucositis Related to Oral Complications among Patients Undergoing Head & Neck Radiotherapy (n=100).

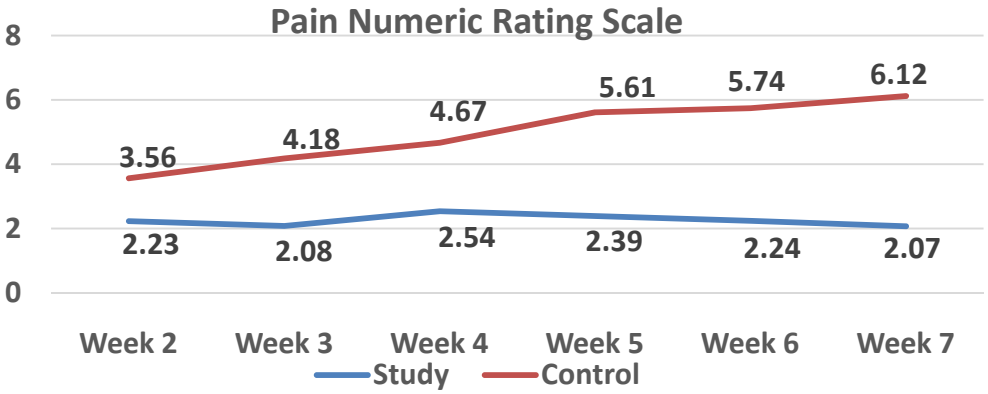

Figure (14): Frequency and percentage distribution of studied patients regarding to their total Pain Score Related to Oral Complications among Patients Undergoing Head & Neck Radiotherapy (n=100).

Table (22): Correlation between Total Practice and Total Knowledge among the Studied Groups

Total practice	Total Knowledge			
	Control		Study	
	r	P-value	r	P-value
Pre	0.102	0.569	0.240	0.064
Post	0.218	0.042*	0.520	<0.001*

Table (23): Correlation between Total Knowledge and Oral Health Assessment among the Studied Groups

Oral Health Assessment	Total Knowledge			
	Control		Study	
	r	P-value	r	P-value
Pre				
Oral cavity	-0.182	0.214	-0.238	0.068
Oral Function	-0.201	0.168	-0.255	0.052
Post				
Oral cavity	-0.221	0.123	-0.518	<0.001*
Oral Function	-0.243	0.098	-0.542	<0.001*

Table (24): Correlation between Total Practice and Oral Health Assessment among the Studied Groups

Oral Health Assessment	Total practice			
	Control		Study	
	r	P-value	r	P-value
Pre				
Oral cavity	-0.158	0.271	-0.235	0.079
Oral Function	-0.189	0.192	-0.249	0.058
Post				
Oral cavity	-0.219	0.136	-0.514	<0.001*
Oral Function	-0.241	0.11	-0.538	<0.001*

Table (25): Correlation between Total Knowledge, National Cancer Institute, and Pain Numeric Rating among the Studied Groups

Severity of Oral mucositis (NCI) Pain Numeric Rating	Total Knowledge			
	Control		Study	
	r	P-value	r	P-value
Pre				
Severity of Oral mucositis(NCI)	-0.176	0.228	-0.242	0.066
Pain Numeric Rating	-0.193	0.187	-0.258	0.054
Post				
Severity of Oral mucositis(NCI)	-0.208	0.148	-0.521	<0.001*
Pain Numeric Rating	-0.226	0.126	-0.547	<0.001*

Table (26): Correlation between Total Practice, Severity of Oral mucositis (NCI), and Pain Numeric Rating among the Studied Groups

Severity of Oral mucositis (NCI) Pain Numeric Rating	Total practice			
	Control		Study	
	r	P-value	r	P-value
Pre				
National cancer institute	-0.169	0.243	-0.212	0.096

Pain Numeric Rating	-0.185	0.199	-0.202	0.169
Post				
National cancer institute	-0.214	0.145	-0.509	<0.001*
Pain Numeric Rating	-0.233	0.119	-0.532	<0.001*

Discussion:-

Oral mucositis (OM) is a common and debilitating adverse effect observed in patients with head and neck cancer (HNC) receiving radiation therapy (RT) with an incidence of 85%-100%. It is characterized by painful inflammation and ulceration of the mucosal membranes in the mouth and throat. This negatively affects patients by causing pain and discomfort while also diminishing the ability to speak, swallow, and eat (Iovoli, et al., 2023).As regards the demographic characteristics of patients in both the study and control groups,those in the study group were slightly older, although the difference was not statistically significant. Approximately half of the participants in each group were males, and most were married, indicating a comparable distribution of gender and marital status. In terms of education, more than half of the participants in both groups were illiterate, with no significant variation detected.From the researcher's perspective, the demographic homogeneity between the two groups is crucial for ensuring internal validity. When age, gender, marital status, and education are comparable, it minimizes the influence of confounding variables on postoperative outcomes such as oral mucositis. For instance, educational level may influence patients' understanding and adherence to oral-care instructions; however, since both groups had a similar proportion of illiterate participants, this potential bias was equally distributed.

Likewise, the predominance of married participants might reflect a supportive family environment that facilitates postoperative care adherence, but this factor was consistent across both groups. Therefore, any subsequent differences in oral mucositis incidence can be more confidently attributed to the implementation of oral care guidelines rather than baseline demographic disparities.The present findings are consistent with those of Karlsson et al. (2024). in study entitled with " Clinical pharmacists and nurses in the management of oral mucositis in head and neck cancer patients during antineoplastic therapy: A scoping review" who reported that balanced demographic characteristics between intervention and control groups were essential for accurately assessing oral mucositis outcomes among head and neck cancer patients. Similarly, Colella et al. (2023). in study entitled with "Interventions for the prevention of oral mucositis in patients receiving cancer treatment"who emphasized that homogeneity in baseline characteristics enhances the interpretability of clinical interventions in mucositis prevention studies. Furthermore, Elad et al., (2022). in study entitled with " The broadening scope of oral mucositis and oral ulcerative mucosal toxicities of anticancer therapies" whohighlighted those differences in education and health literacy could influence self-care behaviors and mucosal recovery, reinforce the importance of demographic balance when evaluate oral-care interventions.

The distribution of cancer sites among the studied patients indicates that the oral cavity was the most frequently affected region in both groups. This predominance can be explained by the high susceptibility of the oral mucosa to carcinogenic exposures, such as tobacco, alcohol, and viral infections, which are well-established risk factors for oral cancers Pacheco, et al., 2021; Pai, et al., (2025).in study entitled with "Impact of an oral care intervention protocol on oral health outcomes in head and neck cancer patients undergoing radiation or chemoradiation therapy"The slightly higher occurrence of pharyngeal cancer in the study group and laryngeal cancer in the control group may be attributed to individual variations in lifestyle and environmental exposures, including smoking intensity, alcohol consumption, and human papillomavirus (HPV) infection, which can influence the anatomical site of tumor development (Mazzetti, et al., 2022).From a research perspective, these variations are expected and reflect the heterogeneous nature of head and neck cancers rather than a systematic difference between the groups.Comparable findings have been reported in the literature. Agurto, et al. (2024). observed a similar pattern, with the oral cavity being the most affected site among patients undergoing radiotherapy for head and neck cancers, while differences in pharyngeal and laryngeal cancer distribution were minor and did not reach statistical significance. Similarly, Mascarenhas, (2021). in study entitled with "Salivary gland hypofunction and/or xerostomia induced by nonsurgical cancer therapies" who highlighted those variations in tumor location within head and neck regions are primarily influenced by patient-specific risk factors rather than treatment allocation, supporting the notion that the observed distribution in the current study reflects baseline comparability.

Concerning patients' total knowledge regarding head and neck cancer and radiotherapy after implementing oral care guidelines, the current findings demonstrate a significant enhancement in the total knowledge scores of patients regarding head and neck cancer and radiotherapy following the implementation of oral care guidelines.From the

researcher's perspective, the marked improvement in the study group after the intervention highlights the positive impact of tailored educational sessions that were patient-centered, interactive, and delivered using simplified materials suited to participants' comprehension levels. Such interventions enhance patients' ability to process health information, leading to better disease awareness and treatment engagement.These findings are in agreement with Thakare&Ankar, (2021). in study entitled with " To Evaluate the Effectiveness of Awareness Program on Self Care Management among Patients Undergoing Radiotherapy" and Ibrahim, (2021). in study entitled with " Effect of Teaching Self-care Module on Radiation-therapy 'Side Effects and Clinical Outcomes of Head and Neck Cancer Patients " who reported that structured education programs significantly increased patients' knowledge and confidence regarding radiotherapy care among head and neck cancer patients. Similarly, Guo, et al. (2024). in study entitled with "Knowledge, attitude, and practice toward advanced precision radiotherapy among patients with head and neck cancer" who found that health education focusing on radiotherapy and side effect management improved both understanding and adherence to preventive oral care measures.

Moreover, Nayak, et al. (2024). in study entitled with "Effectiveness of Comprehensive Intervention Program me on Quality of life, fatigue, self-efficacy, and psychosocial distress among head and neck cancer patients receiving radiotherapy" who demonstrated that comprehensive intervention programs combining education, counseling, and continuous reinforcement produced sustained improvements in patients' health literacy and self-management behaviors during radiotherapy.Concerning the total knowledge about head and neck cancer, radiotherapy, oral mucositis, and oral care, the results demonstrated that before applying the oral care guidelines, most participants in both the study and control groups displayed limited and unsatisfactory knowledge regarding head and neck cancer, radiotherapy, oral mucositis, and oral care. Only a small portion of patients in either group possessed adequate understanding, indicating a general lack of awareness of the significance of preventive oral care and mucosal management prior to intervention.From a researcher's perspective, this baseline deficiency is expected, as patients with head and neck cancer frequently prioritize treatment of the primary disease and may receive limited structured guidance regarding supportive oral care unless specifically provided by healthcare professionals.Following the implementation of the oral care guidelines, there was a substantial improvement in the study group. The majority of patients shifted from unsatisfactory to satisfactory knowledge levels, reflecting the strong effect of the educational intervention. By contrast, the control group showed only slight improvement, likely due to incidental learning or routine clinical counseling, which is typically less systematic. This suggests that structured, targeted education is significantly more effective than general routine instructions in enhancing patient awareness and preparing them for self-care during treatment.

These findings align with Sanchooli et al. (2025). in study entitled with "The Effect of Educational-Care Intervention on the Severity of Mucositis Related to Radiotherapy in Patients with Head and Neck Cancers"who reported that structured oral care education strongly improves knowledge and self-management behaviors among patients receiving radiotherapy. Similarly, Amin, et al. (2024). in study entitled with"Oral health of chemotherapy patients before and after provision of oral hygiene instructions at a tertiary care hospital " who found that oral care instruction programs significantly increased knowledge retention and daily oral hygiene practices in oncology patients.

Moreover, Pai et al. (2025). in study entitled with" Impact of an oral care intervention protocol on oral health outcomes in head and neck cancer patients undergoing radiation or chemoradiation therapy " who emphasized that guided oral care training reduces knowledge gaps that contribute to severe mucositis.Furthermore, Tao, et al. (2024). in study entitled with "Effect of oral health education on improving knowledge, attitude, practice, and oral health status of patients with liver cancer"andPathore, (2021). in study entitled with "Effectiveness of vedio assisted educational program regarding prevention of oral muscositis in terms of knowledge and expressed practices among patients receiving radiotherapy at AIIMS jodhpur " whohighlighted that education involving explanation, demonstration, and reinforcement is essential for improving patient understanding and adherence to oral hygiene regimens during cancer therapy. Together, these studies support the conclusion that structured oral care guideline programs are effective in improving patient knowledge and have the potential to reduce treatment-related complications such as oral mucositis.Regardingpatients' total self-reported oral care pre and post intervention,the current results indicate that before the intervention, patients in both the study and control groups demonstrated inadequate oral care practices, with most individuals performing oral hygiene steps incorrectly or incompletely. After implementing the oral care guidelines, there was a clear and notable improvement among the study group, where patients began to perform oral care procedures correctly and consistently.

Meanwhile, the control group showed only minimal and limited improvement, with most of its patients continuing to demonstrate poor oral care performance. These findings highlight the effectiveness of the structured oral care intervention in enhancing patients' self-care abilities and encouraging adherence to proper oral hygiene practices.Comparable studies have been reported similar findings as Lee, et al., (2021). in study entitled with " The effect of comprehensive oral care program on oral health and quality of life in patients undergoing radiotherapy for head and neck cancer " who documented the positive impact of patient education programs on improving oral hygiene and reducing treatment-related oral complications among individuals undergoing radiotherapy for head and neck cancer.Similarly, Moussa, et al., (2025). in study entitled with "The Impact of Preventive Protocols on Oral Health Outcomes in Cancer Patients Undergoing Chemotherapy or Radiotherapy " who emphasized that implementing standardized oral care protocols contributed to better oral health outcomes and greater adherence to recommended practices. Additionally, Spinato, et al. (2024). in study entitled with" Oral Care in head and neck radiotherapy: proposal for an oral hygiene protocol " who reported that guided oral care interventions promote patient compliance and enhance tolerance to radiotherapy by reducing the severity of oral mucosal injury.

Similarly, Miranda-Silva, et al., (2021). in study entitled with" Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology" who emphasize that patient education and standardized oral care protocols are essential to reducing the severity of oral mucositis in cancer patients. Additionally, Farivar, et al., (2025). in study entitled with "Oral Care Interventions for the Prevention and Management of Anticancer Therapy–Induced Oral Mucositis " who found that structured oral care teaching not only improved patient performance but also enhanced self-efficacy in managing mucosal irritation. A further study by Sanchooli et al., (2025); Elsehrawy, et al., (2024). in study entitled with" Impact of Educational Guidelines on Oral Mucositis Severity and Quality of Life in Oncology Patients Receiving Chemotherapy" and Jiang, et al. (2024). in study entitled with"The effects of an integrated supportive program me on oral health in patients with head and neck cancer undergoing radiotherapy " whose demonstrated that educational training programs improved oral care compliance and lowered mucositis severity among patients receiving chemoradiation. Collectively, these studies support the current findings, reinforcing the essential role of targeted oral care education in improving clinical outcomes for patients undergoing radiotherapy. As regards, oral cavity assessment atpostintervention,the findings of the current study indicate that the implementation of the oral care guidelines had a clear positive impact on the overall oral cavity condition among patients in the study group. post-intervention assessments revealed a marked improvement in the study group, with notable enhancements in lip integrity, gingival health, tongue moisture, palate color, salivary consistency, mucous membrane hydration, and overall oral cleanliness. In contrast, the control group showed only minimal improvement, and severe oral complications remained relatively common.

This improvement can be explained by the structured oral hygiene procedures taught to the study group, which likely promoted better mucosal protection, minimized plaque accumulation, and enhanced saliva flow through stimulation practices. Regular oral care reduces bacterial load and mechanical irritation, preventing mucositis progression and promoting faster mucosal healing during radiotherapy.These results align with Zhang, et al. (2024) in study entitled with " Efficacy of nonpharmacological interventions for severe radiation-induced oral mucositis among head and neck cancer patients " who reported that systematic oral care protocols significantly reduced mucositis severity and improved oral tissue healing in head and neck cancer patients. Similarly, Moore, et al. (2023). in study entitled with " Compliance with oral hygiene and dietary advice for the prevention of post-radiotherapy dental disease among head and neck cancer patients–a qualitative study"; Sohn, et al., (2021). in study entitled with "Effects of the professional oral care management program on patients with head and neck cancer after radiotherapy"and Matsuda, et al., (2022). in study entitled with " Oral health management and rehabilitation for patients with oral cancer" whose found that patient education on oral hygiene practices enhanced mucosal moisture levels and reduced microbial colonization, leading to better oral outcomes. Farivar et al. (2025) and Filippi et al., (2023) also highlighted that consistent oral care practices are strongly associated with reduced oral pain intensity and improved ability to eat and speak. In addition, Kaisha et al. (2025). in study entitled with "Clinical pharmacists and nurses in the management of oral mucositis in head and neck cancer patients during antineoplastic therapy" who emphasized that nurse-led oral care interventions play a central preventive role in minimizing treatment-related mucosal injuries. Furthermore, Colella, et al. (2023). in study entitled with "Interventions for the prevention of oral mucositis in patients receiving cancer treatment" who indicated that maintaining salivary function and mucosal hydration is key to preventing progressive oral deterioration during radiotherapy.

About oral function status among the studied patients after radiotherapy, the current study findings demonstrate a clear improvement in overall oral function among patients who received the structured oral care intervention. after implementation of the oral care guidelines, the study group showed a marked enhancement in these functions, with noticeable reductions in swallowing discomfort, improved ability to chew, better clarity of speech, and a substantial restoration of taste perception. In contrast, the control group exhibited minimal functional recovery, indicating that natural adaptation or routine care alone was insufficient to counteract radiotherapy-related impairments.This improvement can be explained by the structured nature of the oral care protocol, which likely helped in maintaining mucosal integrity, stimulating saliva flow, reducing bacterial load, and minimizing pain and inflammation. Enhanced oral moisture and reduced mucosal injury contribute directly to improved swallowing and chewing, while reducing functional limitations associated with nutritional intake and communication.These findings align with Miranda-Silva, et al. (2021). in study entitled with " Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology" which emphasize that structured oral care regimens can significantly reduce functional impairment associated with oral mucositis. Similarly, Mercadante, et al. (2021). in study entitled with "Salivary gland hypofunction and/or xerostomia induced by nonsurgical cancer therapies" whohighlighted that maintaining salivary gland function and mucosal moisture contributes directly to swallowing and speaking comfort during cancer treatment.

Additionally, Parra-Rojas, et al. (2024). in study entitled with " Oral complications and management strategies for cancer patients" who reported that consistent oral care reduces mucosal breakdown and supports recovery of oral function in patients exposed to radiation. Furthermore, the results are strengthened by Pai et al. (2025). in study entitled with "Impact of an oral care intervention protocol on oral health outcomes in head and neck cancer patients undergoing radiation or chemoradiation therapy" who demonstrated that oral care protocols significantly improve both oral mucosal conditions and functional performance in patients undergoing head and neck cancer therapy, supporting the effectiveness of structured oral care interventions.According to Lanzetti et al. (2023). in study entitled with "Management of oral hygiene in head-neck cancer patients undergoing oncological surgery and radiotherapy" who standardized oral care programs significantly preserve swallowing coordination and speaking clarity by reducing mucosal irritation during radiotherapy. Additionally, Somay, et al. (2022). in study entitled with " Impact of radiation-induced trismus on patients' life quality " who demonstrated that oral care protocols incorporating gentle brushing, saline rinses, and hydration practices result in better oral comfort and improved patient ability to maintain nutrition. Furthermore, Jensen & Saunders, (2021). in study entitled with " Oral Complications of Cancer Therapies" who emphasized that continuous oral care reduces the severity and duration of mucosal breakdown, consequently improving patients' capacity to perform oral-related daily activities.

Likewise, Karimi et al. (2025) and Koirala, (2023). in study entitled with "Oral Health Related Quality of Life in Head and Neck Cancer Patients Visiting a Tertiary Center in Central Nepal" whofound that patients who received structured oral care education showed better recovery of salivary function and less discomfort during eating and speaking. This is also supported by Patton, et al. (2023), in study entitled with "Oral health-related quality of life after radiation therapy for head and neck cancer" who reported that oral moisture maintenance is directly associated with better oral functional performance among patients with head and neck cancer during radiotherapy.Concerning oral mucositis severity based on national cancer institute scoring among the studied patients throughout seven weeks of radiotherapy, during the early phase (week two), both groups showed comparable mucositis scores. However, as radiotherapy continued, a clear divergence appeared between groups. By the fourth week, moderate-to-severe mucositis became substantially more prevalent in the control group. By the end of the seventh week, patients in the study group who received structured oral care guidelines demonstrated marked improvement, with a noticeable reduction in severe mucositis grades and a higher proportion maintaining lower-grade mucosal changes.In contrast, the control group continued to exhibit a high prevalence of severe mucositis. The differences between the two groups were statistically significant across all assessment points which indicates the effectiveness of the oral care intervention in minimizing mucosal breakdown over time.

The observed reduction in mucositis severity among the study group may be explained by the fact that the oral care guidelines encouraged early preventive actions rather than reactive treatment. By initiating oral hygiene measures before mucosal irritation progressed, patients were able to maintain a healthier baseline condition, which reduced the intensity of tissue breakdown during radiotherapy.Another contributing factor is that the intervention supported consistent mechanical removal of oral debris and microbial biofilm, which is known to intensify mucosal inflammation. A cleaner oral environment leads to fewer pathogenic interactions and lowers the chances of secondary infections that commonly aggravate mucositis. Additionally, the guidelines promoted hydration and

lubrication of oral tissues, which helped preserve epithelial elasticity and reduce friction during eating and speaking. This made the mucosa more resilient and less vulnerable to ulceration.Psychological and behavioral aspects also played a role. Patients who received structured education were likely to feel more confident, motivated, and adherent to their daily oral care routines. Increased self-efficacy is recognized as a key factor in sustaining preventive behaviors during cancer treatment. In contrast, patients in the control group relied on routine care, which often focuses on symptom relief after mucositis has already developed, leading to worsening severity over time.

Thus, the improvement noted among the study group can be attributed to preventive initiation of oral care, reduced microbial irritation, enhanced mucosal protection through hydration, and strengthened patient adherence and confidence in self-care routines.The findings of the current study align with recent evidence emphasizing the role of preventive oral care in reducing the severity and duration of radiation-induced mucositis. De Lima Martins, et al. (2023). in study entitled with " Oral hygiene protocols reduce the severity and incidence of oral mucositis during antineoplastic treatment" who reported that systematic oral hygiene protocols significantly delayed the onset of mucositis and reduced its severity among head and neck cancer patients undergoing radiotherapy. Similarly, Davy & Heathcote, (2022). in study entitled with " A systematic review of interventions to mitigate radiotherapy-induced oral mucositis in head and neck cancer patients" who found that patient education and routine oral assessment lowered tissue inflammation and facilitated faster healing. Additionally, Farivar et al. (2025). in study entitled with "Oral Care Interventions for the Prevention and Management of Anticancer Therapy–Induced Oral Mucositis" who demonstrated that integrating oral health interventions into daily care improved mucosal integrity and reduced functional pain.Furthermore, Sanchooli, et al. (2025). in study entitled with "The Effect of Educational-Care Intervention on the Severity of Mucositis Related to Radiotherapy in Patients with Head and Neck Cancers" who highlighted that structured oral care reduced mucosal ulceration, thereby maintaining patients' oral comfort and nutritional intake. These consistent findings across multiple international studies reinforce the effectiveness of implementing oral care guidelines in preventing severe mucositis during radiotherapy.

Regarding pain numeric rating scale among patients undergoing head and neck radiotherapy, the results demonstrate a consistent improvement in pain levels among patients in the study group following the implementation of the oral care guidelines. Early during radiotherapy, the study group began to show lower pain intensity compared to the control group, and this difference widened progressively over the treatment course. By the final week, the majority of patients in the study group reported only mild or no pain, whereas a considerable proportion of the control group continued to experience severe pain. The highly significant statistical differences indicate that the oral care guidelines played a key role in alleviating pain associated with mucositis during radiotherapy.This improvement can be explained by the fact that the oral care guidelines helped reduce mucosal irritation and inflammation; the primary drivers of pain during radiotherapy. Regular cleansing lowered bacterial accumulation, which is known to worsen mucosal injury and intensify pain. Additionally, strategies that maintained oral moisture and hydration likely reduced frictional trauma during speaking and chewing. The education provided also increased patients' adherence to early and continuous care, helping prevent progression from mild to severe ulceration, thereby minimizing pain severity.These findings are in agreement with research showing that structured oral care interventions significantly reduce mucositis-related pain among radiotherapy patients. Nurhidayah, et al. (2024). in study entitled with " The effect of oral care intervention in mucositis management among pediatric cancer patients" who reported that patients who followed a standardized oral care protocol experienced substantially lower pain scores and reduced analgesic use compared to those receiving routine care.

Similarly, Spinato et al., (2024); Alsharife, (2023) emphasized that preventive oral care reduces tissue breakdown and discomfort, thereby improving tolerance to radiotherapy. In a more recent clinical evaluation, Suhaimi et al. (2025). in study entitled with " Pain Control in Oral Mucositis According to the Severity Scale" who demonstrated that maintaining mucosal hydration and minimizing microbial irritation were critical factors in decreasing mucositis pain severity. Moreover, An, et al. (2022). in study entitled with " Oral health behaviors and oral health-related quality of life among dental patients in China" who highlighted that patient education and supportive oral hygiene practices play an essential role in pain control, especially in head and neck cancer patients undergoing radiotherapy.As regards correlation between total practice and total knowledge among the Studied Groups, the resultsindicate that patients who possessed higher oral care knowledge tended to demonstrate better practice performance, particularly among those who received the oral care guidelines. In the study group, the correlation between knowledge and practice strengthened markedly after the intervention, moving from a moderate to a strong positive relationship. This suggests that structured, clear, and continuous patient education can translate into meaningful behavioral change.This relationship can be explained by the concept of health literacy, where individuals

with better understanding of oral care instructions are more able to correctly apply them in daily practice. Similar findings were reported by de Amorim Póvoa (2025). in study entitled with "Lack of knowledge, understanding, and delayed attitudes towards health-seeking behavior in oral cancer patients"who demonstrated that improved oral health knowledge in cancer patients significantly enhances adherence to oral hygiene behaviors. Additionally, Khosravi&Kiani, (2024) and Lee et al., (2021) found that educational interventions for patients undergoing radiotherapy resulted in better oral care performance and reduced complications, confirming that knowledge directly influences self-care execution.

The weaker correlation observed in the control group, which became only slightly significant over time, may be attributed to incidental learning or routine clinical exposure without structured education. This aligns with Moore, et al. (2023) who emphasized that knowledge alone, without guided reinforcement, is insufficient to produce consistent behavior changes in oral hygiene among oncology patients. Therefore, the strong post-intervention correlation in the study group underscores the effectiveness of the oral care guidelines as an educational and behavioral reinforcement tool.Concerning correlation between total knowledge and oral health assessment among the studied groups, the results indicate that there is a negative correlation between total knowledge and both oral cavity condition and oral function scores in the study and control groups. This means that as patients' knowledge increased, the severity of oral complications tended to decrease. In the control group, these correlations were weak and statistically non-significant during both assessment phases, likely because these patients did not receive structured education to effectively translate knowledge into practice. Conversely, in the study group, moderate negative correlations were observed before the intervention. Although these correlations were not statistically significant at that stage, the trend suggests that patients who had relatively higher knowledge were already more capable of minimizing oral health deterioration.

This relationship is clinically logical: better understanding of oral hygiene techniques and awareness of radiotherapy-related oral risks enables patients to adopt protective behaviors that reduce mucosal irritation, dryness, and functional limitations. Similar findings were reported by Zhang et al. (2024), who found that oral health education reduces the severity of mucositis among head and neck cancer patients receiving radiotherapy.Likewise, Liu et al. (2021) in study entitled with "Status of treatment and prophylaxis for radiation-induced oral mucositis in patients with head and neck cancer" who found that higher patient knowledge significantly correlated with better oral functional outcomes and lower oral discomfort during cancer treatment. Additionally, Khosravi&Kiani, (2024)in study entitled with "The Effect of the Continuous Care Model on Oral Health, Self-Efficacy, and Self-Care in Patients with Head and Neck Cancer Undergoing Radiotherapy" who confirmed that patient education improves oral self-care behaviors and subsequently reduces severity of oral complications among oncology patients undergoing radiotherapy.Regarding the correlation between total practice and oral health assessment among the studied groups, the results demonstrate that total practice of oral care was negatively correlated with both oral cavity condition and oral function scores, indicating that higher levels of correct oral care practice were associated with fewer oral complications and better oral functioning. In the control group, this correlation remained weak and non-significant before and after radiotherapy, which is expected since patients did not receive structured oral care training and therefore showed minimal behavioral change.

In contrast, the study group exhibited moderate negative correlations before the intervention, suggesting that even limited pre-existing oral care habits may have provided some protective effect. Following the implementation of the oral care guidelines, these correlations became strong and highly significant, reflecting the impact of consistent, guided oral hygiene practices on reducing mucosal breakdown, maintaining moisture balance, and preventing secondary infections that exacerbate pain and functional impairment.These findings align with previous research emphasizing the importance of systematic oral hygiene routines in radiotherapy patients. For instance, Miranda-Silva et al., (2021). in study entitled with " Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology" whoreported that structured oral care protocols are directly associated with reduced mucositis severity and improved mucosal tolerance during radiotherapy. Likewise, Spinato, et al. (2024) in study entitled with " Oral Care in head and neck radiotherapy" who highlighted that adherence to oral care behaviors helps preserve oral function, particularly swallowing, chewing, and speech, by minimizing mucosal inflammation and promoting tissue healing.

Furthermore, Lee et al. (2021) in study entitled with "The effect of comprehensive oral care program on oral health and quality of life in patients undergoing radiotherapy for head and neck cancer" who observed that patients who engaged in regular oral cleaning demonstrated better taste sensation and oral moisture levels, contributing to

improved overall comfort and feeding ability during treatment. More recently, Suhaimi, et al. (2025) in study entitled with " Pain Control in Oral Mucositis According to the Severity Scale" who confirmed that patients maintaining consistent oral hygiene exhibited lower pain scores and fewer ulcerative lesions during radiotherapy.Concerning correlation between total knowledge, national cancer institute, and pain numeric rating among the studied groups, the current study results demonstrate that total knowledge about oral care and mucositis had a negative correlation with both the National Cancer Institute mucositis severity score and pain intensity levels. This means that higher patient knowledge was associated with lower mucositis severity and reduced pain.In the control group, the correlations remained weak and statistically insignificant before and after radiotherapy, which is expected since patients did not receive structured educational guidance, and therefore no meaningful improvement in knowledge occurred to influence clinical outcomes.However, in the study group, moderate negative correlations appeared before the intervention, suggesting that even a basic awareness of oral hygiene might contribute slightly to reducing mucosal irritation and pain.

After the implementation of the oral care guidelines, the correlations became strong and highly significant, indicating that enhanced knowledge translated into better self-care behaviors, leading to fewer ulcerations, improved oral mucosal integrity, and better pain control.From a clinical perspective, this relationship is supported by existing literature. Knowledge empowers patients to recognize early signs of mucosal irritation, maintain adequate oral hydration, avoid irritants like spicy or acidic foods, and adhere to prescribed oral care routines all of which help reduce tissue injury and pain during radiotherapy.These findings align with recent evidence that structured oral care education improves patients' ability to perform preventive oral hygiene, reduces inflammatory response, and promotes faster mucosal healing, thereby decreasing pain levels (Liu et al., 2025; Farivar et al., 2025).Additionally, improved knowledge enhances adherence to analgesic, hydration, and oral care routines, which has been shown to mitigate mucositis severity during radiotherapy Sohn, et al., (2021).in study entitled with " Effects of the professional oral care management program on patients with head and neck cancer after radiotherapy " Thus, the strong post-intervention negative correlation supports the role of knowledge-based patient education as an effective component of symptom control.

Regarding correlation between total practice, national cancer institute, and pain numeric rating among the studied groups, the current study results indicate a negative relationship between total practice and both the National Cancer Institute mucositis score and Pain Numeric Rating in the control and study groups. In the control group, this relationship remained weak and not statistically significant in both phases, suggesting that in the absence of a structured oral care intervention, practice levels did not have a notable impact on reducing mucosal inflammation or pain.In contrast, the study group showed a noticeable shift. Before the implementation of the oral care guidelines, the relationship between practice and both mucositis severity and pain were weak. However, after applying the guidelines, this relationship became strong and statistically significant. This means that patients who adhered more consistently to the oral care procedures experienced less severe mucositis and reduced pain levels.These findings are in line with recent evidence demonstrating that effective oral care routines such as gentle toothbrushing, saline rinses, and moisturization contribute to maintaining oral mucosal integrity, reducing microbial irritation, and enhancing healing in patients undergoing cancer therapy. Consequently, consistent and correct practice plays a direct and protective role in minimizing oral tissue damage and discomfort (Ferreira et al., 2022; Miranda-Silva et al., 2021; Zhang et al., 2021).

Conclusion:-

In light of the present study findings, the implementation of structured oral care guidelines demonstrated a significant positive impact on patients undergoing radiotherapy for head and neck cancer. The guidelines effectively improved patients' knowledge and practice levels, which in turn contributed to reducing the severity of oral mucositis and associated pain. The findings indicate that better-informed and actively engaged patients are more capable of maintaining oral tissue integrity and preventing complications during treatment. Additionally, the relationships observed between knowledge, practice, and clinical oral outcomes highlight the importance of patient education as an essential component of supportive cancer care. The study reinforces the necessity of integrating systematic oral care protocols into routine oncology nursing practice to enhance patient comfort, treatment tolerance, and overall quality of life.

Recommendations:-

Recommendation related to patients:

1. Educational programs for patients with radiotherapy on head and neck cancer that provide the latest information and practices about oral care guidelines to support and improve self-reported oral care.
2. Intervention protocol should be applied in head and neck radiotherapy Unit for patients with suspected oral mucositis and up-dated periodically to enhance self-care practices for those patients.

Recommendation related to research:

3. Replication of the study on a larger probability sample selected from different geographical area in Egypt to obtain more generalized results and the nursing instructions should be carried out in integration with mobile applications.
4. Researches should be carried out on a wide international basis to understand variations across communities and to learn more about factors that influence outcomes of patients with oral mucositis**.**

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