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RESEARCH ARTICLE

EVALUATE THE INFLUENCE OF TWO DENTAL TREATMENT PROTOCOLS, OUTPATIENT NON-REGULATED TREATMENT VERSUS SUPERVISED HOSPITAL TREATMENT, ON THE ORAL HEALTH OF PATIENTS UNDERGOING ORAL CANCER TREATMENT

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Abstract

Background: Cancer of the oral cavity has reportedly one of the lowest survival rates, in spite of the developments in its management and treatment. Cancer treatment can have side effects that affect mouth. Working together with dentist and the doctor treating cancer may help reduce the risk and seriousness of these side effects.

Objective: To evaluate the non-regulated treatment versus supervised hospital treatment on the oral health of patients undergoing oral cancer treatment

Methods: A quasi-experimental study was conducted at the Oral and Maxillofacial Surgery Service of the Khulna Medical College Hospital and Different Privet Hospital in Khulna City. This study began by including patients with oral cancer (squamous cell carcinoma) in the control group. A total of 30 patients were received from September 2017 to September 2018. After having implemented the resources needed to provide dental treatment, we began treating patients in the experimental group: 30 patients between October 2018 and October 2019.

Results: In during and after treatment, use of chlorhexidine, use of fluoride agents and IOH and plaque control were statistically significant ($p < 0.05$) between two group. In during treatment: plaque index, prosthesis user and daily brushing were statistically significant ($p < 0.05$) between two group. In after treatment: plaque index, prosthesis user and daily brushing were statistically significant ($p < 0.05$) between two group. The experimental (with dental treatment) group, plaque index was reduced by -23.93 ± 29.90 . On the other hand, the control (without dental treatment) group saw an increase in plaque index of $+16.63 \pm 29.76$ between these two periods; the difference was statistically significant ($p < 0.0001$).

Conclusion: In conclusion, increasing daily brushing and a strong reduce in the rate of plaque in the experimental versus control groups in cancer treatment. The second part of cancer treatment saw a reduced plaque index, number of new cavities and number of extractions in the experimental group.

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Introduction:-

Head and neck carcinomas are the fifth leading cause of cancer in the world's population, representing 5% of all cancers in men and 2% in women.¹ The annual incidence of these carcinomas is 500,000 new cases per year.²

Cancer treatment can have side effects that affect mouth. Working together with dentist and the doctor treating cancer may help reduce the risk and seriousness of these side effects. Oral squamous cell carcinoma (OSCC), which encompasses the oral cavity-derived malignancies, is a devastating disease causing substantial morbidity and mortality in both men and women. It is the most common subtype of the head and neck squamous cell carcinoma (HNSCC), which is ranked the sixth most common malignancy worldwide.^{3,4}

Cancer of the oral cavity has reportedly one of the lowest survival rates, in spite of the developments in its management and treatment.^{5,6} In addition, even those who survive may have significant morbidity, residual deformity and reduced quality of life. In spite of the ease of access to the oral cavity, research demonstrates that nearly 50% of the malignant lesions in the oral cavity go unnoticed until they have progressed to an advanced stage.⁷

Aggressive treatment of an oncological disease produces inevitable effects on normal cells. Due to its high rate of cell proliferation, the gastrointestinal tract mucosa, including the oral mucosa, is the main place where the toxic effects of cancer treatment are observed.⁸

The observation about the relationship between patients' oral health and dental treatments carried out during oncological treatment is still limited. The aim of this study is to evaluate the impact of a basic regulated dental treatment on the oral health of patients undergoing oral cancer therapy using a quasi-experimental prospective approach, with a view to increasing the published evidence available in this area.

Material and Methods:-

A quasi-experimental study was conducted at the Oral and Maxillofacial Surgery Service of the Khulna Medical College Hospital and Different Privet Hospital in Khulna City. The possibility of incorporating some kind of dental treatment into the therapy provided to cancer patients at the same hospital was raised (along the lines of Kielbassa et al.).⁹

This study began by including patients with oral cancer (squamous cell carcinoma) in the control group. A total of 30 patients were received from September 2017 to September 2018. After having implemented the resources needed to provide dental treatment, we began treating patients in the experimental group: 30 patients between October 2018 and October 2019.

The inclusion criteria applied in this study were as follows: patients diagnosed with oropharyngeal cancer (squamous cell carcinoma) who had been admitted to the Khulna Medical College or different privet Hospital in Khulna City in Khulna were in need of combined radiochemotherapy cancer treatment.

To avoid biases linked to surgical trauma, which is difficult to standardize, only patients who did not undergo surgery were included. Other inclusion criteria were non-edentulous patients.

The exclusion criteria applied in this study were as follows: patients who voluntarily refused to the treatment proposed by the specialists of our service and opted for another treatment alternative to what oncologists had recommended; patients who were referred to another hospital; patients who chose not to be treated for their disease; patients who willingly ceased cancer treatment; patients who refused to submit to any part of the study or refused to consent to the scientific use of their data; failure to sign or breach of informed consent; patients who died during the study.

All patients were treated by important Consultation Service for Oropharyngeal Tumors at the Different Privet Hospital in Khulna City; once tumor evolution had been assessed, patients were scheduled to undergo cancer treatment. At that time, patients' current dental health, habits and oral problems were assessed. Patients in the control group were informed and advised of the care they should receive during radiochemotherapy treatment. This

dental treatment was established and monitored at primary care level centers. Experimental group patients underwent supervised dental treatment, following Kielbassa et al.⁹ guidelines, along with their radiochemotherapy treatment, but this treatment was held in the facilities of the hospital.

Observers collected all data on the oral health of patients in both the control and experimental groups. A simple odontogram was used for this purpose. Data were as follows: clinical decay, whether the patient had an oral prosthesis, teeth that required dental extraction during the study and the reason for the latter. The plaque index was measured using plaque disclosing tablets and by obtaining the result of dividing the number of surfaces with plaque by the total number of surfaces, multiplied by one hundred. Likewise, the number of daily brushings was recorded, as well as whether or not the patient presented with oral candidiasis. In each group, data collection was performed prior to (one month before the radiochemotherapy), during (after completion of 60% of radiochemotherapy treatments) and after cancer treatment (twelve months after beginning the study). The descriptive study was conducted using mean and standard deviation or percentage, depending on the type of variable. To identify differences between the two groups that could be statistically significant, the chi-squared test or Student's t-test method was applied, according to the variable being compared between the two groups.

Results:-

Table 1:- Treatments applied to the groups before, during and after treatment with radiochemotherapy (n=30)

	Before			During			After		
	Treatment group	Without treatment group	P value	Treatment group	Without treatment group	P value	Treatment group	Without treatment group	P value
Curettage and root planning	1.16±1.23	0.00±0.00	-	0.13±0.09	0.00±0.00	-	0.04±0.013	0.00±0.00	-
Fillings	3.44±5.46	0.71±1.44	0.003	0.19±0.56	0.00±0.00	-	0.80±3.12	0.00±0.00	-
Exodontias	0.04±0.13	0.00±0.00	-	0.05±0.21	0.08±0.33	0.629	0.32±1.23	1.01±1.93	0.237
Use of chlorhexidine	40 (100.0%)	40 (100.0%)	-	32 (80.0%)	7 (17.5%)	0.001	22 (55.0%)	5 (12.5%)	0.001
Use of fluoride agents	40 (100.0%)	11 (27.5%)	0.001	33 (82.5%)	10 (25.0%)	0.001	35 (87.5%)	10 (25.0%)	0.001
IOH and plaque control	40 (100.0%)	40 (100.0%)	-	38 (95.0%)	2 (5.0%)	0.001	37 (92.5%)	3 (7.5%)	0.001

P value reached from chi square and student t-test

In during and after treatment, use of chlorhexidine, use of fluoride agents and IOH and plaque control were statistically significant ($p < 0.05$) between two group.

Table 2:- Data on oral health status in each group before, during and after radio chemotherapy (n=30)

	Before			During			After		
	Treatment group	Without treatment group	P value	Treatment group	Without treatment group	P value	Treatment group	Without treatment group	P value
Plaque index	72.2±37.4	71.3±38.2	0.915	48.4±35.9	85.7±29.0	0.001	29.9±27.6	84.0±31.2	0.001
Clinical caries	3.44±5.2	6.23±7.24	0.051	0.18±0.60	0.53±1.38	0.145	0.74±3.21	1.40±1.86	0.264
Exodontias	0.03±0.15	0.00±0.00	-	0.06±0.21	0.07±0.32	0.869	0.36±1.22	1.09±2.01	0.053
Candidiasis	2 (5.0%)	0 (0.0%)	0.246	2 (5.0%)	7 (17.5%)	0.077	0 (0.0%)	4 (10.0%)	0.057
Prosthesis	10	4 (10.0%)	0.077	14	3 (7.5%)	0.003	15	3 (7.5%)	0.001

user	(25.0%)			(35.0%)			(37.5%)		
Daily brushing	20 (50.0%)	22 (50.0%)	0.654	35 (87.5%)	17 (42.5%)	0.001	35 (87.5%)	15 (37.5%)	0.001

P value reached from chi square and student t-test

In during treatment: plaque index, prosthesis user and daily brushing were statistically significant ($p < 0.05$) between two group. In after treatment: plaque index, prosthesis user and daily brushing were statistically significant ($p < 0.05$) between two group.

Table 3:- Evolution of oral health status in both groups over different periods of cancer treatment (n=30).

	Before			During			After		
	Treatment group	Without treatment group	P value	Treatment group	Without treatment group	P value	Treatment group	Without treatment group	P value
Plaque index	-23.93±29.90	+16.63±29.76	0.001	-20.36±25.03	-3.96±11.78	0.001	-42.52±35.91	-13.14±26.87	0.001
Clinical caries	+0.19±0.60	+0.53±1.55	0.199	+0.79±1.21	+1.38±1.46	0.048	+0.94±2.19	+1.88±1.75	0.037
Exodontias	+0.05±0.21	+0.06±0.33	0.872	+0.36±1.19	+1.10±1.96	0.049	+0.41±1.09	+1.12±1.89	0.042
Candidiasis	0 (0.0%)	+7 (17.5%)	0.005	-2 (5.0%)	-3 (7.5%)	0.500	-2 (5.0%)	+4 (10.0%)	0.012
Prosthesis user	+2 (5.0%)	-2 (5.0%)	0.692	+2 (5.0%)	0 (0.0%)	0.246	+3 (7.5%)	-2 (5.0%)	0.039
Daily brushing	+17 (42.5%)	-5 (12.5%)	0.006	-1 (2.5%)	-2 (5.0%)	0.500	+14 (35.0%)	-7 (17.5%)	0.001

P value reached from chi square and student t-test

Upon focusing on the data increases/decreases of variables, and more specifically by comparing variables before and during cancer treatment, we can state that in the experimental (with dental treatment) group, plaque index was reduced by -23.93±29.90. On the other hand, the control (without dental treatment) group saw an increase in plaque index of +16.63±29.76 between these two periods; the difference was statistically significant ($p < 0.0001$). The incidence of new caries in the dental treatment group was 0.19±0.60. In the control group, this value was 0.53±1.55, finding no statistically significant differences. Furthermore, during this period there was no difference between the number of tooth extractions performed in both groups (experimental: 0.05±0.22; control: 0.07±0.35). Two patients in the experimental group began using prostheses while undergoing treatment, while in the group without dental treatment, two patients stopped using them. The number of daily brushings increased by 17 patients in the experimental group, while it decreased by five patients in the control group ($p > 0.0001$). The number of patients with candidiasis increased in the control group (+7 patients) but remained stable in the experimental group ($p < 0.001$).

With regard to the values found upon comparing the post-treatment period and the intermediate point, we can see that the plaque index was reduced in the experimental group by -20.36 ±25.03. The reduction in plaque index in the control group was lower: -3.96±11.78 ($p < 0.001$). The number of clinical caries at the end of cancer treatment compared to the number during treatment had increased by 0.79±1.21 for the experimental group and 1.38±1.46 for the control group ($p < 0.01$). The number of extractions performed in both groups also showed significant differences between these periods (experimental group: 0.36±1.19; control group: 1.10±1.96; $p < 0.05$). Regarding the use of prostheses, there were no changes observed in the control group during this period. However, two patients in the experimental group began using prostheses. This was not a statistically significant difference. Regarding daily brushing habits, one of the patients in the experimental group and two in the control group ceased brushing, but this was not a statistically significant difference. The presence of candidiasis decreased in two patients in the experimental group and three patients in the control group throughout this period (no significant difference).

Finally, with regard to the evolution of variables measured throughout the cancer treatment, we can state that in patients undergoing dental treatment, plaque index decreased by 44.52 ± 35.91 . In patients without dental treatment, plaque index increased by 13.14 ± 26.87 ($p < 0.0001$). The number of clinical caries in the experimental group was 0.94 ± 2.19 , while the control group showed 1.88 ± 1.75 ($p < 0.01$). The number of dental extractions was lower in patients with treatment (0.41 ± 1.09) than in patients in the control group (1.12 ± 1.99) ($p < 0.05$). Throughout the cancer treatment, 7.5% of patients (four patients) in the experimental group began using prosthetics, while two patients (5.0%) decreased in the control group had to stop using them ($p < 0.05$). Fourteen patients in the experimental group increased their daily brushing, while seven patients in the control group decreased their daily brushing ($p < 0.0001$). The presence of candidiasis during cancer treatment decreased in two patients in the experimental group and increased in four patients in the control group ($p < 0.05$).

Discussion:-

In during and after treatment, use of chlorhexidine, use of fluoride agents and IOH and plaque control were statistically significant ($p < 0.05$) between two group. Nunez-Aguilar et al.¹⁰ study observed that during radio chemotherapy, this situation changed dramatically. The most popular treatments (almost entirely in the experimental group) were scaling and polishing, scaling and root planning, and instruction in oral hygiene and plaque control. The change in the attitudes and oral health habits of the experimental group was significant, with 95.12% of patients voluntarily attending hygiene education sessions ($p < 0.001$).

In during treatment: plaque index, prosthesis user and daily brushing were statistically significant ($p < 0.05$) between two group. In after treatment: plaque index, prosthesis user and daily brushing were statistically significant ($p < 0.05$) between two group. Nunez-Aguilar et al.¹⁰ reported this improvement in oral care leads to a real improvement in the oral health of the patient, as was observed in the experimental group, with 36 patients who brushed daily during cancer treatment, compared to 16 patients who brushed in the control group. With all controls, an improved better plaque index is to be expected, and the difference between the experimental and control groups almost double. They also found a small number of new clinical caries in the experimental group compared to the control group. The experimental group included more patients who used their prosthesis during radiochemotherapy than in the control group (a ratio of 13 patients out of 40 versus a ratio of 2 out of 41 ($p < 0.001$)). Currently, few cancer centers have experienced dental practitioners integrated in the cancer team and available to provide appropriate oral care prior to, and throughout cancer continuum; and even fewer have integrated dental treatment services on site.¹¹⁻¹³ Some centers have consultants and some have no organized or experienced dental providers to call upon for best care.¹³ In a large study, only 35 % of oral cancer patients had a regular dentist and dental care¹⁴ and about 22.7% of cancer care centers for pediatric patients have a nurse in the oncology team who is responsible for oral care issues.¹⁵ Even though an experienced dentist who can work as a consultant to coordinate the dental care of patients by liaison with primary care dental practitioners is essential, dental assessment is recorded in only 8.5% of the 6,458 patient registrations (551 patients) and 12.8% of the 4,297 of patients with treatment plans.¹⁶

In this study observed that the data increases/decreases of variables, and more specifically by comparing variables before and during cancer treatment, we can state that in the experimental (with dental treatment) group, plaque index was reduced by -23.93 ± 29.90 . On the other hand, the control (without dental treatment) group saw an increase in plaque index of $+16.63 \pm 29.76$ between these two periods; the difference was statistically significant ($p < 0.0001$). The incidence of new caries in the dental treatment group was 0.19 ± 0.60 . In the control group, this value was 0.53 ± 1.55 , finding no statistically significant differences. Furthermore, during this period there was no difference between the number of tooth extractions performed in both groups (experimental: 0.05 ± 0.22 ; control: 0.07 ± 0.35). Two patients in the experimental group began using prostheses while undergoing treatment, while in the group without dental treatment, two patients stopped using them. The number of daily brushings increased by 17 patients in the experimental group, while it decreased by five patients in the control group ($p > 0.0001$). The number of patients with candidiasis increased in the control group (+7 patients) but remained stable in the experimental group ($p < 0.001$). Nunez-Aguilar et al.¹⁰ reported the experimental group, plaque index decreased from 71.32% before treatment to 27.09% ($p < 0.001$). These patients brushed much well after treatment compared to the periods before and during radiochemotherapy, going from 18 patients who did not brush to a total of 35 patients who brushed in the experimental group, whereas the control group saw a decrease in the number of brushes ($p < 0.001$). All patients who used prostheses at baseline in the experimental group continued using them after radiochemotherapy. This data seems very relevant due to its high clinical significance. Finally, with regard to the evolution of variables measured throughout the cancer treatment, we can state that in patients undergoing dental treatment, plaque index decreased by 44.52 ± 35.91 . In patients without dental treatment, plaque index increased by 13.14 ± 26.87 ($p < 0.0001$). The

number of clinical caries in the experimental group was 0.94 ± 2.19 , while the control group showed 1.88 ± 1.75 ($p < 0.01$). The number of dental extractions was lower in patients with treatment (0.41 ± 1.09) than in patients in the control group (1.12 ± 1.99) ($p < 0.05$). Throughout the cancer treatment, 7.5% of patients (four patients) in the experimental group began using prosthetics, while two patients (5.0%) decreased in the control group had to stop using them ($p < 0.05$). Fourteen patients in the experimental group increased their daily brushing, while seven patients in the control group decreased their daily brushing ($p < 0.0001$). The presence of candidiasis during cancer treatment decreased in two patients in the experimental group and increased in four patients in the control group ($p < 0.05$). Nunez-Aguilar et al.¹⁰ reported that the typical dental treatment carried out on these patients involved dental extractions. In this paper, we propose conservative dental therapies that avoid radical treatment that would directly affect the quality of life of patients, in keeping with the guidelines published by Kielbassa et al.⁹. Jham et al.¹⁷ also studied the evolution in oral health of patients before, during and after cancer therapy and found similar results. They performed regulated dental treatment prior to radiotherapy that preserved restorable teeth, with only 50% of patients requiring extractions. However, they do not compare the results to a control group, which precludes analysis of the importance of dental treatment in oral health, including its effect on the appearance of new cavities and mucositis. Saito et al.¹⁸ observed a decrease in complications in the oral cavity after chemotherapy, mainly in the reduced appearance of mucositis in patients who attended dental treatment sessions based on hygiene and periodontal treatment. The influence of this treatment cannot be individually assessed because these hygienic measures were also taught to the control group of patients with oral mucositis. Bertl et al.¹⁹ analyzed the overall oral health of patients with head and neck cancer, as well as the dental care they received. Only 52% of patients requested dental check-ups before cancer therapy, although it was recommended to all of them, and 80% of them needed dental treatment.

Conclusion:-

In conclusion, increasing daily brushing and a strong reduce in the rate of plaque in the experimental versus control groups in cancer treatment. The second part of cancer treatment saw a reduced plaque index, number of new cavities and number of extractions in the experimental group. This observed that implementing a protocol of formal dental control care in hospitals during cancer treatment, as well as integrating it into further cancer treatment and outpatient unregulated treatment, leads to a decrease in plaque index, number of extractions needed and incidence of decay, as well as an increase in daily brushing and other improvements to overall oral health.

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