

## Oral health status among children receiving chemotherapy

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### ABSTRACT

**Aim:** To investigate the effects of chemotherapeutic agents on the oral health of children and to compare the action of two mouth rinses chlorhexidine digluconate 0.2 % and salty water (0.9% NaCl) in relation to their ability in controlling the plaque and gingival inflammation with children treated by cytotoxic agents. **Materials and Method:** In this clinical trial, the selected children were divided into two groups the first one comprised of 30 healthy children represented as a control group and the second one comprised of 30 children who were receiving chemotherapy for at least 6 months, they were selected from patients attended to pediatric wards of public hospitals in Mosul city. All children were of similar age groups and mean age of  $5 \pm 1$  years. The plaque and gingival indices were measured according to silness and l e for the six teeth at the baseline. Then the 30 children who were receiving chemotherapy were randomly divided into two groups; each consisting of 15 children, they were instructed to use mouth rinses twice daily for 30 seconds after breakfast and before the bed time. The plaque and gingival indices were again measured one month after mouth rinsing for the six teeth at the baseline.

**Results:** The results of this study revealed that the chemotherapeutic agents modify oral health and there was significant increase of plaque and gingival indices in children receiving chemotherapeutic agents (at  $p \leq 0.05$ ), also results showed that there was a significant reduction after rinsing with chlorhexidine digluconate for plaque and gingival indices (at  $p \leq 0.05$ ), while non significant change for salty water mouth wash. **Conclusion:** In view of the possible factors that causes increase of the plaque and gingival indices, suggested myelosuppression that is associated with chemotherapy which has effects on rate and pattern of hard and soft tissues resulting in reduced the ability to repair and maintain the oral health status.

**Key words:** Chemotherapy, oral health, chlorhexidine mouth wash.

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### INTRODUCTION

Cancer chemotherapy agents are extremely powerful drugs that have as a side effect the potentials for disruption or destruction of oral tissues.<sup>(1,2)</sup> One of the early complications of chemotherapy includes bone marrow suppression and immunosuppression that can cause neutropenia.<sup>(3,4)</sup>

The oral cavity is often site of complications during chemotherapy<sup>(5)</sup> and stomatitis and gingivitis is a common side effects of many of these chemotherapeutic agents and may present as painful mucositis involving any of the oral mucous membrane either in a localized or generalized fashion<sup>(1)</sup>, which can interfere with oral feeding of the patients and deteriorates their performance.<sup>(6)</sup>

In children receiving chemotherapy,

usually there is recurrent infections and severe gingival inflammation, bleeding, generalized bone loss and marked tooth mobility.<sup>(7,8)</sup> Antiseptic solutions have been used for periodontal treatment in those patients including chlorhexidine which is the most commonly used and effective mouth wash used for treatment of periodontal infections.<sup>(9-12)</sup>

Also antibacterial properties of salt solutions are well documented in the literatures and much of their activity is based upon the osmotic pressure changes which cause bacterial cell disruption and death.<sup>(13,14)</sup>

The aims of this study was to investigate the effects of chemotherapeutic agents on oral health of children and to compare the action of two mouth rinses chlorhexidine digluconate 0.2% and salty

water (0.9%NaCl) in relation to their ability for controlling the plaque formation and gingival inflammation in children treated by cytotoxic agents .

#### MATERIALS AND METHOD

Sixty children were participated in this work; their age ranged between 3-10 years, with mean of age equal to  $5\pm 1$  years. Thirty of them were healthy children while the other thirty children were treated with chemotherapeutic agents including vincristine, methotrexate, doxorubicine and asparaginase and those patients were selected from patients at pediatric wards in public hospitals of Mosul city.

The plaque and gingival indices were measured according to Silness and L oe at 1963 <sup>(15)</sup>, for both healthy and diseased children, then the results for gingival index were recorded as occurrence of gingivitis: Grade 1 ( mild inflammation, slight change in colour ,slight oedema ,no bleeding on probing ); Grade 2 (moderate inflammation , redness , oedema and glazing, the gum bleeds on probing), and grade 3 (severe inflammation, marked redness and oedema ,ulceration ,there is a tendency for spontaneous bleeding ), or as absence of gingivitis grade zero (normal gingiva).

For plaque index, the estimation of plaque accumulation is the same as for gingival index where the presence of plaque were given: Grade 1 (a film of plaque adhering to the gingival margin and the adjacent area of the tooth , the plaque may only be recognized by running a probe across the tooth surface); Grade 2 (a moderate accumulation of soft deposits within the gingival pocket or on the tooth and gingival margin ,this can be seen with the naked eye ); Grade 3 (an abundance of soft matter within the gingival pocket or on the tooth and the gingival margins), and absence of plaque gives grade zero (no plaque in the gingival area).

The patients were divided into two equal groups: Each consisted of fifteen patients. At first, they were received an instructions to brush their teeth 3 times daily for a period of twenty days using the same tooth paste (Signal 2), after determination the base line point, each child from the first group received 0.2% chlorhexidine digluconate mouth wash, they were inst-

ructed to brush with (signal 2) tooth paste once at morning after breakfast and once at the evening before bed time. They were instructed to brush for at least 3 minutes to ensure thorough cleaning of the teeth; then rinse his/her mouth with 10 ml of the solution after each brushing for 30 seconds with no any intake of food or drink for 30 minutes post rinsing. The same regimen was done for the second group as they received a container of water with dissolved salt at concentration of 0.9%.

After one month of using the mouth rinses the gingival and plaque indices were measured for both groups in the same method mentioned above.

Statistical analysis of data in this study was carried out using mean  $\pm$  Standard Deviation (SD),T-test between the group of healthy children and those receiving chemotherapy and between patients group using chlorhexidine mouth rinse and those using salty water mouth rinse (at  $p\leq 0.05$ ).

#### RESULTS

The results showed that children taking chemotherapeutic drugs had significantly higher gingival and plaque indices than the control group of healthy children ( $p\leq 0.05$ ), (Table 1). There was also significant reduction in gingival index for patients using chlorhexidine digluconate mouth rinse compared to those using salty water mouth rinse ( $p\leq 0.05$ ), (Table 2), also there was significant reduction in plaque index for patients using chlorhexidine digluconate mouth rinse compared to those using salty mouth rinse ( $p\leq 0.05$ ), (Table 3).

#### DISCUSSION

Oral soft tissue damage and mucositis can be a significant problem for patients receiving chemotherapy. The frequency and severity of these problems can vary significantly with the type and duration of therapy and from patient to patient. Chemotherapy develop acute oral complications which may result in significant morbidity, impaired nutrition, treatment delays and dose reductions which are affecting the prognosis of the primary disease.<sup>(7,16,17)</sup>

Table (1) : Comparison between healthy and patients children for both gingival and plaque indices.

Index	Healthy children (Without chemotherapy)		Patients children (with chemotherapy)		t-test
	Number	Mean $\pm$ SD	Number	Mean $\pm$ SD	
Gingival	30	0.91 $\pm$ 0.39	30	2.15 $\pm$ 0.42	S ( $p \leq 0.05$ )
Plaque	30	0.84 $\pm$ 0.31	30	2.62 $\pm$ 0.38	S ( $p \leq 0.05$ )

S: Significant (  $p \leq 0.05$ ); SD: Standard deviation

Table (2) Effects of mouth rinses on gingival index in children with chemotherapy.

Rinses used	Before rinsing		After rinsing		t-test
	Number	Mean $\pm$ SD	Mean $\pm$ SD		
Salty water ( 0.9 % )	15	2.21 $\pm$ 0.59	2.12 $\pm$ 0.41		NS ( $p \leq 0.05$ )
Chlorhexidine digluconate ( 0.2 % )	15	1.89 $\pm$ 0.51	1.34 $\pm$ 0.29		S ( $p \leq 0.05$ )

NS: Not Significant; S: Significant (  $p \leq 0.05$ ); SD: Standard deviation

Table (3) : Effects of mouth rinses on plaque index in children with chemotherapy.

Rinses used	Before rinsing		After rinsing		t-test
	Number	Mean $\pm$ SD	Mean $\pm$ SD		
Salty water (0.9%)	15	1.12 $\pm$ 0.31	0.91 $\pm$ 0.13		NS( $p > 0.05$ )
Chlorhexidine digluconate ( 0.2 % )	15	0.91 $\pm$ 0.12	0.64 $\pm$ 0.9		S ( $p \leq 0.05$ )

NS: Not Significant; S: Significant (  $p \leq 0.05$ ); SD : Standard deviation

The direct inhibitory effects of chemotherapy on DNA replication and mucosal cellular proliferation result in reduction in the renewal capacity of the basal epithelium and therefore, the direct stomatotoxicity of the chemotherapy occurs.<sup>(7, 18, 19, 20)</sup>

This study was a clinical attempt to make a comparison between oral hygiene of healthy children and of those treated by chemotherapy, also to compare the anti-plaque and antigingivitis effects of one commercially available oral antiseptic (chlorhexidine digluconate) and salty water mouth rinses in children receiving chemotherapy.

In this study, there was higher plaque and gingival indices in children receiving chemotherapy compared to healthy children. Also the chlorhexidine digluconate had more potent plaque and gingivitis inhibiting effect than salty water mouth rinse

and this is due to pharmacological effects of chlorhexidine which is highly effective against grampositive and gramnegative microorganisms and it inhibit the deposition of plaque and this leads to a reduction in the amount of gingival inflammation<sup>(11)</sup>. This was in agreement with several studies<sup>(10,21,22)</sup>, and in disagreement with other study<sup>(23)</sup>, which was done by Lundstrom *et al* who found non significant improvement in oral hygiene when use chlorhexidine digluconate mouth rinsing for a period of three weeks.

The results of this study were consistent with other studies<sup>(14, 24)</sup> regarding the non significant reduction in gingival and plaque scores for the group using salty mouth wash.

The plaque index of Silness and Løe 1964 together with the gingival index of Silness and Løe 1963 were chosen for assessment of oral health in this study for

their world wide acceptance, ease to application and flexibility.<sup>(15)</sup>

Finally, we can say that the potential oral sequels associated with chemotherapy can be prevented, reduced, or alleviated with careful and continuous dental care.<sup>(10, 25)</sup>

### CONCLUSION

Oral stomatitis and mucositis in patients receiving cancer therapy is a significant problem for patients and for clinicians trying to manage them. This study has attempted to review some of the etiological factors and some useful techniques for measuring these problems.

More precise measurement of oral mucositis in children receiving chemotherapy should lead to more effective preventative and therapeutic strategies for oral mucositis; also the need for evaluation of other types of mouth rinsing agents appear to be mandatory.

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