

Comparative Evaluation of Different Subgingival Irrigants on Gingival Health of Patients Undergoing Multibracketed Orthodontic Therapy

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ABSTRACT

Background: Gingivitis is known to develop in adolescent patients during fixed orthodontic treatment with the response characterized by gingival inflammation and hyperplasia.

Materials and methods: 32 patients undergoing fixed orthodontic therapy aged between 13-25 years were selected for the study. Patients were divided into four groups and those were Control group, Ozone dental jet, chlorhexidine and saline was used for intraoral irrigation. PI, OHI index, GI and gingival bleeding index were recorded at 3, 6, 9 and 12 weeks.

Results: indicates mean and standard deviation of Group I patients was increase in baseline to 15th week. Group II & IV showed decrease in values of indices. There was significant decrease in value in Group III patients

Conclusion: Group III (Ozone & 0.12% CHX) is more effective in reducing the plaque, debris, gingivitis and gingival bleeding.

Keywords: Pure Ozone, Ozonated water, 0.12% Chlorhexidine, Saline.

INTRODUCTION

The presence of fixed appliances during orthodontic therapy is associated with an increased risk of enamel decalcification and gingival inflammation. Gingivitis is known to develop in adolescent patients during fixed orthodontic treatment with the response characterized by gingival inflammation and hyperplasia. Development of hyperplastic gingivitis within 1 to 2 months after the placement of appliances. The design of appliances has various attachments such as wires, brackets and bands which serve as potential areas for bacterial adherence, collection and retention of food and debris.¹ Both supragingival and

subgingival plaque plays an important role in the initiation of inflammation of the gingival tissues. According to Lundstrom and Hamptom² it is particularly difficult to maintain an acceptable oral hygiene when bands, wires and ligatures were involved.

Ozone was first discovered in 1840 by German chemist Christian Frederick Schonbein. In 1870 Landler was the first person to use in medical field. In 1920's Dr. Edwin Parr a Swiss dentist started to use O₃ as part of his disinfection system.⁴ Recently the use of ozone (O₃) has gained momentum in dentistry. It is used in almost all aspects of dentistry in three different forms gas, oil and water. In the

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field of orthodontics, ozone gas has been tested for its anticaries effect and also for its effect on shear bond strength of orthodontic brackets to enamel.

Ozone has been recognized as a powerful sterilizing agent which can destroy bacteria, viruses and odours. Ozone water which contains three times more oxygen than tap water and used to disinfect the water system in dental units. The purpose of this study is to check both clinical effects and to compare the different subgingival irrigants on gingival health of patients undergoing multibrancketed orthodontic therapy.

MATERIALS AND METHODS

Different materials used for the study include:

- Mouth mirror and Probe** – for intra-oral examination.
- Floss** – to check the gingival bleeding index.
- Chlorhexidine** – 0.12% Chlorhexidine mouth wash for irrigation.
- Saline (Nacl solution)** – used for irrigation.
- Ozone dental jet** – for sub gingival irrigation (KENT OZONE DENTAL JET).



Fig 1: Chlorhexidine, dental floss, saline, and Ozone dental jet

The study was carried out on 32 patients who are undergoing fixed orthodontic therapy in Meghna Institute of Dental Sciences, ranging between 13-25 years of age. The patients were explained about the study and prior consent was taken. The patients were examined and those fulfilling the following inclusion criteria were selected:

Patients with age group between 13-25 yrs.
Systemically healthy patients.

GROUP I- CONTROL GROUP



3rd week



15th week

GROUP II



3rd week



15th week

GROUP III



3rd week



15th week

GROUP IV



3rd week



15th week

GROUP III>GROUP II>GROUP IV>GROUP I

Patients who are undergoing multibrancketed orthodontic treatment.

Patients with bleeding on probing.

Patients with minimal crowding.

The patients were randomly divided into four groups:

Group I- control group

Group II- irrigated with pure ozone

Group III- irrigated with ozonated water and chlorhexidine (0.12%)

Group IV- irrigated with ozonated water and saline

Before irrigation four indices i.e plaque index, OHI index, gingival index and gingival bleeding index were recorded. Irrigation was done at baseline, 3 weeks, 6 weeks, 9 weeks, 12 weeks and 15 weeks. Indices were recorded on patients at every follow

up before irrigation. Scoring criteria for different indices are as follows.

A total of 32 patients were divided into four groups and each group has 8 subjects. Before irrigation four indices i.e plaque index, OHIS Index, gingival index and gingival bleeding index were recorded at baseline, 3rd week, 6th week, 9th week, 12th week and 15th week. Values were recorded and statistical analysis was done using ANOVA one way test, and paired t test.

RESULTS

Results indicates mean and standard deviation of group I patients and it results that there was an increase in mean values in all four indices from baseline to 15th week. (Table1). Indicates mean and standard deviation of group II patients showed decrease in mean values from baseline to 12th week (Table 2). Indicates mean and standard deviation of group III patients showed decrease in mean values from baseline to 15th week (Table 3). Indicates mean and standard deviation of group IV patients showed decrease in mean values from baseline to 15th week (Table 4).

Table 1: Group I mean and standard deviation of clinical parameters.

DURATION	Plaque index		OHI s index		Gingival index		Gingival bleeding index	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
BASELINE	1.57	0.12	1.60	0.18	1.68	0.15	0.58	0.08
3 WEEKS	1.65	0.12	1.66	0.16	1.76	0.09	0.64	0.08
6 WEEKS	1.56	0.19	1.65	0.12	1.69	0.11	0.67	0.09
9 WEEKS	1.66	0.06	1.67	0.09	1.67	0.11	0.69	0.09
12 WEEKS	1.69	0.12	1.65	0.12	1.71	0.14	0.73	0.07
15 WEEKS	1.63	0.19	1.70	0.08	1.78	0.11	0.74	0.05

Table 2: Group II mean and standard deviation of clinical parameters.

DURATION	Plaque index		OHI s index		Gingival index		Gingival bleeding index	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
BASELINE	1.46	0.18	1.43	0.10	1.76	0.16	0.73	0.08
3 WEEKS	1.25	0.22	1.33	0.08	1.52	0.16	0.61	0.05
6 WEEKS	0.94	0.10	1.26	0.09	1.28	0.09	0.46	0.06
9 WEEKS	0.84	0.11	1.25	0.07	0.92	0.06	0.34	0.05
12 WEEKS	0.88	0.11	1.20	0.06	0.97	0.08	0.28	0.03
15 WEEKS	0.88	0.13	1.15	0.05	0.99	0.06	0.21	0.03

Table 3: Group III mean and standard deviation of clinical parameters

DURATION	Plaque index		OHI s index		Gingival index		Gingival bleeding index	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Baseline	1.21	0.32	1.40	0.24	1.60	0.25	0.65	0.09
3 weeks	1.18	0.20	1.21	0.18	1.36	0.21	0.54	0.11
6 weeks	1.01	0.25	1.01	0.19	1.03	0.18	0.45	0.09
9 weeks	0.87	0.20	1.01	0.15	0.97	0.04	0.36	0.08
12 weeks	0.81	0.10	0.90	0.10	0.96	0.09	0.28	0.06
15 weeks	0.85	0.10	1.02	0.16	1.00	0.08	0.22	0.07

Table 4: Group IV mean and standard deviation of clinical parameters.

DURATION	Plaque index		OHI s index		Gingival index		Gingival bleeding index	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Baseline	1.66	0.20	1.72	0.13	1.76	0.17	0.67	0.09
3 weeks	1.50	0.21	1.68	0.18	1.55	0.21	0.59	0.11
6 weeks	1.33	0.15	1.51	0.15	1.43	0.13	0.51	0.10
9 weeks	1.23	0.15	1.48	0.04	1.31	0.15	0.42	0.09
12 weeks	1.08	0.19	1.36	0.07	1.13	0.09	0.33	0.11
15 weeks	0.90	0.10	1.09	0.16	0.96	0.14	0.29	0.11

Table 5: Comparison of mean and standard deviation of clinical parameters of all groups.

CLINICAL PARAMETERS	GROUP I		GROUP II		GROUP III		GROUP IV		P value
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	
Plaque index	1.63	0.11	1.04	0.08	0.99	0.16	1.28	0.15	<0.001*
OHI s index	1.66	0.11	1.27	0.10	1.09	0.12	1.47	0.09	<0.001*
Gingival index	1.71	0.1	1.24	0.08	1.16	0.1	1.36	0.09	<0.001*
Gingival bleeding index	0.68	0.07	0.44	0.03	0.42	0.08	0.47	0.09	<0.001*

The results of the present study in group I (control group) patients, Plaque index and OHIS index showed that there was no significant difference

from base line to 15th week. In gingival index results showed statistically non significant from baseline to 12th week and there was mild

significant difference from 12th week to 15th week. In Gingival Bleeding index the results showed statistically non significant difference from 3rd week to 15th week.

DISCUSSION

Gingivitis is most common in all patients but in orthodontic patients it is more severe due to bands, brackets, wires and they feel difficulty in maintaining oral hygiene. In present study lower incisors are most commonly effected teeth in gingivitis.

In group II (pure ozone) patients were irrigated with pure ozonated water and results showed there was a significant difference in plaque index and OHIs index at 3rd week and 6th week itself and non significant at 9th week, 12th week and 15th week. In Gingival index and Gingival bleeding index there was statistically significant difference of gingival inflammation from baseline to 15th week.

In group III patients (Ozone and 0.12% CHX), Plaque index and OHIs index showed there was statistically significant difference at 3rd and 6th week itself, non significant difference at 9th week, 12th week and 15th week. In Gingival index there was statistically significant difference of gingival inflammation at baseline 3rd week & 6th week itself non significant at 9th week, 12th week and 15th week. In Gingival bleeding index there was a statistically significant difference of gingival bleeding from baseline to 15th week.

In group IV patients (Ozone and saline) Plaque index showed statistically significant difference from baseline to 15th week. In OHIS index results showed statistically significant difference from 3rd week to 6th week & 9th week to 15th week and non significant from baseline to 3rd week and 6th week to 9th week. In Gingival index and Gingival bleeding index there was statistically significant difference of gingival inflammation from baseline to 15th week.

In comparison of group I (control group), group II (Pure Ozone), group III (Ozone and 0.12% CHX) and group IV (Ozone and saline) P value (<0.05) showed statistically significant in all four groups. There was greatest significance in reduction of plaque, debris, gingivitis and gingival bleeding in group III patients i.e irrigated with Ozone and 0.12% chlorhexidine.

Study conducted by Broadwater WT et al¹⁶ reported that ozone at low concentration of A single-blind crossover study conducted by Moran J Addy et al⁸ was used compare the ability of a 0.2% chlorhexidine mouthrinse (Corsodyl) with a sanguinarine-zinc mouthrinse (Veadent) to inhibit plaque and gingivitis. They concluded that Corsodyl was significantly more effective at inhibiting both plaque and gingivitis therefore Veadent mouth rinse would at most only have a limited role as an inhibitor of plaque and gingivitis. The present study concluded that group II, III, and IV are effective as an inhibitor of plaque, gingivitis and gingival bleeding. Group III patients had significantly more effective in reducing plaque, gingivitis and gingival bleeding than group II and IV.

Brightman LJ et al¹ conducted to assess the effectiveness of 0.12% chlorhexidine gluconate (CH) mouthrinse and Peridex on orthodontic patients with established gingivitis. They concluded that Peridex in combination with mechanical plaque removal proved to be an important therapeutic agent in controlling gingival inflammation, bleeding and plaque accumulation. The present study concluded that combination of Ozone and 0.12% CHX was more effective in reducing plaque, gingivitis and gingival bleeding.

A study by Morrow et al⁹ was to assess the effect of single application of subgingival irrigation with 0.12% chlorhexidine digluconate or isotonic saline on gingivitis in adolescent orthodontic patients. The present study concluded that patients of group III and group IV had significant reduction in plaque, gingival bleeding and gingivitis. But group III patients irrigated with ozone & 0.12% CHX had greater significance in reduction of plaque, gingivitis and gingival bleeding.

SUMMARY AND CONCLUSION

Plaque, debris, gingivitis and gingival bleeding were reduced in group II, III and IV patients. Intra group comparison showed statistically non significant results in group I (control group) patients. Intra group comparison showed significant results in group II (pure Ozone), group III (Ozone & 0.12%) and group IV ((Ozone & Saline) patients.

Intergroup comparison showed significant P value (<0.05) in all four groups. But group III (Ozone &

0.12% CHX) has less mean value when compared to remaining three groups. Group III (Ozone & 0.12%) was significantly more effective than group II (Pure ozone) and group IV (Ozone & saline) in reducing plaque, debris, gingivitis and gingival bleeding.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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