DISSERTATION

COMPARATIVE EVALUATION OF CHEMICAL AND HERBAL MOUTHWASHES IN REDUCING AEROSOL CONTAMINATION PRODUCED BY ULTRASONIC SCALING

Submitted to

BABU BANARASI DAS UNIVERSITY,

LUCKNOW, UTTAR PRADESH

In the partial fulfilment of the requirements for the degree

of

MASTER OF DENTAL SURGERY

in

PERIODONTOLOGY

By

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Under the guidance of

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BABU BANARASI DAS COLLEGE OF DENTAL SCIENCES

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DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled "**COMPARATIVE EVALUATION OF CHEMICAL AND HERBAL MOUTHWASHES IN REDUCING AEROSOL CONTAMINATION PRODUCED BY ULTRASONIC SCALING**" is a bonafide and genuine research work carried out by me under the guidance of **Dr Vandana A Pant** Professor and Head, Department of Periodontology, and Co-Guide **Dr Ashish Saini** Reader, Babu Banarasi Das College of Dental Sciences, Babu Banarasi Das University, Lucknow, Uttar Pradesh.

Date: 28/03/2022

Place: Lucknow

Dr Dilip Kumar Maurya

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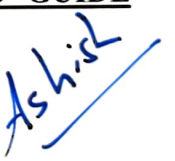

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Date: 28/03/2022

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Dr Dilip Kumar Maurya

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List of Abbreviations

CHX	Chlorhexidine
PVP-I	Povidone- Iodine
CFUS	Colony Forming Units
HR	Herbal
EO	Essential Oil
PPD	Probing Pocket Depth
PAL	Probing Attachment Level
GI	Gingival Index
BOP	Bleeding On Probing
PI	Plaque Index
RAL	Relative Attachment Level
SRP	Scaling And Root Planing
CAL	Clinical Attachment Loss
MGI	Modified Gingival Index
PD	Probing Depth
DUWL	Dental Unit Water Lines

I M PROUD TO HAVE SUCH A LOVELY FAMILY.

I SUSTAIN MYSELF WITH YOUR LOVE AND SUPPORT.

THANK YOU TO MY LOVELY FAMILY MEMBERS.

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"दुग्धेन धेनुः कुसुमेन वल्ली शीलेन भार्या कमलेन तोयम् । गुरुं विना भाति न चैव शिष्यः शमेन विद्या नगरी जनेन ॥ "

Almighty GOD, we acknowledge our dependence on Thee and we beg Thy blessings upon us, our parents, our teachers and humanity.

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ABSTRACT

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Contaminated aerosol produced at the time of scaling and root planing is a vigorous source of infections. Pre-procedural mouthrinsing has found potent effectiveness in reducing the bacterial contamination of the aerosol that was produced during the procedure. Thus, the aim of the present study was to compare and evaluate the chemical and herbal mouthwashes containing Chlorhexidine, Povidone Iodine and herbal curcumin as a preprocedural mouth rinsing agent in reducing bacterial load of the aerosol produced by ultrasonic scaling.

Material and Methodology: 40 subjects were randomly divided into control group and test groups on the basis of agent used as preprocedural mouthwash. Control group was without any prerinses. The test group was divided into three sub groups Group I: 0.2 % Chlorhexidine, Group II: Povidone Iodine 2% and Group III: herbal Curcumin. The contaminated aerosol was collected on two previously prepared blood agar culture plates placed on left and right side of the patient. The culture plates were incubated for 24hr and colony forming units (CFUs) were counted.

Result: The minimum CFU was recorded in 0.2% CHX followed by povidone iodine, herbal curcumin and control group.

Conclusion: The pre-procedural rinse can significantly reduce the viable microbial content of dental aerosol. Every practitioner should inculcate the pre-procedural mouthrinse before starting any dental procedure in daily routine

INTRODUCTION

INTRODUCTION

Dental diseases are recognized as major public health problems throughout the world. The microflora of the oral cavity has great variety. There are almost 700 types of microorganisms in the oral cavity, of which some can play a role in cause of infection in oral disease [1]. Aerosol production is a common feature during various dental treatment procedures and it is defined as suspensions of liquid and/or solid particles in the air which is generated by coughing, sneezing, or any other act that expels oral fluids into the air. Aerosols that contain particles more than 50 μm in diameter are referred as splatter, while particles measuring less than 50 μm are known as droplet nuclei[2]. Particle size which may vary from 0.001 to >100 μm and the smallest particles of an aerosol (0.5–100 μm in diameter) have the potential to penetrate and lodge in the smaller passages of the lungs or they can come into contact with the skin or mucous membranes and are thought to carry the greater potential for transmitting infections and disease[3]. The aerosol and splatter are most common concern in dentistry because of their potential effects on the health of patients and of dental personnel.

The bacteria in the plaque release toxins which cause swelling, redness and bleeding of gums. As we know it is impossible to eliminate oral bacteria causing dental plaque, hence it is important to achieve plaque control by limiting growth of harmful bacteria. Bacterial flora in plaque is variable according to the site such as – sub gingival / supra gingival, and tooth / gingiva.

Numerous studies have been conducted to verify the extent of medicinal plants in curing the infections and trauma. Various herbal mouthwashes are gaining popularity as they have been contained in naturally occurring ingredients called as Phytochemicals that achieve the desired antimicrobial and anti-inflammatory effects. Herbal formulations may be more appealing because they may work without alcohol, artificial preservatives, flavours or colours and having minimal side effects.

The equipment's that spreads aerosols and splatters carrying microorganisms in the dental clinic's environment, are ultrasonic instruments, high-speed dental handpieces, and three-way syringes. To reduce microbial cross-contamination in the dental office, various procedures, materials, and antimicrobial agents have been proposed, such as immunisation of dental staff, decontamination of surfaces, sterilisation of instruments, use of personal protective barriers, and pre-procedural mouthwashes.[4] Preprocedural

rinse with a solution containing an antibacterial agent is one approach of lowering total bacterial counts created during dental operations. The preprocedural mouthrinses have been found to be effective in reducing the bacterial count of the aerosol produced at the time of ultrasonic procedures.[5] Herbal extracts have been of particular interest these days offering significant advantages over the chemical ones and helps to control dental plaque and gingivitis. SARS-CoV-2 has been found to be aerosolized for at least three hours under experimental conditions and also survive for more than 72 hours on plastic and stainless-steel surfaces, posing significant dangers to all healthcare workers.**[6]** The virus may be associated with high concentrations in the nasal cavity, nasopharynx, oral cavity, and oropharynx, providing chances for SARS-CoV-2 transmission in the operating room. [7,8]

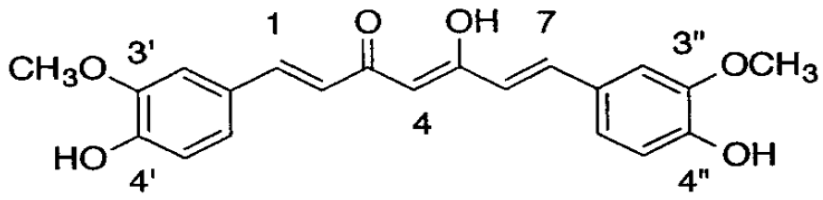
Chlorhexidine (CHX), a broad range antibiotic having notable antimicrobial activity on both gram-positive and gram-negative bacteria, as well as fungi and certain viruses, is the most often used chemical for plaque management.[9] Parotid swelling is a rare unwanted effect of CHX mouthwash. Overly rigorous mouth washing may predispose the patient to this disease by causing negative pressure in the duct and CHX aspiration. The use of CHX mouthrinse may also enhance supragingival calculus production because CHX induces salivary protein to precipitate on the tooth surface, increasing pellicle thickness and precipitation of inorganic ions on the pellicle layer.[10] The dissolution of the bacterial membrane causes denaturation of the bacterial protein, resulting in brownish staining of the teeth. Because of its negative effects, it is not advisable for prolonged usage. Burning feelings (glossodynia), desquamation of the oral mucosa, and oral paraesthesia are some of the fewer common adverse effects which has been frequently reported [11,12] but countered by Gupta V et al. [13]

Povidone-iodine (PVP-I) is a water-soluble mixture of molecular iodine and the water-soluble solubilizer polyvinyl-pyrrolidone. Povidone-iodine is the iodophor of elemental iodine (PVP-I).[14] This iodophor has a bactericidal action similar to pure iodine combined with a broad-spectrum antiseptic, which is commonly used to treat periodontitis.[15] Because of its affinity for cell membranes, PVP–I, a frequently used topically applied antiseptic, delivers diatomic free iodine directly to the bacterial cell surface, where it exerts its antibacterial effects.[16] It has been reported that applying PVP–I to the gingival edge lowers the risk of bacteraemia after gingivectomy and tooth extraction.[17] Previously, PVP-I was used with ultrasonics to enhance periodontal

disease treatment results. Its range of action includes bacteria connected to periodontitis, and it has been demonstrated to have a significant therapeutic benefit in terms of pocket depth reduction when used as a rinse during early periodontal treatment.[18] Povidone-iodine has shown some side effects like aspiration pneumonitis and thyroid dysfunction. [19,20] Anaphylaxis, contact dermatitis, and swelling were also observed as a result of exposure.[21,22]

Since CXH and PVP-I both are chemical mouth rinses with various side effects therefore, a naturally occurring indigenous oral hygiene aid with least or no side effects is necessary. Aloe vera, curcumin, and neem extract are few herbal products which have been researched for their anti-bacterial properties [23,24,25].

Turmeric, or Curcuma longa, is a perennial plant of the Zingiberaceae family (ginger). Curcumin has a unique conjugated structure including two methoxylated phenols and an enol form of β-diketone, and the structure shows a typical radical trapping ability as a chain-breaking antioxidant.



Chemical structure of curcumin

It is frequently used to treat sprains and edoema induced by injuries.[26] Turmeric powder has been used in traditional Indian medicine for the treatment of biliary problems, anorexia, hepatic disorders, rheumatism, and sinusitis for the last 14 years.[27,28] Curcuma longa is used to treat disorders that cause stomach aches.[29] Turmeric's antioxidant, hepatoprotective, anti-inflammatory, anti-carcinogenic, and antimicrobial properties, as well as its use in gastric ulcer (can cause ulcer at high doses), cardiovascular disease, and gastrointestinal disorders, antioxidant, and wound healing, have all been the focus of recent research. [28,30,31,32,33] Pain and swelling are reduced by massaging hurting teeth with roasted powdered turmeric. Scaling and root planing can be supplemented with a local medication delivery system comprising 2% turmeric gel. [34]

Various researches have been conducted to assess the efficacy of CHX, PVP-I and few indigenous herbal extracts in reducing the microorganism in oral cavity after phase I therapy. As per the review of literature there is scarcely few studies to assess the effect of these two chemical mouthwashes i.e. CHX, PVP-I and herbal mouthwash as preprocedural mouthrinses in reducing the aerosol microbial contamination. Therefore, the present study was undertaken to assess and compare the clinical efficacy of PVP-I, CHX and herbal Curcumin extract as preprocedural mouthrinse in reducing aerosol microbial contamination produced during ultrasonic scaling.

AIM AND OBJECTIVES

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The aim of the present study is to assess and compare the efficacy of three different preprocedural mouth rinses viz. chlorhexidine (CHX), betadine (PVP-I) and curcumin, in reducing aerosol microbial contamination produced during ultrasonic scaling.

OBJECTIVES

1. To assess the aerosol microbial contamination load at two different sides of patients (Left and Right) without any preprocedural mouth rinse.
2. To assess the aerosol microbial load at two different sides of patients (Left and Right) with preprocedural mouth rinse i.e., CHX, PVP-I, and Curcumin extract.
3. To compare the efficacy of each mouth rinse in reducing the aerosol microbial load at two different sides of patients (Left and Right).

REVIEW OF LITREATURE

REVIEW OF LITERATURE

1. **C N Brownstein et al**. (1990)[35] conducted study along with 44 volunteers with at least 6 interproximal sites that bled on probing were randomly assigned to one of four treatment groups: placebo-rinse, CHX-rinse (0.12%), placebo-irrigation, and CHX-irrigation on a double-blind basis (0.06%). In all groups, a half-mouth was climbed two weeks before to treatment. Rinses were done twice a day, and irrigation was done once a day with an oral irrigator with the tip angled at a right angle to the tooth. Without being instructed, the subjects continued to practise good dental hygiene. Plaque was considerably decreased ($p < 0.05$) by CHX-rinse (0.12%) and CHX-irrigation (0.06%). Following CHX (0.12 percent) rinses, gingival bleeding decreased by 26% in both scaled and unscaled sites, and by 40% in both kinds of sites after CHX (0.06 %) irrigation. The CHX-irrigation prevented bleeding more ($p < 0.05$) than the placebo-irrigation.
2. **Fine DH et al. (1992)[36]**. Conducted a double-blind, controlled, cross-over clinical investigation. Total of eighteen people took part in the study. Half mouth (experimental side) was scaled with ultrasonic for 10 minutes after being randomly allocated either antiseptic mouthwash or a control rinse and rinsed with 20 ml for 30 seconds. When compared to the non-rinsed control, then result shoed that rinsing with the antiseptic mouthwash resulted in a 94.1% reduction in recoverable CFUs, while the control rinse resulted in a 33.9% drop. There was a statistically significant difference between the experimental mouthwash and the non-rinsed control group ($P<0.001$).
3. **D D Logothetis et al.** (1995)[37] Evaluated the effects of chlorhexidine gluconate, an antiseptic mouthwash containing essential oils, and water on bacterial aerosol pollution created by an air cleaning system. Before treatment, patients were given one of the three solutions to rinse with. The chlorhexidine pre-treatment rinse was much more successful than the other solutions in minimising bacterial aerosols, according to bacterial counts obtained during the treatment.

4. **Kaim et al (1998)**[38] Compared an antimicrobial activity of herbal (HR) mouthwash with essential oil (EO) mouthwash alone and combined with 0.12% chlorhexidine (CHX) against Streptococcus mutans, Streptococcus sanguis, and Actinomyces viscous. Result which they found was that there was a bacterial reduction in the aerosols more after the use of Essential oil mouthwash in comparison to the herbal mouthwash and the results were different. The reason for the difference may be attributed to the difference in the composition of Herbal mouthwash used in both the studies.
5. **Rosling B, et al (2001)** [39] Study was conducted to see how effective topically applied PVP-iodine was as an adjuvant to basic non-surgical therapy and at re-treatment during long-term periodontal disease management in patients with advanced periodontal disease. 223 individuals with severe destructive periodontitis with 8 non-molar teeth and 6mm in two teeth in each dentate quadrant were enlisted. An ultrasonic device was used to do non-surgical treatment. In the test group, the instrumentation was paired with 0.1 percent PVP-iodine administration. The test group showed considerably lower mean probing pocket depth (PPD) values and significantly higher gain of probing attachment level (PAL) than the control group at the 3, 6, and 12-month re-examinations after baseline I.
6. **Pistorius A et al. (2003)**[40] Conducted a randomised, double-blind clinical trial. 89 patients included in which 45 females and 44 males having mean age 49.1 +/- 1.31 years. They were divided into three groups: group 1 (n = 34), which received an oral irrigator with subgingival tips and an herbal-based mouthrinse; group 2 (n = 29), which received the oral irrigator in conjunction with a conventional mouthwash; and group 3 (n = 26), which received a conventional mouthwash without subgingival irrigation. GI reduced in group 1 from 1.80 +/- 0.04 to 1.56 +/- 0.04 over a three-month period, increased in group 2 from 1.79 +/- 0.05 to 1.68 +/- 0.04, and stayed virtually constant in group 3 (from 1.79 +/- 0.05 to 1.81 +/- 0.04). There were significant differences between the groups (analysis of variance, $P < 0.05$). Throughout the follow-up period, all three groups saw a decrease in PI, with no statistically significant differences. There was no significant reduction in probing depths

in any of the groups. Mouthwash using a blend of herbal extracts was found to be efficient in lowering bacterial load in aerosols as well as gingival irritation.

7. **Hoang T, et al. (2003)** [41] Evaluated PVP-I as a periodontal pocket disinfectant. 10%. 16 patients with at least one 6 mm periodontal pocket in each quadrant of the dentition and one or more periodontopathic bacteria. Study site in each quadrant of each individual was randomly assigned to undergo subgingival irrigation with 10% PVP-iodine combined with scaling and root planing, scaling and root planing alone, subgingival irrigation with 10% PVP-iodine, or subgingival irrigation with sterile saline. Result showed that PVP-iodine/scaling and root planing group reduced mean pocket depth by 1.8 mm, the scaling and root planing group by 1.6 mm, and the PVP-iodine and saline monotherapy groups by 0.9 mm, with statistical significance reached for the scaling and root planing group vs. the PVP-iodine group (P 1/4 0.04) and the scaling and root planing group vs. the saline group (p 1/4 0.02).
8. **Charles CH et al. (2004)**[42] Conducted a 6-month clinical experiment to examine the antiplaque and anti- gingivitis effects of a Chlorhexidine and an essential oil mouth rinse. 108 patients aged 20 to 57 years were randomly assigned to one of three groups: essential oil mouth rinse (Listerine antimicrobial), 0.12% CHX (peridex), or 5% hydroalcoholnegative control. Following scaling, an oral soft tissue examination was performed. It was recommended that use mouthwash twice a day in addition to mechanical oral hygiene. At three and six months, clinical factors were assessed. The study revealed that the antiplaque and anti-gingivitis effects of essential mouthrinse and CHX were equal.
9. **Southern EN et al. (2006)**[43]. Conducted a research project with A total of 63 patients were allocated to one of three therapy groups: CHX, Herbal or placebo. Participant asked to rinses twice daily (morning and evening) with (1/2) ounce of assigned mouthwash after brushing and flossing for three months. Individuals were given the identical soft bristle toothbrush and whitening toothpaste, as well as instructions to avoid using any other oral rinse for the length of the trial. At the start of the trial and at the end, a full mouth periodontal probing was conducted. When compared placebo, CHX was the only oral rinse that showed a statistically significant reduction in mean GI,

BOP, and PI ratings. Chlorhexidine (CHX) shown to be more efficient in lowering bacterial population as a gingival irritation.

10. **Cherry M, et al. (2007)** [44] Performed study to evaluate povidone–iodine rinse on bacteraemia produced by ultrasonic scaling. Before ultrasonic scaling of FDI teeth 31–35, 60 patients with gingivitis participated in a randomised, placebo-controlled experiment in which 30 were rinsed with 0.9% saline and 30 with 7.5% povidone–iodine for 2 minutes. Blood samples were lysocentrifuged before and after.As a result, they discovered that 33.3% of the saline group and 10% of the povidone–iodine group had oral bacteraemia. With a statistically significant odds ratio (OR) of 0.189 (95 % of confidence intervals, OR 5 0.043–0.827), washing with povidone–iodine was almost 80% more efficient than rinsing with saline in lowering the occurrence of bacteraemia.
11. **Ribeiro E DP, et al (2010)** [45] Conducted controlled clinical experiment see how well topically administered povidone-iodine (PVP-I) worked as an adjuvant to non-surgical therapy of interproximal class II furcation involvements. 32 patients with at least one interproximal class II furcation involvement that bleed on probing with a probing pocket depth (PPD) of 5mm were randomly assigned to either subgingival instrumentation with an ultrasonic device using PVP-I (10%) as the cooling liquid (test group) or identical treatment using distilled water as the cooling liquid (control group) (control group). The visible plaque index, bleeding on probing (BOP), gingival margin position, relative attachment level (RAL), PPD, and relative horizontal attachment level were all assessed (RHAL). After 6 months, the results showed that both groups had similar means of PPD reduction, RAL and RHAL gain ($p>0.05$).
12. **Mali MA et al. (2012)**[46] A clinical and microbiological investigation was done to compare the effectiveness of 0.1% turmeric mouthwash to 0.2% chlorhexidine gluconate in the prevention of plaque and gingivitis. A total of 60 patients aged 15 year and above with mild to moderate gingivitis were included. The participants in the study were split into two groups. Chlorhexidine gluconate mouthwash was recommended to Group A-30 participants. The experimental (turmeric) mouthwash was recommended to

Group B-30 participants. Both groups were instructed to use 10 mL mouthwash diluted in equal parts water for 1 minute twice a day, 30 minutes after brushing. Plaque and gingival index parameters were measured on days 0, 14, and 21. After 14 and 21 days, subjective and objective criteria were evaluated. Chlorhexidine gluconate and turmeric mouthwash were shown to be useful as an adjuvant to mechanical plaque control in the prevention of plaque and gingivitis in a study. Both mouthwashes contain anti-plaque, anti-inflammatory, and anti-microbial characteristics that are equivalent.

13. **Muglikar S. et al. (2013)** [47] conducted study of Curcumin's effectiveness in the treatment of persistent gingivitis. 30patients selected with generalised chronic gingivitis between the ages of 20 to 40 years. They were separated randomly into 3 groups with 10 patients in each group. Patients in group 1 had scaling and root planing followed by chlorhexidine mouthwash (SRP/CHX Gr-1); patients in group 2 had scaling and root planing followed by curcumin mouthwash (SRP/CUR Gr-2); and patients in group 3 had just scaling and root planing (SKP Gr-3). At baseline (day 0), 7-, 14-, and 21-days, gingival and plaque indices were measured. The differences between the groups were analysed statistically. Curcumin is equivalent to chlorhexidine as an anti-inflammatory mouthwash, according to the study. As a result, it can be used as a supplement to mechanical periodontal treatment.
14. **Kaur et al. (2014)** [48] Study conducted with 60 patients was done, with 20 patients in each group ranging age from 20 to 50 years. Pre-rinses with 0.2% CHX and 1% Povidone iodine were utilised. He also included an extra group that received ozone irrigation (0.082 mg/h) for 1 minute as a pre-rinse. For 10 minutes, ultrasonic scaling was performed. The plates were positioned 9 feet behind the patient's head and at the patient's chest. Contaminated aerosol was collected and cultured for 48 hours on blood agar plates at 37 degrees. They discovered a substantial decline in all categories as a result of their findings. At the patients' check, the CFU decrease between CHX, PVP-I, and Ozone, 35%, 37%, 29%, operator’s mask 57%, 54%, 47% and 9 feet behind patients head 36%, 47% and 29%.

15. **Gupta G et al**. (2014)[49] Conducted study with 24 patients and divided into three groups, each with eight patients, for a whole mouth parallel double blinded placebo control. They employed 0.2% CHX, herbal extracts and a water control group. Pre-rinses with 10ml for 1minute and 10 minutes before scaling. For 30 minutes, piezoelectric ultrasonic scaling was performed. The bacterial contamination in the aerosol was cultivated in a blood agar plate and incubated for 48 hours at 37 degrees. The samples came from the site's patients, as well as the operator's and assistant's chests. They discovered that the mean CFU decrease between CHX-water, water-herbal, and CHX-herbal was 71.3 %, 38.4 %, 35.2 % in the patient's chest, 71.6 %, 35.0 %, 36.6 % in the operator's chest, and 16.1 %, 6.9 %, 9.3 % in the assistant's chest.
16. **Gupta G et al. (2014)[50]** performed a study to compare the effectiveness of Chlorhexidine 0.2% mouthwash and herbal mouthwash as pre-procedural mouth rinses. This was 45-day study, a single-centre, double-masked, placebo-controlled, randomised and three-group parallel design. 24 patients with chronic periodontitis were randomly assigned to one of three groups (A, B, or C) of eight patients each to receive preprocedural rinses with 0.2 percent chlorhexidine gluconate, herbal mouthwash, and water. Result showed that CFUs in groups A and B were considerably lower than those in group C, with a $P< 0.001$. In addition, CFUs in group A were considerably lower than in group B ($P<0.05$) (independent t-test). The patient's chest area had the most CFUs, whereas the assistant's chest area had the least.
17. **Subasree S, et al. (2014) [51]** Performed a study to compare the turmeric's effects on oral health with chlorhexidine mouthwash. 100 patients were chosen randomly. Turmeric mouthwash prepared by dissolving 10milligrams of curcumin extract in 100 mL distilled water. At 0, 14, and 21 days, GI and PI were recorded. He reported that CHX and turmeric mouthwash were effective in the prevention of plaque and gingivitis. Turmeric's anti-inflammatory properties might explain the observed impact. In both groups, there was a decrease in overall microbial count.

18. **Kandwal A, et al. (2015)**[52] studied the comparative evaluation of turmeric gel with 2% chlorhexidine gluconate gel for the treatment of plaque induced gingivitis, 60 patients with plaque-induced gingivitis were divided into two groups, Group A was given turmeric gel and Group B was given chlorhexidine gel for 21 days in vaccupress trays. Plaque and gingival index were taken at baseline, 14 days and 21 days. Subjective and objective criteria were evaluated at 14 and 21 days. Study concluded that both groups reported comparable reduction in plaque and gingival index. Turmeric gel reported better acceptance due to pleasant odour and no staining of teeth in comparison to chlorhexidine gel that reported a bitter taste and staining of teeth.
19. **Sudhakar J et al (2015)** [53] conducted a study to evaluated Curcumin gel for its anti-inflammatory properties as an adjuvant to scale and root planning. In this study, 30 patients aged 25 to 60 years old with chronic localized or generalized periodontitis with pocket depths of 5-7 mm affecting at least two non-adjacent locations were included. Scaling and root planing were conducted on the experimental site, followed by the administration of the curcumin gel and the periodontal pack. Subgingival scaling was performed alone at the control site, followed by the placement of a periodontal pack. The following parameters were included: (PI), (GI), (PPD), and (CAL). On days 0, 30, and 45, these parameters were recorded. Significant reduction in mean was observed in PI, GI, PPD and gain in clinical attachment level were demonstrated in both the groups from baseline to 45 days. Study concluded Curcumin can be effectively used along with scaling and root planning.
20. **Pulikkotil SJ, et al. (2015)** [54] Study performed to check Curcumin's effects on crevicular levels of IL-IB and CCL28 in experimental gingivitis. 60 systemically healthy volunteers were randomly randomised to one of three topical anti-gingivitis gels in this study. On the test quadrant only, each gel was applied twice daily for 10 minutes as the only means of dental hygiene for 29 days. At baseline, 29 days, and 60 days, the modified gingival index (MGI), plaque index (PI), bleeding on probing (BOP), and probing depth (PD) were measured. At baseline and after 29 days, the levels of IL-1B and CCL28 in gingival crevicular fluid were measured. It was discovered that topical

curcumin has anti-inflammatory properties equal to CHX-MTZ but was superior to CHX in terms of influencing IL-1B and CCL28 levels.

21. **Sahrmann P, et al (2015)** [55] conducted study to see how contemporaneous subgingival rinse with 10% PVP-iodine during subgingival instrumentation affected the results. In periodontitis patients, subgingival instrumentation was done with either water or PVP-iodine rinse. Subjects gargled for 1 minute with the assigned liquid before instrumentation. The pockets were then cleaned for 1 minute before being sub-gingivally instrumented with liquid-cooled ultrasonic scalers (water/PVP-iodine) (1 min). They discovered that oral-borne bacteraemia was identified in 10 of the control samples and 2 of the test samples, for a total of 19 samples in each group. The test group had significantly less bacteria and bacteraemia than the controls (12.2 [1; 46]) ($p = 0.003$), with an average of 3.0 [1; 5] colony forming units.
22. **Sindhura H, et al (2017)** [56] Performed a study see how beneficial subgingival irrigation with 10% povidone iodine as an adjuvant to scaling and root planing is (SRP). A total of 60 patients with mild to severe chronic periodontitis and periodontal pocket depths of 4–6 mm was enrolled. Plaque index, gingival index, and bleeding index were measured at the start. The Florida probe was used to determine the amount of PD and clinical attachment. At baseline, each participant was divided into two arches, with the maxillary arch receiving SRP alone and the mandibular arch receiving SRP with 10% povidone iodine irrigation. Subgingival irrigation with povidone iodine combined with SRP demonstrated a statistically significant decrease in all clinical indices as well as levels of Porphyromonas gingivalis (Pg) and Aggregatibacter actinomycetemcomitans (Ag) three months following therapy.
23. **S. Selva et al. (2020)**[57] Conducted study to find an effectiveness two different mouthrinses as a preprocedural mouthrinses on aerosol contamination which is produced during ultrasonic scaling. 30patients were included in this study. They were randomly divided into two different groups and subjected to scaling before and after rinsing with 0.2% chlorhexidine and 0.1% turmixs. Plane blood agar plates were used for the collection of contaminated aerosols. The anaerobic bacteria in the aerosol created after pre-rinse with Turmix had a

mean CFU/mL of less than 50% of the mean effective pre-rinse Chlorhexidine plus threshold.

24. **Paul et al.** (2020)[58] performed study to check effectiveness of three different mouthwashes tested on 60 patients in research. Patients selected between the ages of 18 to 35years. Chlorhexidine (CHX), povidine iodine solution (PVP-I), and Alovera (AV) extract were used. They were placed into three groups, each of which received 10 ml of three different mouthwashes before as a pre-rinsing for one minute. After that, 20 minutes of piezoelectric ultrasonic scaling was completed. Blood agar plates were positioned at distance of 12inches on the patient's chests and the doctor's chest from the patient's lips. Plates were cultured for 48 hours. Result showed that the mean CFU decrease between CHX-PVP-I, CHX-AV, and PVP-I was 69.1 %, 9.3 %, and 66.0 % in the operators' chest and 60.4 %, 8.3 %, and 56.8 % in the patients' chest.
25. **C. J. Seneviratne et al. (2020)** [59] conducted a study to check the efficacy of three different mouth-rinses in saliva of SARS – CoV-2 patients. 36 SARS-CoV-2-positive patients,16 SARS-CoV-2-positive patients were randomly assigned to one of four groups: povidone-iodine (PI) group (n = 4), chlorhexidine (CHX) group (n = 6), cetylpyridinium chloride (CPC) group (n = 4) or water as a control group (n = 2). After applying mouth rinses/water, saliva samples were obtained from all patients at baseline for 5 minutes, 3 hours, and 6 hours. After then, SARS-CoV-2 RT-PCR analysis was performed on the samples. Result showed that salivary clinical trial values of patients in each group of PI, CHX, CPC, and water at 5 min, 3 h, and 6 h showed no significant changes, while the CPC group patients at 5 min and 6 h and the PI group patients at 6 h showed a significant rise.
26. **M M Khan et al. (2020)** [60] performed a study to use of 0.5% povidone- iodine solution in otorhinolaryngology practice in covid 19 pandemic. The 0.5% PVP-I solution is made with commercially available PVP-I of 10 % concentration. Prior to exams, patients were asked to place 0.5% PVP-I drops in their noses and gargle their mouths for 30 seconds. Nasal douching and gargling should begin one day before the endoscopic operation (nasal and throat). Douching and rinsing should be done again right before the surgery. Tolerance and any allergic reactions were recorded after nasal packing with

0.5 % PVP-I and 4 % xylocaine/adrenaline solution. The 0.5 % was tolerated by both the patient and the health-care providers and t There were no allergies reported.

MATERIALS AND METHODOLOGY

Materials And Methodology

Place of the study where it is conducted: -

A clinical longitudinal study was carried out in the Department of Periodontics, Babu Banarasi Das Collage of Dental Sciences (BBDCODS), Lucknow India. Ethical clearance was obtained from the ethical committee of BBDCODS (IEC 19); patients fulfilling the following inclusion and exclusion criteria were selected from the OPD of the Periodontology department of BBDCODS.

Study subjects

Human

Study sample size

30 patients

- Control group without mouthwash.
- Group I (chlorhexidine)- 10 patients
- Group II (*Povidone-iodine*)- 10 patients
- Group III (herbal curcumin)- 10 patients

Eligibility criteria

Patients will be selected based upon the following inclusion and exclusion criteria.

Inclusion criteria

- Age range 25-55 years.
- Minimum 24 permanent teeth.
- Plaque score of 2.0 – 3.0 on plaque index.
- Overall good systemic health.
- Non-smokers and non-tobacco chewers.
- No history of antimicrobial therapy for the past 6 months.
- No history of hypersensitivity to any drugs.

Exclusion criteria

- Pregnant and lactating females.
- Patients with a history of trauma in the past 6 months.
- Patients on phenytoin, calcium channel blockers, and cyclosporine medication.
- Oral prophylaxis within last 6 months.
- Five or more carious lesions requiring immediate restorative treatment.

Materials

Material and equipment's used in this study are: -

Armamentarium for Diagnosis and Pre-clinical Assessment:

- Mouth mirror
- UNC Periodontal probe
- Tweezers

Armamentarium for procedure:

- Pezoelectronic Ultrasonic scaler (Woodpecker).
- Plain Blood agar culture plate. (Manufactured by Chetana Laboratory, Nashik, India)
- Chlorhexidine mouthwash 0.2% (Periex, Manufactured by Goran pharma Pvt Ltd, Gujrat, India).
- Povidone- iodine gargle 2% (Betadine, Manufactured by G.S. Pharmbutor Pvt. Ltd. Behror, Rajasthan, India).
- Turmeric-based mouthwash (Turmix mouthwash, Manufactured by Sanat CotecHealth Care Pvt. Ltd. Roorkee- Dehradun)

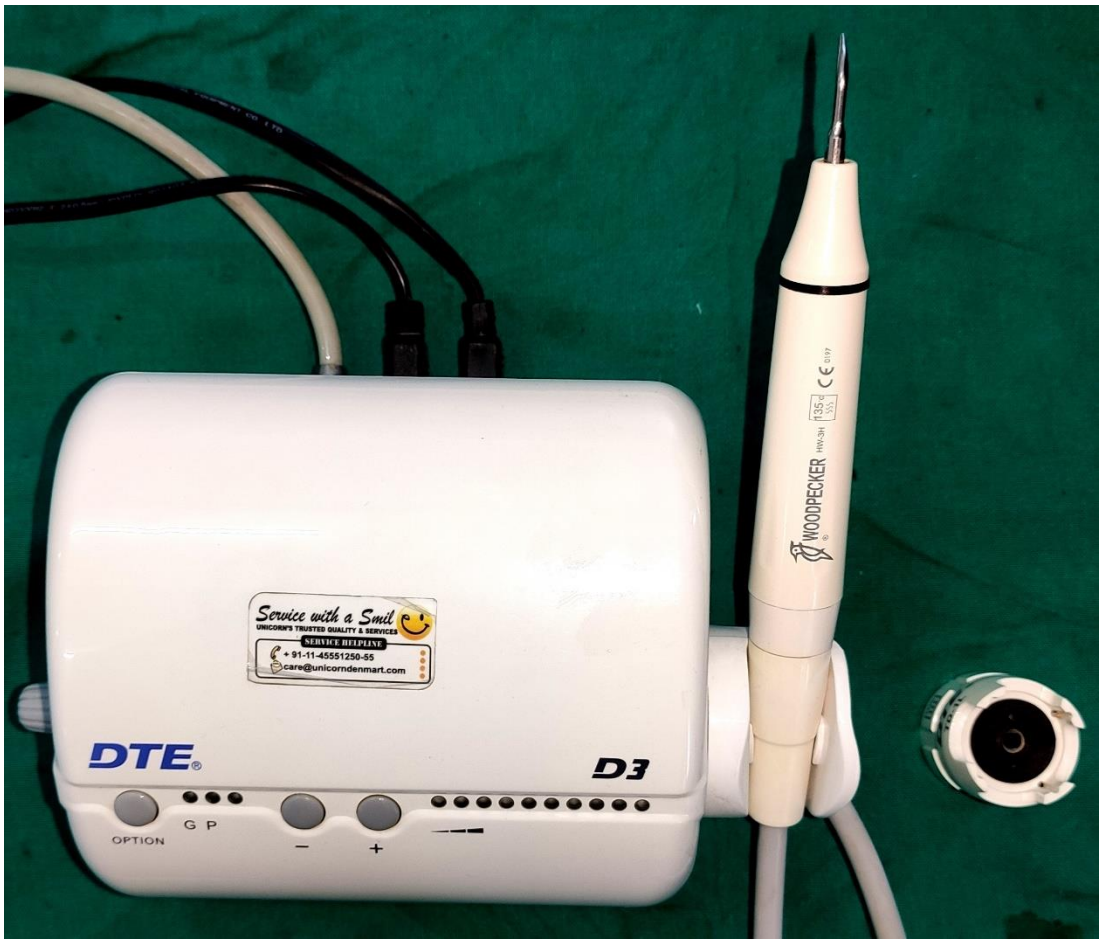


Figure 1: Pezoelectronic Ultrasonic scaler (Woodpecker)

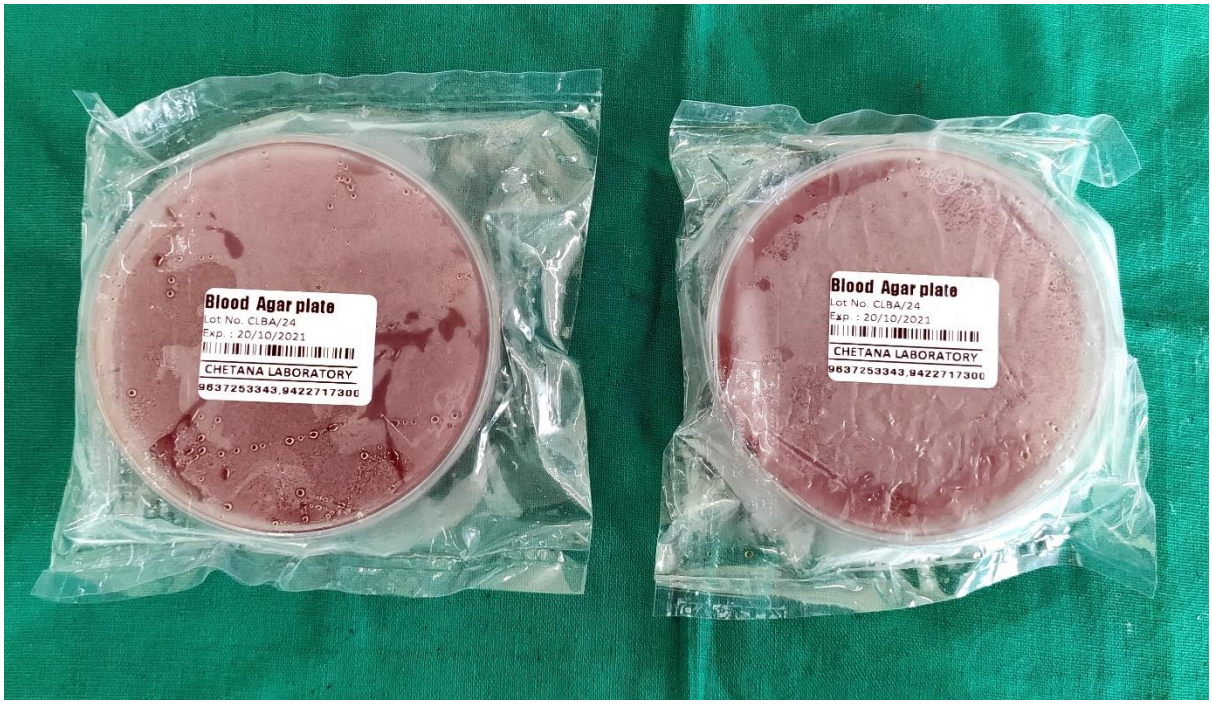


Figure 2: Packed Culture Plates

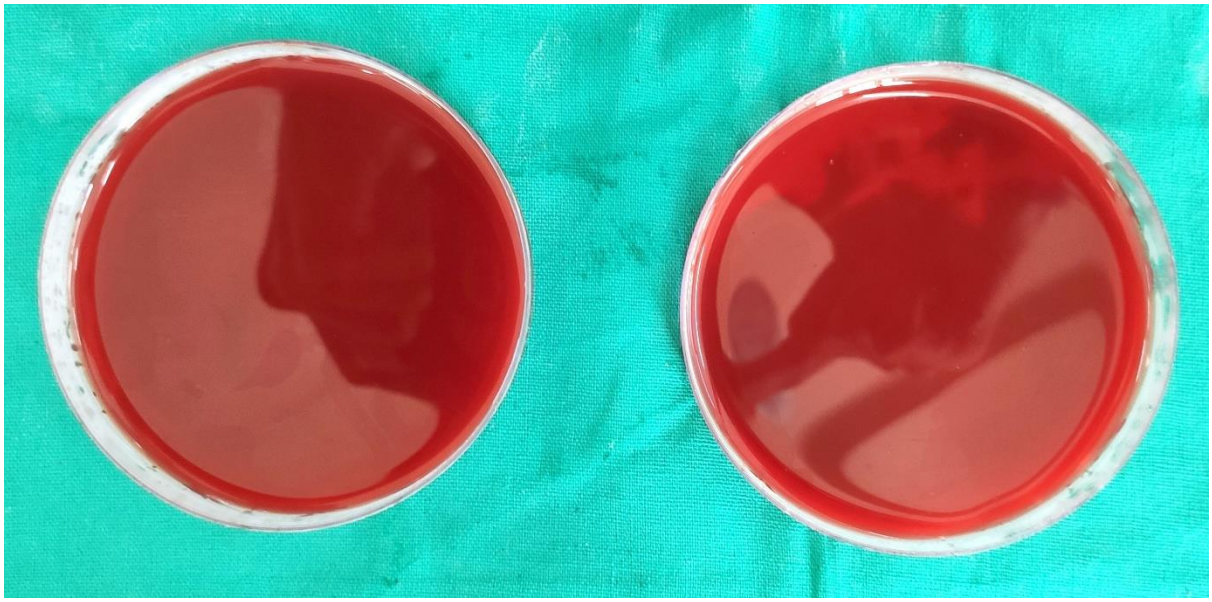
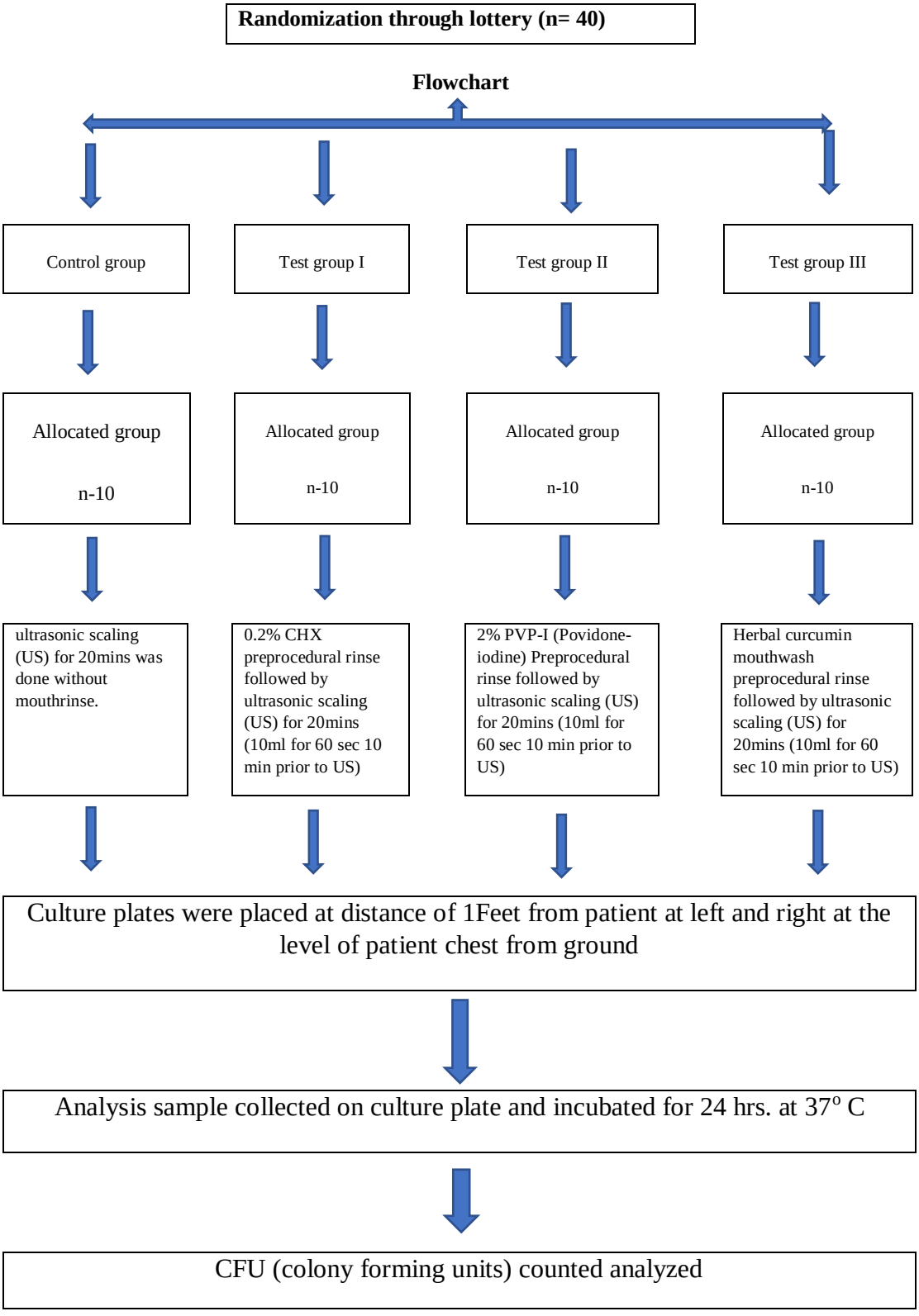


Figure 3: Blood Agar culture Plates

Figure 4: (A) Povidone Iodine 2%, (B) herbal Turmix Mouthwash, (C) Chlorhexidine 0.2% mouthwash

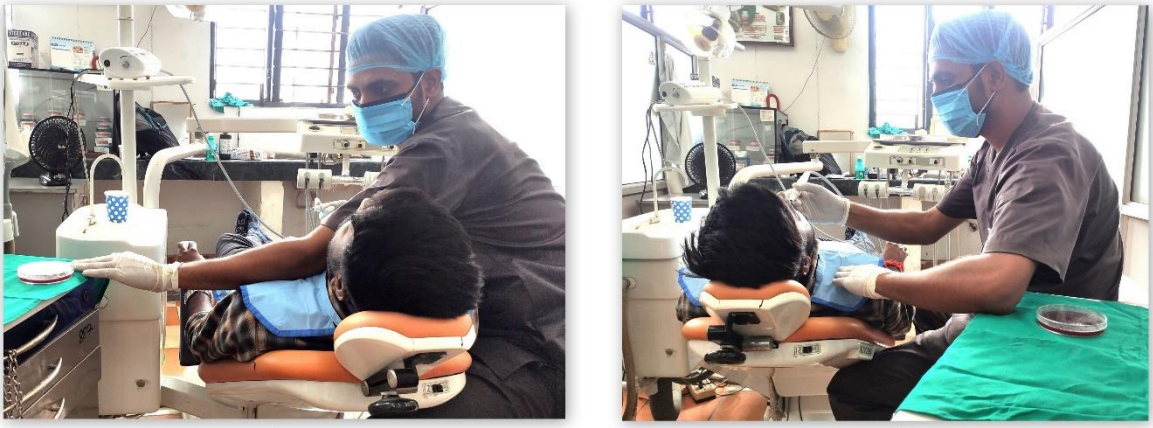
Study design

Preparation and formulation



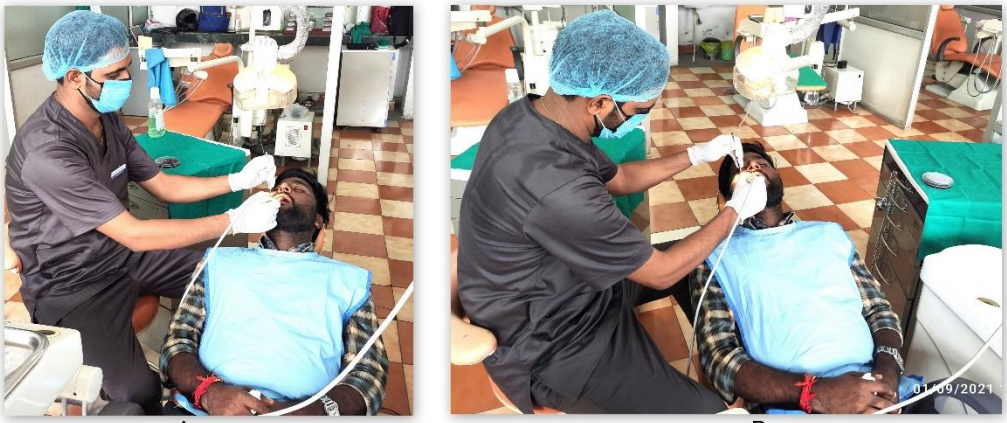
Methodology

The patients were selected on the basis of the inclusion and exclusion criteria. 30 subjects, age and gender matched, were randomly divided into three groups on the basis of agents used for preprocedural mouth rinsing. Group I – 0.2% Chlorhexidine (CHX) mouthrinse; Group II – 2% Povidone- iodine (PVP-I) mouthrinse and Group III - Herbal mouthrinse containing Curcumin as described in the above flowchart. The aerosols were collected on two previously prepared and sterilized blood agar plates which was placed at two different positions in the operatory from reference point (patient's chest level), i.e, at 12 inches (1feet) in right side and at 12 inches (1 feet) towards the left side. After getting the reference point Group I- patient were given 10ml of chlorhexidine mouthwash for 1 minutes as pre-procedural mouthrinses and after 10 minutes ultrasonic scaling was performed for 20mins. Aerosol were collected on reference point pre-prepared blood agar culture plates. Culture plates were sealed by parafilm and incubated for 24hours at 37^{o} C. Colony forming unit was counted after 24 hours. Similarly, the procedure was done with other two mouth rinses in the other two respective groups. Data was statistically analyzed to assess which pre-procedural mouth rinse is most effective in reducing the aerosol bacterial load.



A B

Figure 5: Position of Culture Plates from patient chest (A) 1 feet left side from patient, (B) 1 Feet Right side from patient.



A B

Figure 6: Ultrasonic scaling was performed with blood agar plates fixed at predetermined positions.

Figure 7: Incubator Culture plates placed, at 37^0 C for 24hrs.

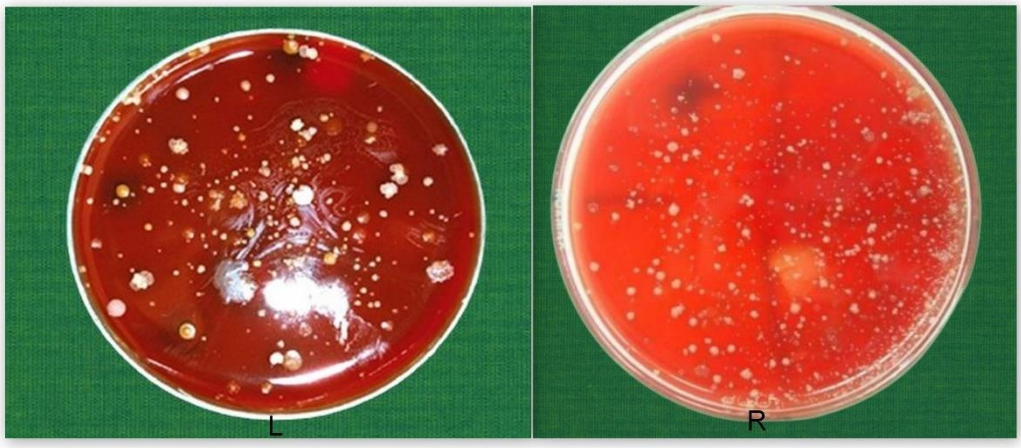


Figure 8: blood agar plates showed microbial colonies after 24hr of incubation at 37^0C without prerinse

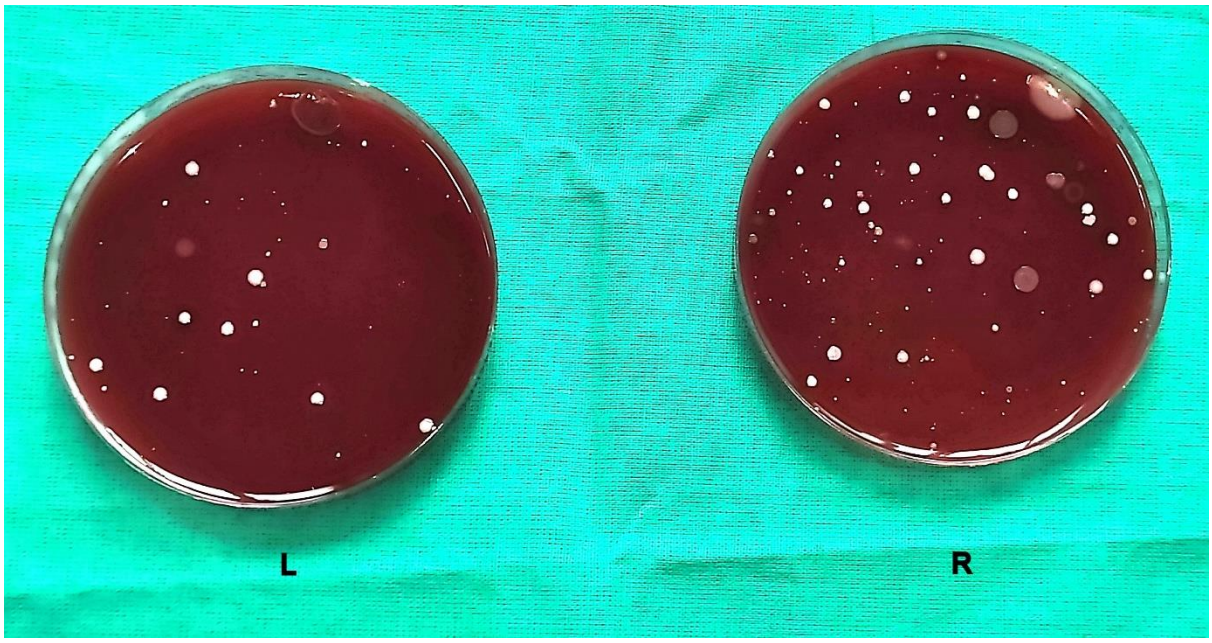


Figure 9: After prerinsing with CHX 0.2%, blood agar plates showed microbial colonies after 24hr of incubation at 37^0C.

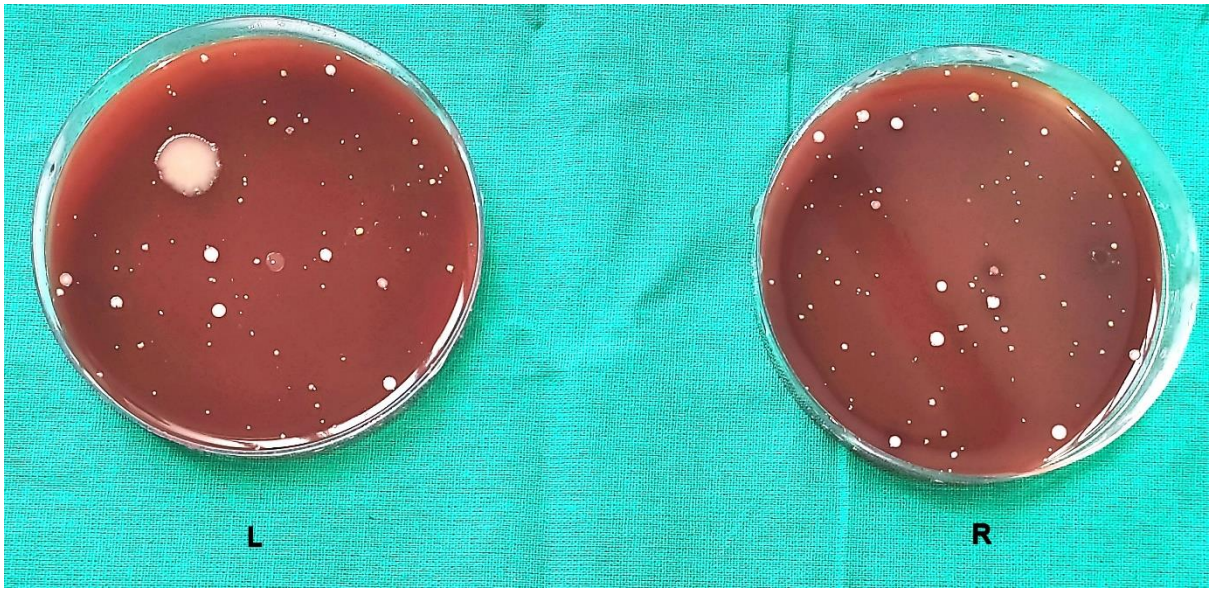


Figure 10: After prerinsing with 2% PVP-I, blood agar plates showed microbial colonies after 24hr of incubation at 37^0C.

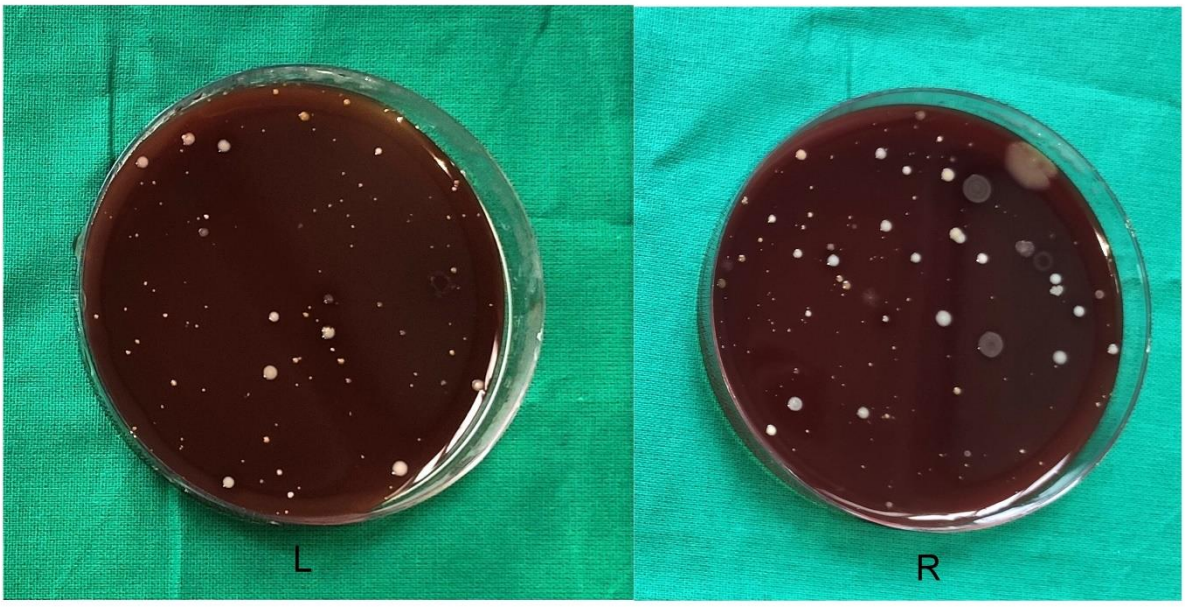


Figure 11: After prerinsing with herbal curcumin, blood agar plates showed microbial colonies after 24hr of incubation at 37^0C.

OBSERVATIONS AND RESULTS

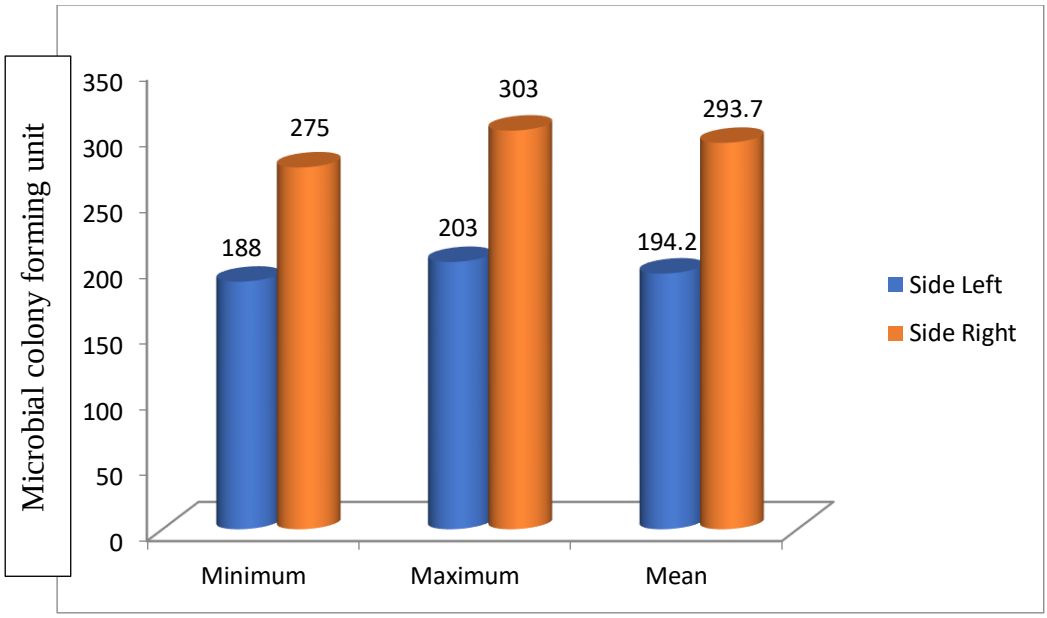
OBSERVATIONS AND RESULTS

The present study was conducted to evaluate and compare the efficacy of three different preprocedural mouth rinses containing chlorhexidine, povidone iodine and herbal curcumin respectively, in reducing aerosol microbial contamination. Subjects were broadly divided into two groups, Control group & Test group. Control group comprised of 10 subjects where CFU were observed without using any pre-procedural mouthrinse. Test groups comprised of 30 subjects which were sub divided equally into three groups, Group I (0.2%chlorhexidine), Group II (2% Povidone iodine) and Group III (Herbal curcumin). Intra group comparison was done to observe the efficacy of all the groups for the amount of CFU.

Table 1: Descriptive data for control group without pre-procedural mouthrinse.

Side	N	Minimum CFU	Maximum CFU	Mean	SD
Left	10	188.00	203.00	194.20	± 5.33
Right	10	275.00	303.00	293.70	±8.69

Table 1 shows the descriptive data for control group without pre-procedural rinse and the mean CFU was counted after 24hr and was found to be 194.20±5.33 and 293.70±8.69 on left and right side respectively (table 1, graph 1).

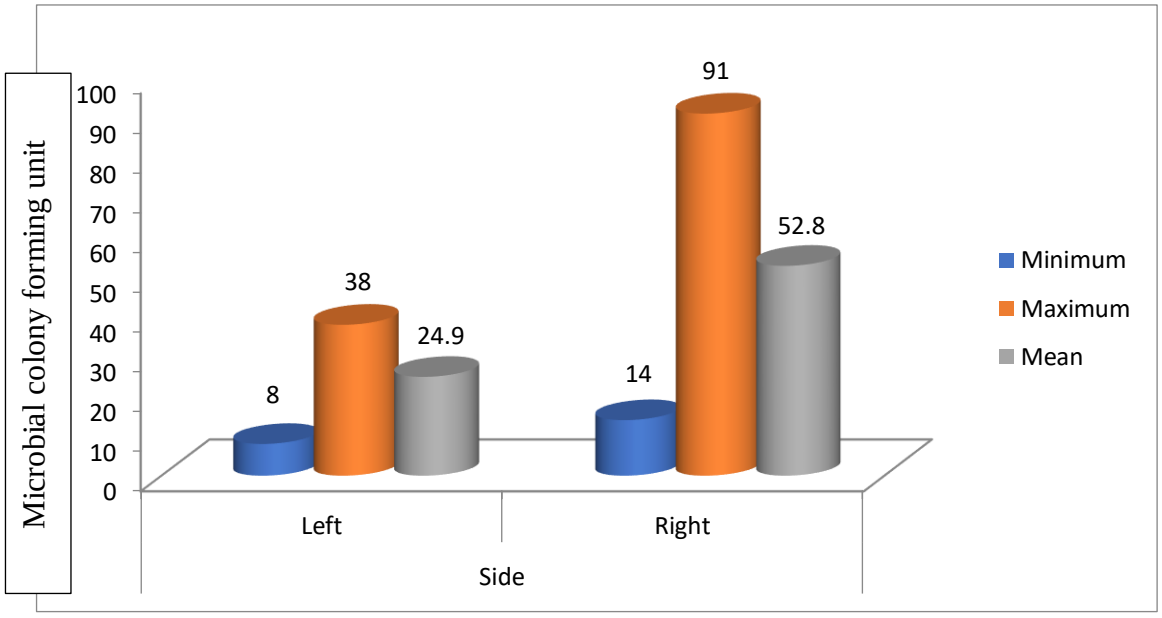


Graph 1: Graphical representation for control group without pre-procedural mouthrinse.

Table 2: Descriptive data for test group with pre-procedural mouthrinse Chlorhexidine 0.2% (Group I)

Side	N	Minimum CFU	Maximum CFU	Mean CFU	SD
Left	10	8.00	38.00	24.90	± 9.94
Right	10	14.00	91.00	52.80	± 23.62

Table 2 shows the descriptive data for group I (Chlorhexidine 0.2%) as pre-procedural mouthrinses and the mean CFU was counted after 24hr and was found to be 24.90±9.94 and 52.80±23.62 on left and right side respectively (table 2, graph 2).

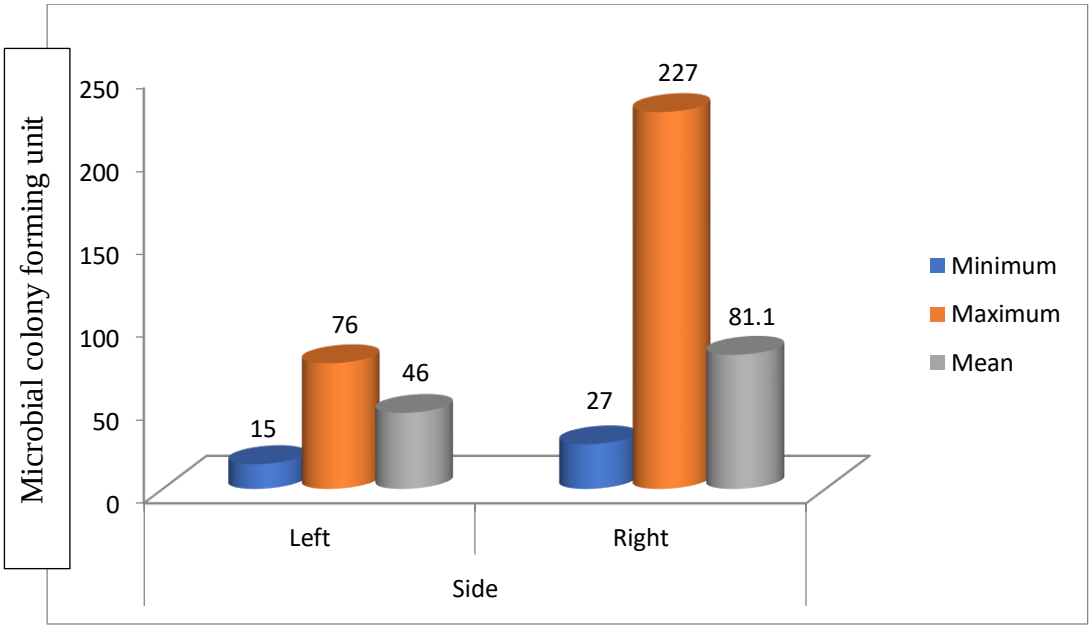


Graph 2: Graphical representation of test group with pre-procedural mouthrinse Chlorhexidine 0.2% (Group I)

Table 3: Descriptive data for test group with pre-procedural mouthrinse Povidone iodine 2% (Group II)

Side	N	Minimum CFU	Maximum CFU	Mean CFU	SD
Left	10	15.00	76.00	46.00	±18.98
Right	10	27.00	227.00	81.10	±72.91

Table 3 shows the descriptive data for group II (povidone iodine 2%) as pre-procedural mouthrinses and the mean CFU was counted after 24hr and was found to be 46.00±18.98 and 81.10±72.91 on left and right side respectively (table 3, graph 3).

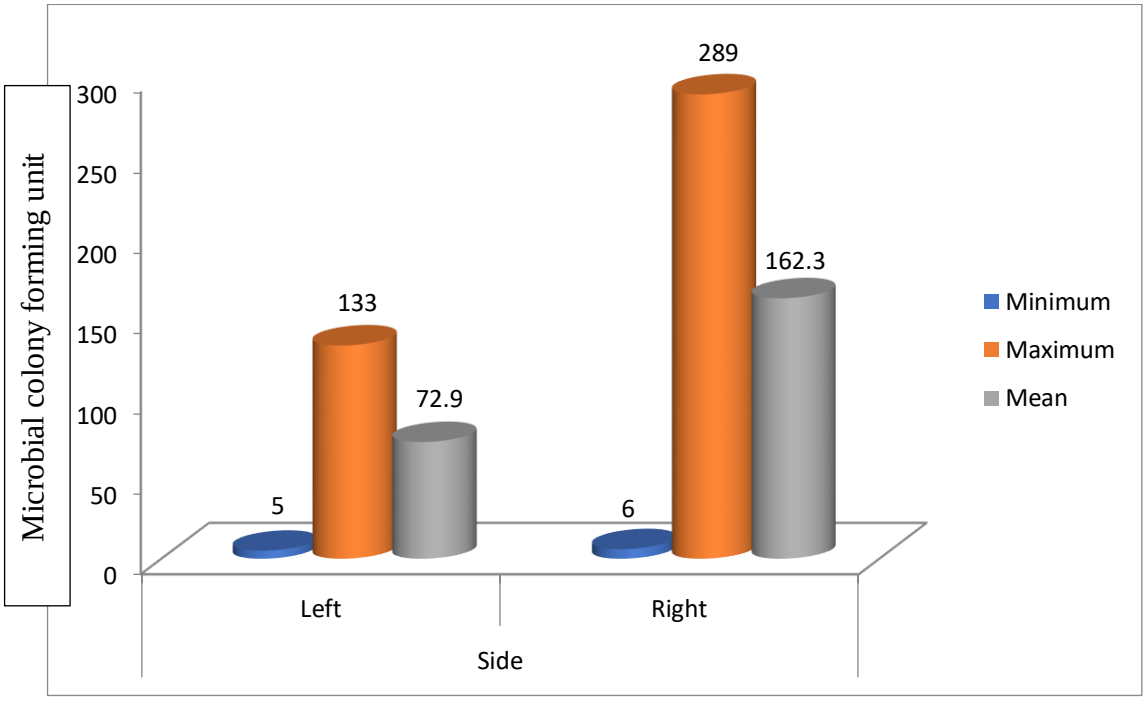


Graph 3: Graphical representation of test group with pre-procedural mouthrinse povidone Iodine (Group II)

Table 4: Descriptive data for test group with pre-procedural mouthrinse (herbal curcumin) (Group III)

Side	N	Minimum CFU	Maximum CFU	Mean CFU	SD
Left	10	5.00	133.00	72.90	±45.80
Right	10	6.00	289.00	162.30	±107.36

Table 4 shows the descriptive data for group III (herbal curcumin) as pre-procedural mouthrinses and the mean CFU was counted after 24hr and was found to be 72.90±45.80 and 162.30±107.36 on left and right side respectively (table 4, graph 4).



Graph 4: Graphical representation of test group with pre-procedural mouthrinse (herbal curcumin) (Group III)

Table 5: Comparison of different mouthrinses for the left side of patients

Mouthrinse	Mean	SD	Anova test	P value
Control Group	194.20	5.33	65.57	<0.01*
Chlorhexidine 0.2% (Group I)	24.90	9.94		
Povidone iodine 2% (Group II)	46.00	18.98		
Herbal (Group III)	72.90	45.80		

Tukey HSD Post-hoc Test...

Control vs Group I: Diff=169.3000, 95%CI=133.6814 to 204.9186, p≤0.01*

Control vs Group II: Diff=148.2000, 95%CI=112.5814 to 183.8186, p≤0.01*

Control vs Group III: Diff=121.3000, 95%CI=85.6814 to 156.9186, p≤0.01*

Group I vs Group II: Diff=-21.1000, 95%CI=-14.5186 to 56.7186, p=0.39

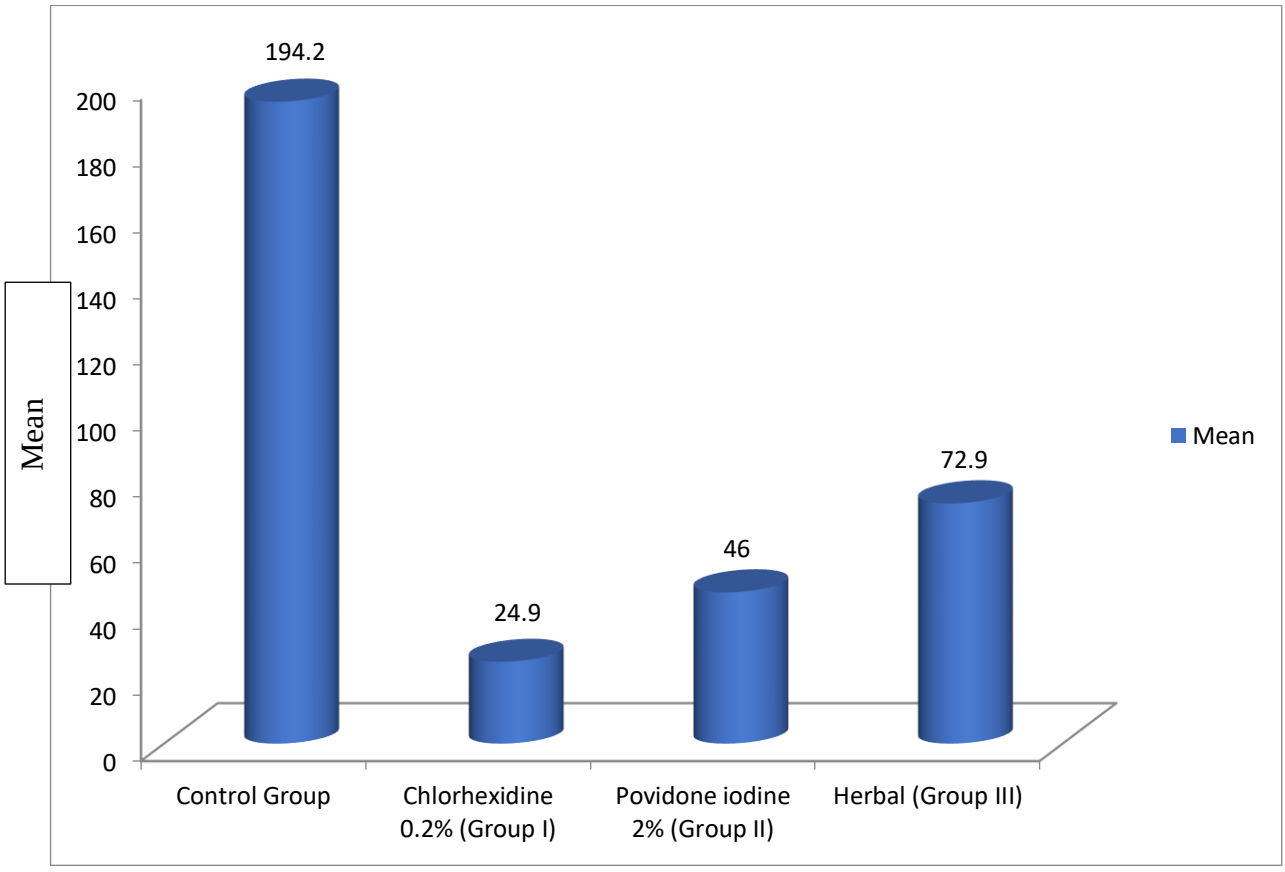
Group I vs Group III: Diff=48.0000, 95%CI=12.3814 to 83.6186, p≤0.005*

Group II vs Group III: Diff=26.9000, 95%CI=-5.4700 to 59.2700, p=0.12

*: statistically significant, P value (P≤0.05)

Table 5, graph 5 shows the comparison of different mouth rinses for the left side for the CFU reduction. Table shows that the maximum CFU was obtained in the control group. The maximum CFU reduction was seen in Group I (CHX 0.2%), followed by Group II (PVP-I) and Group III (herbal curcumin). The CFU reduction was compared with statistic using Anova test among the control group and test groups. When control group was compared with test groups Tukey HSD post hoc test showed significant difference of p≤0.01. Tukey HSD post hoc test revealed there was no significant difference when group I compared to Group II (P= 0.39) but when Group I was compared to Group III there was statically significant difference (P≤

0.005) was seen. While when Group II was compared with Group III there was no statically significant difference (P=0.12) was seen.



Group 5: Graphical representation of different mouthrinses for the left side of patients.

Table 6: Comparison of different mouth rinses for the right side of patient.

Mouthwash	Mean	SD	Anova test	P value
Control Group	293.70	8.69	26.68	<0.01*
Chlorhexidine 0.2% (Group I)	52.80	23.62		
Povidone iodine 2% (Group II)	81.10	72.91		
Herbal (Group III)	162.30	107.36		

Tukey HSD Post-hoc Test...

Control vs Group I: Diff=240.9000, 95%CI=161.2891 to 320.5109, p≤0.01*

Control vs Group II: Diff=212.6000, 95%CI=132.9891 to 292.2109, p≤0.01*

Control vs Group III: Diff=131.4000, 95%CI=51.7891 to 211.0109, p≤0.01*

Group I vs Group II: Diff=-28.3000, 95%CI=-51.3109 to 107.9109, p=0.77

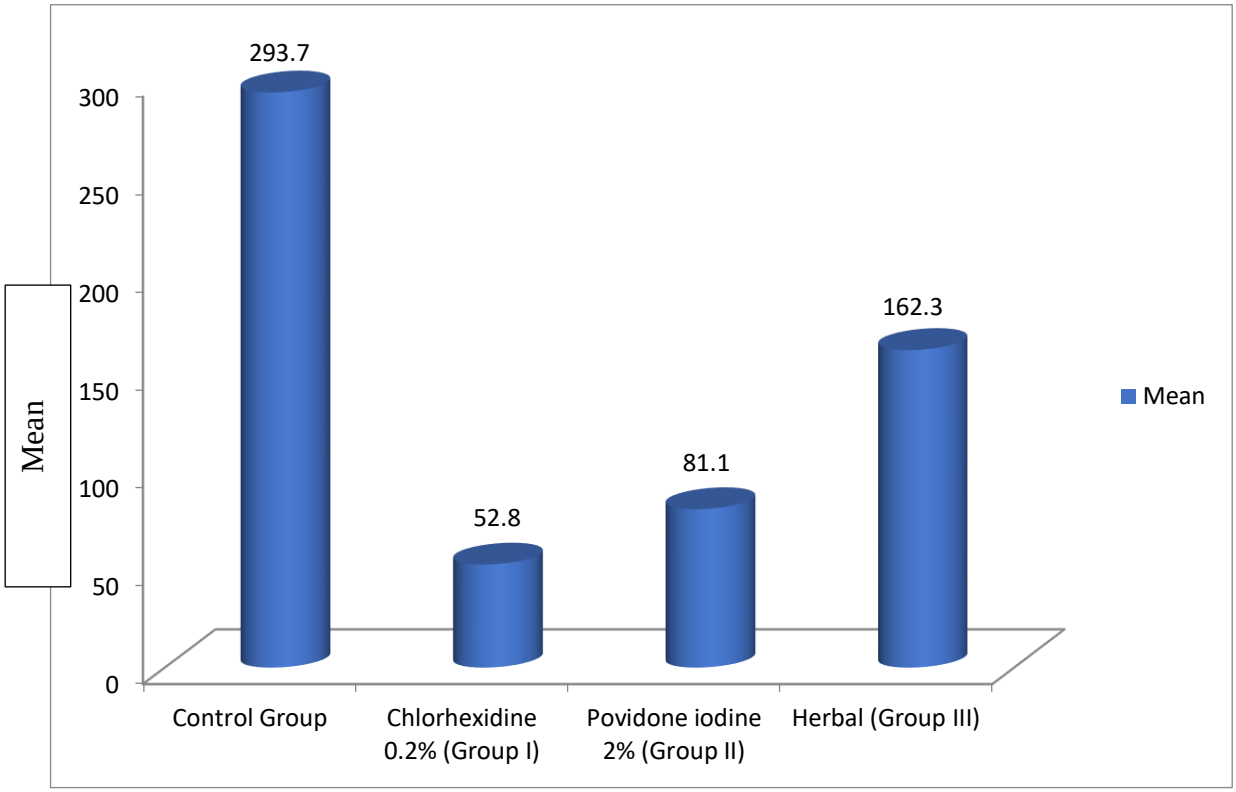
Group I vs Group III: Diff=109.5000, 95%CI=29.8891 to 189.1109, p≤0.004*

Group II vs Group III: Diff=81.2000, 95%CI=1.5891 to 160.8109, p≤0.04*

*: statistically significant *, P value (P≤0.05)

Table 6, graph 6 shows the comparison of different mouth rinses for the right side of the patient for CFU reduction. Table shows that the maximum CFU was obtained in the control group. The maximum CFU reduction was seen in Group I (CHX 0.2%), followed by Group II (PVP-I) and Group III (herbal curcumin). The CFU reduction was compared with statistic using Anova test among the control group and test groups. When control group was compared with test groups Tukey HSD post hoc test showed significant difference (p<0.01). Tukey HSD post-hoc test revealed there was no significant difference when group I was compared to Group II (P=0.77) but

when Group I was compared to Group III statically significant difference (P≤ 0.004) in CFU reduction was seen. According to Tukey HSD post-hoc test when Group II was compared with Group III statically significant difference (P≤0.04) was seen.



Graph 6: Graphical representation of different mouth rinses for the right side of patient.

DISSCUSION

DISCUSSION

This clinical longitudinal prospective study was designed to evaluate the effect of preprocedural mouthrinses in reducing bacterial aerosol contamination with different mouthwashes like chlorhexidine, betadine and herbal curcumin.

Various dental procedures generate aerosol and droplets contaminated with microorganisms, blood, and saliva. These aerosols might be a vector for disease transmission. The size, shape, density, microbiology of DUWL (Dental unit water lines), oral flora of the patient, and type of therapy are all variables that affect the composition of these aerosol particles[61]. Microorganisms have also been discovered colonizing dental equipment and the water lines of dental units, generating a biofilm. This bioaerosol mixture is inhaled by both the dental staff and the patient, therefore it's critical to be aware of the risks and take proper precautions[62]. There have been several reports establishing aerosol as a strong media for cross infections that cause measles, tuberculosis, and severe acute respiratory syndrome (SARS)[63].

SARS-CoV-2 has been known to spread from person to person by droplets or direct touch[64]. SARS-CoV-2 was found in the saliva of 91.7% of COVID-19 patients in a prior investigation, with a median viral burden of 3.3×10^6 copies/ml[65]. SARS-CoV-2 RNA in saliva from sick people has been reported to be stable for lengthy periods of time at 4 °C, 19 °C and 30 °C [66]. COVID-19 can be transmitted by saliva, either directly or indirectly through contact with infected items. As a result, there has been a rising worry about SARS-CoV-2 transmission in dentistry environments[67]. Dental hygienists, dental assistants, and dentists are among the positions with the highest COVID-19 risk, according to the World Economic Forum [68.]

This study was done out since the peak of COVID-19 epidemic, and participants were included in the research depending on their symptom's presentation to dental clinics for treatment. For instance, during the early stages of the COVID-19 pandemic, Chinese health authorities recommended to use povidone–iodine (PVP-I) and hydrogen peroxide-based mouth-rinses as a pre-procedural preventive measure, while the National Dental Centre Singapore recommended using Cetylpyridinium chloride (CPC) mouth-rinse[69]. In Korea, the first case report on the effectiveness of mouthwashes in lowering SARSCoV-2 viral load in saliva was published[70].

Sethi, et al. reported in study that the bacterial count estimated by Miller in 1976 in the aerosol generated during dental procedure was up to a million bacteria per cubic foot of the air.[71] According to Rautemaa et al. there has been a lot of worry in recent decades about the spread of these aerosols in dental offices and the degree of pollution they create[72].

The most overwhelming microorganisms seen during spray emanation in a dental arrangement are Streptococcus at around 42% and Staphylococcus species around 41% of the aggregate[62,73]. Bacteria's like Streptococci, Staphylococci, Legionella, M. tuberculosis, Bacillus anthracis, and endotoxins that are generated by gram negative organisms are the most frequent bacteria found in aerosol that can cause disease[74,75]. Penicillium, Aspergillus, Acremonium, Paecilomyces, Mucor, and Cladosporium are among some of the common fungi found in aerosols[74]. Infections are promptly communicated via airborne course, and incorporate SARS infection, intestinal infections of gastrointestinal beginning delivered at sewage treatment offices, RSV, Hantavirus from rat dung, varicella - zoster infection, measles, mumps and rubella infections[74].

Doctors and assistants' masks, as well as the light unit, surfaces near spittoons, and movable instrument-material tables, are the regions with the most microbiological contamination during dental treatments[76]. These aerosols can be transmitted over extended distances, even beyond the confines of the patient's room. Smaller particles are passed on to those who are closest to the patient. When compared to bigger particles, smaller particles go much further[77].

According to the earlier studies that have reported that the peak of aerosol contamination vanishes within 10- 30 mins of scaling procedures. Therefore, it is advisable to not remove mask or protective wear immediately after the procedures[78].

There are various methods to reduce the contamination of bacterial aerosol in dental unit area. Using of high suction, pre-procedural mouthrinses, proper ventilation, air purifier, rinsing dental unit twice before use, devices reducing air contamination in a dental area, use of personal equipment's (gloves, eye wear, face shields, apron and masks) etc.

Mouthrinses play a major role in controlling the contamination of aerosol at the time of dental treatment. There are many studies sayings that the pre- procedural mouthrinses play a role in reducing the bacterial load in the aerosol produced at the time of ultrasonic scaling, cavity preparation, and various dental procedure. There is various chemical-based mouthwash that helps in reducing the bacterial load in aerosol. Chlorhexidine and betadine (povidone iodine) are most commonly used mouthwashes.

Chlorhexidine that was first developed as an antiseptic agent by Imperial Chemical Industries, (Manchester, UK) in the 1950s.[79] The chemical structure CHX is (1:6-di[4-chlorophenyldiguanido]- hexane) is a bisbiguanide that consists of two chlorguanide chains linked by a hexamethylene chain. At physiological pH, it is a strong base and a di-cation. CHX solutions are colourless, odourless, and unpleasant to the taste[80]. The CHX act on bacterial cell wall, and adsorbed onto phosphate-containing protein components. It penetrates and breaks the bacterial cytoplasmic membrane at bacteriostatic doses, causing cytoplasmic component leakage. After entering the cytoplasm via the broken cytoplasmic membrane, it has a bactericidal effect by creating irreversible precipitates with intracellular adenosine triphosphate and nucleic acids[80]. CHX has property like bacteriostatic, bactericidal, fungicidal, fungistatic and some virus killing properties. Gram-positive bacteria have lower minimum inhibitory concentrations than Gram-negative bacteria because CHX has a higher affinity for the cell wall of Gram-positive bacteria. CHX in mouthwash solutions adheres to oral mucosal surfaces via electrostatic forces, inhibiting the production of dental plaque and exerting a bacteriostatic effect that lasts many hours[81,82].

Another mostly commonly chemical based mouthrinses is povidone iodine(betadine). Povidone-iodine (PVP-I) was first discovered by H. A. Shelanski and M. V. Shelanski at the Industrial Toxicology Laboratories in Philadelphia in 1955. If compared to other commonly used gargled antiseptics, PVP-I is relatively well tolerated[83]. It was developed in order to cause a less harmful antimicrobial iodine complex than the tincture of iodine, which causes burns. PVP-I act when free iodine (I2) get break from the polymer complex. When iodine gets in free form, they rapidly ingress microbes and break proteins and oxidises nucleic acid structure that leads to microbial death[48]. PVP-I 1% can be used a mouthrinses after every 2-4 hours[85]. The exact potent

concentration of PVP-I for mucins and saliva was not known but twice concentration will be strong and fruitful for the dilution from saliva[86,87]. With decades allergy to PVP-I is very rare [88] while some are sensitive to PVP-I[89] and some expectational allergy is type I allergy[90].

Studies stated CHX and PVP-I both are effective in reducing bacterial load as pre-operative mouthrinses or post- operative mouthrinses. These mouthwashes are prepared with help of chemical products because of that they have some kinds of side effects that causes harm to the patients. To avoid all these side effect, in this study we have used the commercially available herbal mouthwash that is turmeric based(turmix). In this study we have compared herbal mouthrinses (turmeric based turmix) with CHX and PVP-I as pre-procedural mouthrinses to check the efficacy in reducing bacterial load in aerosol.

In consideration of the constraints of the current study, an attempt was made to evaluate one common medicinal plant from Indian flora representatives for mouthwash usage. Curcumin was the name of the herb. The reason for choosing them as representations was because of their extensive use as a medicinal plant in Indian traditional medicine.

Turmeric, often known as "Indian Saffron," is the most frequent ingredient found in Indian cooking[91]. The active ingredient curcumin is obtained from the rhizome Curcuma longa by Linn[92]. Roughley isolated Curcumin longa in 1815, and Whiting characterised its chemical structure in 1973. Fats, proteins, minerals, carbohydrates, and moisture are all present in curcumin. Curcumin (diferuloylmethane) (3–4%) is responsible for the yellow hue. It is made up of curcumin I (94%), curcumin II (6%), and curcumin III (3%). It has a melting point of 184°C, is soluble in ethanol, and occurs as keto–enol tautomers in solution [93]. Curcumin have a derivatives demethoxy and bisdemethoxy that been discovered. Curcumin has a low bioavailability when taken orally. Poor oral bioavailability is caused by poor gastrointestinal absorption, a fast metabolic rate, and quick systemic clearance from the body [91]. Curcumin passes through the gastrointestinal tract unmodified in 40 to 85 % of cases. Curcumin is combined with bormelain to improve absorption and anti-inflammatory properties[94]. Curcumin is an herb that may be used to identify plaque. It causes plaque to become yellow and aids in its detection[95]. Curcumin solution (1%), according to Suhag et al.[96]

and Gottumukkala et al.[97], can be used as a subgingival irrigation because it lowers inflammation. When compared to chlorhexidine and saline, turmeric had a lower mean probing pocket depth.

This present study was designed to evaluate the three test groups i.e., Group I, II, and III to compare with control group without mouthrinse on CFU counts. Result revealed that there was reduction in bacterial load in aerosol after using different mouthrinses as a pre-procedural mouthrinses.

Results parameters

All the three test groups showed a significant reduction in CFU on both left and right side of the patient when compared to the control group ($P \leq 0.01$).

Result parameter on left side of patient

When group I was compared to group II there was no significant difference between the two in CFU reduction ($P = 0.39$). Group I when compared to group III showed a significant difference in reduction of CFU ($P \leq 0.005$). When group II was compared to Group III there was no significant reduction in CFU ($P = 0.12$).

By this observation it can be stated that both CHX and PVP-I can be effectively used as prerinse and can be helpful in reducing aerosol microbial contamination. Herbal (curcumin) prerinse is not much effective when compared to CHX & PVP-I but when compared to control group it was found to be significantly effective in reducing the aerosol microbial contamination ($P \leq 0.01$).

So overall, observation on the left side indicates that all three CHX, PVP-I and Herbal curcumin are effective in reducing aerosol microbial contamination having CHX most effective and herbal the least.

Result parameter on Right side of patient

When group I was compared to the group II there was no significant difference between the two in CFU reduction ($P=0.77$). When group I was compared to group III showed a significant in difference reduction of CFU ($P \leq 0.004$). When Group II was compared to Group III it showed a significant difference in reduction of CFU ($P \leq 0.04$).

By this observation it can be stated that both CHX and PVP-I can be effectively used as prerinse and can be helpful in reducing aerosol microbial contamination. Herbal (curcumin) prerinse is not much effective when compared to CHX & PVP-I but when compared to control group it was found to be significantly effective in reducing the aerosol microbial contamination.

So overall on the observation on the right side indicates that all three CHX, PVP-I and Herbal curcumin are effective in reducing aerosol microbial contamination having CHX most effective and herbal the least.

It can also be observed that more CFU was formed on the right side as compared to left side for all the groups, which, we presume, may be because the operators were right-handed and it's a normal tendency to tilt the patients head to right side for right-handed operator.

Yadav S et al.[98] had used three different reference point; operator chest, patient chest and 4 feet at 4 "O" clock and found the CFU. In this study we had taken the collection area at 1 foot away from oral cavity on both left and right side of patient. This has been done because this is usually the position of assistant and operator during most of the dental procedures and any type of transmission of contaminated aerosol to them is possible.

In the present study, the culture plates were incubated at 37^{o} C in incubation chamber for 24 hrs and the number of colonies forming units were counted. It was in accordance with the study conducted by **Rani et al**.[99]

In accordance to our study, **Ogata J et al**,[100] reported a significant reduction in gargling group with PVP-I which eradicated the general bacteria and MRSA colonies in the pharynx more before incubation when compared to the patient who gargled with normal tap water.

Also, **Domingo et al**., (1996)[101] reported a significant reduction in percentage in CFUs count when PVP-I 1% was used as a pre rinse.

In our study, 0.2% CHX pre-procedural rinse showed a significant reduction in CFUs when compared to all test groups and control group. This result was in accordance with data found by **Feres M et al. (2010)**[102].

Chatterjee et al. (2011)[103] who has compared 1% turmeric mouthwash with 2% CHX mouthwash, where he found that turmeric mouthwash to be effective as CHX mouthwash in reducing the gingival index and plaque index. Our study also found similar results in reducing the CFUs when herbal curcumin mouthwash was compared to without mouthwash.

In this study, herbal curcumin pre-procedural rinse significantly reduced the CFUs when compared to the no pre-procedural mouthrinse but was not as effective as CHX. Whereas, **Mail. Et al. (2012)**[104] **Muglikar et al. (2013)**[105] conducted a study in 2013 with 30 patients for 21 days and found that curcumin mouthwash was more potent than CHX mouthwash as anti-inflammatory product.

According to **Chusri et al. (2012)** [106] a study was conducted and found that there was reduction in PI because of antibiofilm activity of curcumin. Since this study stated that the curcumin has a property of antibiofilm, similarly in our result we have found that it helps in reducing the CFUs forming when used as a pre-rinse mouthwash.

The current study of ours showed significant difference in reducing the CFU count when pre-rinsed with the 0.2% CHX and 2%PVP-I. **Ammu A. et al**. (2019)[107] conducted a study with same groups as of ours where it was found that there also was significant reduction of bacterial CFU in the both the groups but, there was no significant reduction of bacterial CFU in control group(water).

Our present study was influenced by the current scenario of covid 19 where the viral load is present in the oropharynx of the Covid 19 patients. Study conducted in Malaysian population by **Mohamed N A et al**. (2020) [108] showed that 1% PVP-I and essential oil was effective in reducing the viral load in the oropharynx.

Our study showed similar pattern where microorganisms were reduced significantly using chemical and herbal prerinses compared to without any prerinse.

CONCLUSION

CONCLUSION

Following conclusions have been drawn from the current study: -

1. The aerosol microbial contamination load was significantly high at two different sides of patient (left and right) when no pre-procedural mouthrinse was done.
2. 0.2% CHX, 2% PVP-I and herbal curcumin mouthwash used as pre-procedural mouthrinse proved to be significantly effective in reducing the aerosol microbial contamination load when compared to without any pre-procedural rinse at both left and right side of the patient.
3. Between the two chemicals; both CHX and PVP-I pre-procedural mouthrinse were found to be comparably equally effective.
4. As compared to CHX and PVP-I the herbal curcumin pre-procedural mouthrinse was found to be less effective but when compared to without any pre-procedural mouthrinse, it was found to be highly effective.

The pre-procedural rinse can significantly reduce the viable microbial content of dental aerosol. Every practitioner should inculcate the pre-procedural mouthrinse before starting any dental procedure in daily routine. Indigenous herbal products can always be promoted for their cost effectiveness and less side effects.

Our current study was a small sized sample and short-term research; further clinical and microbiological experiments with bigger sample sizes are needed to clarify and broaden our understanding of the functions of herbal mouthwash in periodontal disease.

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109.

ANNEXURES

Annexures

Annexure 1

Institutional Ethical Committee

Babu Banarasi Das University
Babu Banarasi Das College of Dental Sciences,
BBD City, Faizabad Road, Lucknow – 226028 (INDIA)

Dr. Lakshmi Bala
Professor and Head Biochemistry and
Member-Secretary, Institutional Ethics Committee

Communication of the Decision of the VIIIth Institutional Ethics Sub-Committee

IEC Code: 19 (Revised) **BBDCODS/03/2022**

Title of the Project: Comparative Evaluation Of Chemical and Herbal Mouthwashes In Reducing Aerosol Contamination Produced By Ultrasonic Scaling.

Principal Investigator: Dr. Dilip Kumar Maurya **Department:** Periodontology

Name and Address of the Institution: BBD College of Dental Sciences Lucknow.

Type of Submission: Revised, MDS Project Protocol

Dear Dr. Dilip Kumar Maurya,

The Institutional Ethics Sub-Committee meeting comprising following four members was held on 09th March, 2022.

1.	Dr. Lakshmi Bala Member Secretary	Prof. and Head, Department of Biochemistry, BBDCODS, Lucknow
2.	Dr. Amrit Tandan Member	Prof. & Head, Department of Prosthodontics and Crown & Bridge, BBDCODS, Lucknow
3.	Dr. Rana Pratap Maurya Member	Reader, Department of Orthodontics, BBDCODS, Lucknow
4.	Dr. Akanksha Bhatt Member	Reader, Department of Conservative Dentistry & Endodontics, BBDCODS, Lucknow

The committee reviewed and discussed your submitted documents of the current MDS Project Protocol in the meeting.
The comments were communicated to PI thereafter it was revised.

Decisions: The committee approved the above protocol from ethics point of view.

Forwarded by:

Lakshmi Bala 9/3/22

(Dr. Lakshmi Bala)
Member-Secretary,
IEC

Member-Secretary
Institutional Ethic Committee
BBD College of Dental Sciences
BBD University
Faizabad Road, Lucknow-226028

(Dr. Utpal Ahuja)
Principal
Babu Banarasi Das College of Dental Science
(Babu Banarasi Das University)
BBD City, Faizabad Road, Lucknow-226028

Annexure – 2

Institutional research committee approval certificate

BABU BANARASI DAS COLLEGE OF DENTAL SCIENCES
(FACULTY OF BBD UNIVERSITY), LUCKNOW

INSTITUTIONAL RESEARCH COMMITTEE APPROVAL

(Revised)

The project titled **"Comparative Evaluation Of Chemical and Herbal Mouthwashes In Reducing Aerosol Contamination Produced By Ultrasonic Scaling"** submitted by **Dr Dilip Kumar Maurya** Post graduate student from the **Department of Periodontology** as part of MDS Curriculum for the academic year 2019-2022 with the accompanying proforma was reviewed by the Institutional Research Committee present on **07th March 2022** at BBDCODS.

The Committee has granted approval on the scientific content of the project. The proposal may now be reviewed by the Institutional Ethics Committee for granting ethical approval.

Dr. Puneet Ahuja
Chairperson

Annexure -3

Consent Form

Babu Banarasi Das College of Dental Sciences

(Babu Banarasi Das University)

BBD City, Faizabad Road, Lucknow – 227105 (INDIA)

Consent Form (English)

Title of the Study…….

Study Number……..

Subject's Full Name…….

Date of Birth/Age ……

Address of the Subject…….

Phone no. and e-mail address……

Qualification ……

Occupation: Student / Self Employed / Service / Housewife/ Other (Please tick as appropriate)

Annual income of the Subject……

Name and of the nominees(s) and his relation to the subject…… (For the purpose of compensation in case of trial related death).

1. I confirm that I have read and understood the Participant Information Document dated …….. for the above study and have had the opportunity to ask questions. OR I have been explained the nature of the study by the Investigator and had the opportunity to ask questions.

2. I understand that my participation in the study is voluntary and given with free will without any duress and that I am free to withdraw at any time, without giving any reason and without my medical care or legal rights being affected.

3. I understand that the sponsor of the project, others working on the Sponsor 's behalf, the Ethics Committee and the regulatory authorities will not need my permission to

look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. However, I understand that my Identity will not be revealed in any information released to third parties or published.

4. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).

5. I permit the use of stored sample (tooth/tissue/blood) for future research. Yes [] No []

Not Applicable

6. I agree to participate in the above study. I have been explained about the complications and side effects, if any, and have fully understood them. I have also read and understood the participant/volunteer's Information document given to me.

Signature (or Thumb impression) of the Subject/Legally Acceptable

Representative……..

Signatory 's Name……. Date …….

Signature of the Investigator…… Date……..

Study Investigator 's Name..... Date……..

Signature of the witness…… Date……..

Name of the witness……

Received a signed copy of the PID and duly filled consent form Signature/thumb impression of the subject or legally Date……..

Acceptable representative

Annexure - 4

PID Form

Babu Banarasi Das College of Dental Sciences

(A constituent institution of Babu Banarasi Das University)

BBD City, Faizabad Road, Lucknow – 227105 (INDIA)

Participant **Information Document (PID)**

1. **Study title**

   Comparative evaluation of chemical and herbal mouthwashes in reducing aerosol contamination produced by ultrasonic scaling.

2. **Invitation paragraph**

   You are being invited to take part in a research study, it is therefore important for you to understand why the study is being done and what it will involve. Please take time to read the following information carefully. Ask us for any clarifications or further information. Whether or not you wish to take part is your decision.

3. **What is the purpose of the study?**

   The purpose of this study is to evaluate the clinical comparative evaluation of herbal mouthwashes in reducing aerosol contamination produced by ultrasonic scaling.

4. **Why have I been chosen?**

   You have been chosen for this study as you are fulfilling the required criteria for this study.

5. **Do I have to take part?**

   Your participation in the research is entirely voluntary. If you do, you will be given this information sheet to keep and will be asked to sign a consent form. During the study you still are free to withdraw at any time and without giving a reason.

6. **What will happen to me if I take part?**

   You will be one of the 40 participants in 40 patients enrolled in the study. The mouthwashes will be randomly given to patients for the preprocedural rinses.

7. What do I have to do?

You do not have to change your regular lifestyles for the investigation of the study.

8. What is the procedure that is being tested?

The procedure will involve evaluating and comparing the effectiveness of herbal mouthwashes in reducing of bacterial load in preprocedural mouth rinses.

9. What are the interventions for the study?

3 different mouthwashes will be given to 3 different group of people as preprocedural mouth rinses to evaluate the better efficacy of the mouthwashes. The preprocedural rinses will be done in Group I with chlorhexidine, Group II with povidone iodine and Group III curcumin-based mouthwashes. After 10 min of preprocedural rinses the ultrasonic scaling will be done for 20 mins. Aerosol will be collected on the culture plate which will be placed at the defined reference distance. The plate will be incubated at 37 degree for 24 hours and the colony forming units will be counted.

10. What are the side effects of taking part?

There are no side effects on patients of this study.

11. What are the possible disadvantages and risks of taking part?

There are no risk or disadvantages of taking part in this study.

12. What are the possible benefits of taking part?

This study will help us to know to evaluate the efficacy of herbal mouthwashes in reducing bacterial load.

13. What if new information becomes available?

If additional information becomes available during the course of the research you will be told about these and you are free to discuss it with your researcher, your researcher will tell you whether you want to continue in the study. If you decide to withdraw, your researcher will make arrangements for your withdrawal. If you decide to continue in the study, you may be asked to sign an updated consent form.

14. What happens when the research study stops?

If the study stops/finishes before the stipulated time, this will be explained to the patient/volunteer.

15. What if something goes wrong?

If any severe adverse event occurs, or something goes wrong during the study, the complaints will be handled by reporting to the institution (s), and Institutional ethical community.

16. Will my taking part in this study be kept confidential?

Yes, it will be kept confidential.

17. What will happen to the results of the research study?

The results of the study will be used to compare efficacy of the herbal Curcumin mouthwash. Your identity will be kept confidential in case of any report/publications.

18. Who is organizing the research?

This research study is organized by the academic institution (BBDCODS).

19. Will the results of the study be made available after study is over?

Yes.

20. Who has reviewed the study?

The study has been reviewed and approved by the Head of the Dept, and the IEC/IRC of the institution.

21. Contact for further information

Dr Dilip Kumar Maurya

Department of Periodontology

Babu Banarasi College of Dental Sciences.

Lucknow-227105

Mob- 9452901798

Dr Vandana A Pant

Department of Periodontology

Babu Banarasi College of Dental Sciences.

Lucknow-227105

Mob-9935957775

Dr Laxmi Bala,

Member Secretary,

Babu Banarasi College of Dental Sciences.

Lucknow

bbdcods.iec@gmail.com

Annexure - 5

बाबूबनारसीदासकॉलेजऑफडेंटलसाइंसेज

(बाबूबनारसीदासविश्वविद्यालयकाएकघटकसंस्थान)

बीबीडीसिटी, **फैजाबादरोड**, **लखनऊ -** 227105 (**भारत)**

प्रतिभागीसूचनादस्तावेज (पीआईडी)

1-अध्ययन शीर्षक

अल्ट्रासोनिक स्केलिंग द्वारा उत्पादित एरोसोल संदूषण को कम करने में रासायनिक और हर्बल माउथवॉश का तुलनात्मक मूल्यांकन।

2- आमंत्रण अनुच्छेद?

आपको एक शोध अध्ययन में भाग लेने के लिए आमंत्रित किया जा रहा है, इसलिए आपके लिए यह समझना महत्वपूर्ण है कि अध्ययन क्यों किया जा रहा है और इसमें क्या शामिल होगा। कृपया निम्नलिखित जानकारी को ध्यान से पढ़ने के लिए समय निकालें। हमसे कोई स्पष्टीकरण या अधिक जानकारी के लिए पूछें। आप हिस्सा लेना चाहते हैं या नहीं यह आपका निर्णय है।

3- अध्ययन का उद्देश्य क्या है?

इस अध्ययन का उद्देश्य अल्ट्रासोनिक स्केलिंग द्वारा उत्पादित एरोसोल संदूषण को कम करने में हर्बल माउथवॉश के नैदानिक तुलनात्मक मूल्यांकन का मूल्यांकन करना है।

4-मुझे क्यों चुना गया है?

आपको इस अध्ययन के लिए चुना गया है क्योंकि आप इस अध्ययन के लिए आवश्यक मानदंडों को पूरा कर रहे हैं।

5- क्या मुझे भाग लेना है?

अनुसंधान में आपकी भागीदारी पूरी तरह से स्वैच्छिक है। यदि आप करते हैं, तो आपको रखने के लिए यह सूचना पत्र दिया जाएगा और सहमति पत्र पर हस्ताक्षर करने के लिए कहा जाएगा। अध्ययन के दौरान आप अभी भी किसी भी समय और बिना कारण बताए वापस लेने के लिए स्वतंत्र हैं।

6- अगर मैं भाग लेता हूं तो मेरे साथ क्या होगा?

अध्ययन में नामांकित 40 रोगियों में आप 40 प्रतिभागियों में से एक होंगे। प्रीप्रोड्यूरल रिंस के लिए मरीजों को बेवजह माउथवॉश दिए जाएंगे।

7- मुझे क्या करना है?

अध्ययन की जांच के लिए आपको अपने नियमित जीवन शैली को बदल ने की ज़रूरत नहीं है।

8- परीक्षण की जारही प्रक्रिया क्या है?

इस प्रक्रिया में प्रीप्रोड्यूरल माउथ रिंस में बैक्टीरिया के भार को कम करने में हर्बल माउथवॉश की प्रभावशीलता का मूल्यांकन और तुलना करना शामिल होगा।

9- अध्ययन के लिए हस्तक्षेप क्या हैं?

माउथवॉश की बेहतर प्रभावकारिता का मूल्यांकन करने के लिए 3 अलग-अलग माउथवॉश लोगों के 3 अलग-अलग समूहों को प्रीप्रोसेडुरल माउथ रिंस के रूप में दिए जाएंगे। प्रीप्रोसेड्यूरल रिन्स ग्रुप । में क्लोरहेक्सिडिन, ग्रुप ॥ में पोविडोन आयोडीन और ग्रुप ॥। करक्यूमिन-आधारित माउथवॉश के साथ किया जाएगा। प्रीप्रोसेड्यूरल रिन्स के 10 मिनट के बाद अल्ट्रासोनिक स्केलिंग 20 मिनट के लिए की जाएगी। एरोसोल को कल्चर प्लेट पर एकत्र किया जाएगा जिसे परिभाषित संदर्भ दूरी पर रखा जाएगा। प्लेट को 24 घंटे के लिए 37 डिग्री पर इनक्यूबेट किया जाएगा और कॉलोनी बनाने वाली इकाइयों की गिनती की जाएगी।

10- भाग लेने के दुष्प्रभाव क्या हैं?

इस अध्ययन के कोई दुष्प्रभाव नहीं हैं।

11- भाग लेने के संभावित नुकसान और जोखिम क्या हैं?

इस अध्ययन में भाग लेने का कोई जोखिम या नुकसान नहीं है। लेकिन हम प्रत्यारोपण के साथ 100% सफलता की गारंटी नहीं देते हैं। यह व्यक्ति के शरीर की स्वीकृति और अस्वीकृति की प्रतिक्रिया पर निर्भर करता है; प्रत्यारोपण उपचार कभी-कभी विफल हो सकता है।

12- भाग लेने के संभावित लाभ क्या हैं?

यह अध्ययन बैक्टीरिया के भार को कम करने में हर्बल माउथवॉश की प्रभावकारिता का मूल्यांकन करने के लिए हमें जानने में मदद करेगा।

13- क्या होगा अगर नई जानकारी उपलब्ध हो जाए?

यदि अनुसंधान के दौरान अतिरिक्त जानकारी उपलब्ध हो जाती है, तो आपको इन के बारे में बताया जाएगा और आप अपने शोधकर्ता के साथ इस पर चर्चा करने के लिए स्वतंत्र हैं,

आपका शोधकर्ता आपको बताएगा कि क्या आप अध्ययन जारी रखना चाहते हैं। यदि आप वापस लेने का निर्णय लेते हैं, तो आपका शोधकर्ता आपकी वापसी की व्यवस्था करेगा। यदि आप अध्ययन जारी रखने का निर्णय लेते हैं, तो आपको एक अद्यतन सहमति पत्र पर हस्ताक्षर करने के लिए कहा जा सकता है।

14- शोध अध्ययन बंद होने पर क्या होता है?

यदि अध्ययन निर्धारित समय से पहले बंद / खत्म हो जाता है, तो यह रोगी / स्वयंसेवक को समझाया जाएगा।

15- क्या होगा अगर कुछ गलत हो जाए?

यदि कोई गंभीर प्रतिकूल घटना होती है, या अध्ययन के दौरान कुछ गलत होता है, तो संस्थान (एस), और संस्थागत नैतिक समुदाय को रिपोर्ट करके शिकायतों को नियंत्रित किया जाएगा।

16- क्या इस अध्ययन में मेरा हिस्सा गोपनीय रखा जाएगा?

हां इसे गोपनीय रखा जाएगा।

17- शोध अध्ययन के नतीजों का क्या होगा?

अध्ययन के परिणामों का उपयोग हर्बल एलोवेरा और कर्क्यूमिन माउथवॉश की प्रभावकारिता की तुलना करने के लिए किया जाएगा। किसी भी रिपोर्ट / प्रकाशन के मामले में आपकी पहचान गोपनीय रखी जाएगी।

18- शोध का आयोजन कौन कर रहा है?

यह शोध अध्ययन शैक्षणिक संस्थान (BBDCODS) द्वारा आयोजित किया जाता है।

19 क्या अध्ययन के परिणाम अध्ययन के बाद उपलब्ध कराए जाएंगे?

हाँ।

20- अध्ययन की समीक्षा किसने की है?

अध्ययन की समीक्षा की गई है और संस्थान के प्रमुख, और आईईसी / आईआरसी द्वारा अनुमोदित किया गया है।

21- अधिक जानकारी के लिए संपर्क करें

डॉ.दिलीप कुमार मौर्य

पीरियोडोंटोलॉजी विभाग

बाबूबनारसी कॉलेज ऑफ डेंटलसाइंसेज।

लखनऊ-227,105

मोब- 9452901798

डॉ.वंदना ए पंत (HOD)

पीरियोडोंटोलॉजी विभाग

बाबूबनारसी कॉलेज ऑफ डेंटलसाइंसेज।

लखनऊ-227,105

मोब- 9935957775

डॉ लक्ष्मी बाला

सदस्यसचिव

बाबू बनारसी कॉलेज ऑफ डेंटलसाइंसेज

लखनऊ

bbdcods.iec@gmail.com

पीआईकाहस्ताक्षर .....

नाम .....

दिनांक.....

Annexure – 6

Case History

DEPARTMENT OF PERIODONTICS

PATIENT'S CASE SHEET

Date: O.P.D. No.

Name: Age: Sex: Occupation

Address: Mobile No. :

CHIEF COMPLAINT(S):

HISTORY OF PRESENT ILLNESS

HISTORY OF PAST ILLNESS

A. Past Medical History

B. Past Dental History

(a) Periodontal Treatment Region

[1]

(b) **Other dental therapy**

Conservative

Prosthetics

Orthodontics

Oral Surgery

Any Other

C. Present Medical History

(a) General health

1. Bleeding Tendencies
2. Allergy
3. Cardiovascular Diseases
4. Endocrinal Diseases
5. Gastro Intestinal Diseases
6. Neurological Disorder
7. Respiratory Diseases
8. Genito Urinary Diseases
9. Hereditary/Genetic Disorder
10. Puberty/ Pregnancy/ Menopause
11. Any Infectious Disease(s)
12. Medication
13. Any other abnormality

(b) Nutritional Status:

i) Well Built /Average /Poor

ii) Non Vegetarian / Vegetarian

D. PRESENT DENTAL HISTORY

(a) **Oral Hygiene Maintenance:**

Brush/ Finger/ Stick / Paste/ Powder
Frequency: Once/ Twice/ Thrice
Direction

(b) **HABITS**

1.	Awareness of any Traumatising habits	Yes	No
2.	Grinding of Teeth	Yes	No
3.	Masticatory Muscle Tiredness	Morning	Evening
4.	Biting Habits	Lip/ Tongue/ Cheek/ Misc	
5.	Chewing	Betel/ Tobacco/ Mis.	
6.	Smoking	Beedi/ Cigarette/ Misc.	
7.	Mouth Breathing/ Tongue Thrusting		

CLINICAL EXAMINATION

EXTRA ORAL EXAMINATION

Face

Lips:	Competency
Skin:	Color: Normal or Palor
Neck	Swellings- Unilateral or Bilateral
Jaws:	Symmetry- Antero- Posterior relationship & movements Temporo-Mandibular Joint

INTRA ORAL EXAMINATION:

A. Soft Tissue

Labial & Buccal Mucosa:		Colour, texture
Cheek:		Colour, Stretchability, Consistency
Tongue:		Colour, Size, Mobility, Texture
Floor of the Mouth:		
Palate:	Hard:	Colour, Defect, Depth, Rougae, Tori.
	Soft:	Color, Defect
Vestibule:		
Saliva:		Flow: heavy/ diminished/ Normal Viscosity: thin/thick
Frenum/ Frenii		Number, Size, Attachment
Perio- Endo Problem		

B. Gingival Status

1. Colour
2. Contour
3. Consistency
4. Surface Texture
5. Position
6. Size
7. Exudate

C. Hard Tissue

1. No. of teeth present
2. Hypersensitivity
3. Missing teeth (why, when)
4. Caries / Non-vital
5. Supernumerary
6. Proximal contact relationship
7. Plunger cusp
8. Crown size and Colour
9. Pathologic Tooth Migration
10. Mobility — Grade I / II / III
11. Hypoplasia
12. Occlusion — Angle's Classification : Class I / II / III
    Bite: Normal /Open/ Deep/Cross/Crowding
13. Retained / Impacted
14. Attrition/ Erosion/ Abrasion
15. Furcation Involvement
16. Trauma from Occlusion
17. Halitosis
18. Any dental anatomic factors
19. Calculus - Mild / Moderate / Severe
20. Stains - Mild / Moderate / Severe

19. Probing depth

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

INDICES

1. Plaque Index (Silness & Loe / Turesky-Gilmore-Glickman Modication of Quigley-Hein

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

2. Gingival index (Loe & Silness / Modified Gingival Index)

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

3. Calculus index

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

4. Clinical attachment Level

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

DIFFERENTIAL DIAGNOSIS :

INVESTIGATION

1. ROENTENOGRAPHIC EXAMINATION :

OPG/IOPA/BITE WING/OCCLUSAL

DESCRIPTION		REGION
1. Lamina dura		
2. Periodontal ligament space		
3. Root form		
4. Bone loss	Vertical	
	Horizontal	
	Infra bony crater	
	Miscellaneous	
5. Periapical pathology		
6. Any other finding		

2. LAB INVESTIGATIONS

Date	Investigation	Result
	BLOOD	
	Hb%	
	RBC	
	TLC	
	DLC	
	ESR	
	Random Sugar	
	Bleeding time	
	Clotting time	
	HbS Ag Status : Positive / Negative	
	HIV Status : Positive / Negative	

DIAGNOSIS

PROGNOSIS

TREATMENT PLAN

EMERGENCY -

PHASE I -

PHASE II -

PHASE III -

PHASE IV -

S.No.	Date	Procedure Done	Next Appointment	Staff Signature

DEPARTMENT OF PERIODONTICS
BABU BANARASI DAS COLLEGE OF DENTAL SCIENCES
LUCKNOW

PROFORMA OF PATIENT'S INFORMED CONSENT

I..... son/daughter/wife of.....
aged..... years, resident of.....
being under the treatment of Dr..... do hereby willfully consent to the performance of a surgical procedure under local anaesthesia for the treatment of ..... (Diagnosis) upon myself / upon..... aged..... years, who is related to me as..... (for e.g. son, daughter, wife etc).

I have been informed regarding the inherent risk involved during and after the surgical procedure and that the success of the treatment cannot be guaranteed. I have signed this consent from voluntarily out of my free will without any compulsion or influence.

Date : Place :

Signature : Time :

(To be signed by parent / guardian in case of minor)

सहमति पत्र

मैं.....पुत्र/पुत्री/पत्नी.....आयु.....वर्ष

निवासी.....

मेरे दंत एवं मुख रोग का उपचार डा. ..... कर रहे हैं।

दंत एवं मसूड़े की शल्य क्रिया के लिए मुख निश्चेतना (Local anesthesia) आवश्यक है।

मुझे पूरी शल्य प्रक्रिया के दौरान होने वाले संभावित खतरों के बारे में ठीक से बता दिया गया है एवं उचार की सफलता के बारे में कोई निश्चितत नहीं है से भी अवगत करा दिया गया है मैं इस सहमति पत्र पर भलीभांति, बिना किसी दवाब के अपनी इच्छानुसार हस्ताक्षर कर रहा हूँ।

दिनांक हस्ताक्षर

स्थान समय

नोट : अवस्यक / नाबालिग होने की अवस्था में अभिभावक के हस्ताक्षर आवश्यक है।

Annexure – 7

Table of Clinical Parameter

CONTROL GROUP

20 MIN
1 FEET FROM PATIENTS

S.NO	LEFT	RIGHT
1	188	298
2	191	295
3	193	303
4	189	289
5	195	301
6	203	275
7	197	299
8	188	287
9	197	289
10	201	301

Mouthwash Chlorhexidine 0.2%
20 MIN
1 FEET FROM PATIENTS

S.NO	LEFT	RIGHT
1	13	14
2	18	91
3	8	53
4	30	75
5	29	72
6	37	46
7	21	26
8	38	34
9	24	56
10	31	61

Mouthwash betadine 2%

20 MIN

1 FEET FROM PATIENTS

S.NO	LEFT	RIGHT
1	55	227
2	61	198
3	64	85
4	43	89
5	15	37
6	28	27
7	31	39
8	53	45
9	76	36
10	34	28

Mouthwash herbal

20 MIN

1 FEET FROM PATIENTS

S.NO	LEFT	RIGHT
1	15	18
2	5	6
3	122	235
4	80	246
5	73	241
6	18	17
7	79	203
8	109	289
9	95	195
10	133	173

Annexure – 8

Statical Analysis

Statistical analysis: Data so collected was tabulated in an excel sheet, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA). For each assessment point, data were statistically analyzed using one way ANOVA and the level of significance was set at $p < 0.05$.

The statistical analysis for the present study was done by applying the following formulae:

1. **Mean**: The mean (or average) is the most popular and well-known measure of central tendency. It can be used with both discrete and continuous data, although its use is most often with continuous data. The mean is equal to the sum of all the values in the data set divided by the number of values in the data set. So, if we have n values in a data set and they have values x_1, x_2, ..., x_n, the sample mean, usually denoted by $\bar{x}$ (pronounced x bar), is:

$$\bar{x} = \frac{(x_1 + x_2 + \cdots + x_n)}{n}$$

This formula is usually written in a slightly different manner using the Greek capitol i.e.:

Sample Mean	Population Mean
$\bar{x} = \frac{\Sigma x}{n}$	$\mu = \frac{\Sigma x}{N}$

where Σx is sum of all data values

N is number of data items in population

n is number of data items in sample

2. **Standard deviation**: the standard deviation (SD, also represented by the lower case Greek letter sigma σ or the Latin letter s) is a measure that is used to quantify the amount of variation or dispersion of a set of data values. A low standard deviation indicates that the data points tend to be close to the mean (also called the expected value) of the set, while a high standard deviation indicates that the data points are spread out over a wider range of values.

$$\sigma = \sqrt{\frac{\Sigma\ (x - \bar{x})^2}{n}}$$

σ = **lower case sigma**
Σ = **capital sigma**
$\bar{x}$ = **x bar**

3. **Anova test**: Analysis of variance (ANOVA) is a statistical technique that is used to check if the means of two or more groups are significantly different from each other. ANOVA checks the impact of one or more factors by comparing the means of different samples. This technique was invented by R.A. Fisher, and is thus often referred to as Fisher's ANOVA (F), as well.

ANOVA Table...

Source of Variation	Sum of Squares	d.f.	Variance	F	p
Between Groups:					
Within Groups:					
Total:					

Sum of square between groups: For the sum of the square between groups, we calculate the individual means of the group, then we take the deviation from the individual mean for each group. And finally, we will take the sum of all groups after the square of the individual group.

Sum of squares within group: In order to get the sum of squares within a group, we calculate the grand mean for all groups and then take the deviation from the individual group. The sum of all groups will be done after the square of the deviation.

F –ratio: To calculate the F-ratio, the sum of the squares between groups will be divided by the sum of the square within a group.

Degree of freedom: To calculate the degree of freedom between the sums of the squares group, we will subtract one from the number of groups. The sum of the square within the group's degree of freedom will be calculated by subtracting the number of groups from the total observation.

ANNEXURE 9
PLAGIARISM REPORT

Curiginal

Document Information

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