# Comparative Effect of Plaque Removal Efficacy of Toothbrush with Bristle Containing Neem and Charcoal for Maintaining Oral Hygiene: A Clinical Study.



**Abstract:**

Background: The deposition of plaque and calculus is the primary etiological factor for the gingival diseases caused by poor dental hygiene. To provide healthy gums & disease-free oral cavity among the population, toothbrushes with bristle having the extract of Neem and Charcoal supplied to evaluate the effectiveness of plaque removal efficacy for maintaining oral hygiene.

Methodology: This study shall be undertaken after the approval from the Institutional Ethical Committee on the patients reporting to the out Patient Department of Sharad Pawar Dental College and Hospital. The patient was recruit to this study after obtaining informed consent from them. A Randomized clinical trial was conducted among 30 participants (male and female) in Sharad Pawar Dental College, between the ages of 33 to 44 years having at least 20 permanent teeth (excluding the third molars and crowns prosthesis). As per the Plaque Index given by Silness P. and Loe H., the first plaque range should be between <1 and >3 in 1970 is participated in the study. Following the randomization, each participant will provide a specific available toothbrush and asked to 1 minute of brushing, following which the plaque index was measured again. They were advised to brush their teeth two times a day for one minute with the allotted toothbrush in the morning and night after dinner with a commercially available toothpaste using a modified bass technique. At baseline, 7th day, and 15th day, the plaque index scores (before and after brushing) were collected, data was recorded and statistically analyzed.

Expected Results: On day baseline, 7 days, and 15 days after brushing, the mean plaque indices decreased. There was also a decrease in mean plaque indices from day one to day seven and fifteen. These decreases were all statistically significant ($P < 0.001$).

Conclusion: The current study demonstrated a significant changes in plaque scores with the use of toothbrushes with bristle containing Neem and Charcoal. The continues usage of the assigned toothbrush resulted in an even greater changes in plaque scores.

Keywords: Neem toothbrush, charcoal toothbrush, plaque, oral hygiene.

## INTRODUCTION:

The wide range of brushes now available, as well as the continuous development of new toothbrushes, has grown into a scientifically developed instrument with advanced ergonomic designs, safe and hygienic materials that help us all. To provide healthy gums among the population toothbrushes having the extract can be supplied and study the effect of plaque removal for maintaining oral hygiene [1]. Chemical and mechanical techniques are two of the most common methods for plaque reduction [2]. Plaque control is found to be very effective whenever a toothbrush with Neem and Charcoal bristles is used in combination with an effective brushing method and for a sufficient period. The size and shape of a toothbrush should be such that it promotes the mechanical removal of plaque. The effectiveness is determined by the brush type, design, and brushing technique [3]. In India, 80 percent of the population lives in rural regions, and many still beginning their day with a chewing stick, charcoal, and have healthy teeth though the trees and source of charcoal are not present everywhere [4]. Tooth caries, the most dental plaque is a common cause of oral diseases and appears to develop when the natural balance between bacteria and the host is disrupted [5]. Lack of oral hygiene causes plaque and calculus to build up, which is one of the primary etiological reasons for gingival disorders, resulting in oral hygiene disorder [6, 7].Neem has antifungal, antibacterial, antiviral, and many more characteristics. Infections, tooth decay, bleeding, and painful gums can all be treated with them [8]. The brush is inherently antibacterial due to the charcoal. Charcoal's deodorizing properties help to naturally clean the mouth and remove the plaque debris. The charcoal toothbrushes are intended to whiten teeth, freshen breath, reduce the growth of bacteria and detoxify the body, remove bacteria by increasing the mouth PH level, and effectively clean teeth and gums [9]. Charcoal toothbrushes contain fine grain powder obtaining by Oxidizing coal olive pit coconut shells and other material. There are several in vitro studies that show the extract's positive effects on plaque bacteria, but no in vivo research has been published yet, according to our literature search. As a result, the purpose of this scientific research was to assess the effects of Neem and Charcoal extract toothbrush on maintaining oral hygiene and plaque removal.

## STUDY OBJECTIVES AND HYPOTHESES:

1. To evaluate the effectiveness of toothbrushes with bristle containing Neem on the removal of plaque at baseline, 7th day, and 15th day with help of plaque index.
2. To evaluate the effectiveness of a toothbrush with bristle containing Charcoal on the removal of plaque at baseline, at 7th day, and 15 days with help of plaque index.
3. To evaluate the comparison of the effectiveness of toothbrush with bristle containing Neem and charcoal on the removal of plaque at baseline at 7th day and 15 days with help of plaque index.

METHODS:

Study design:

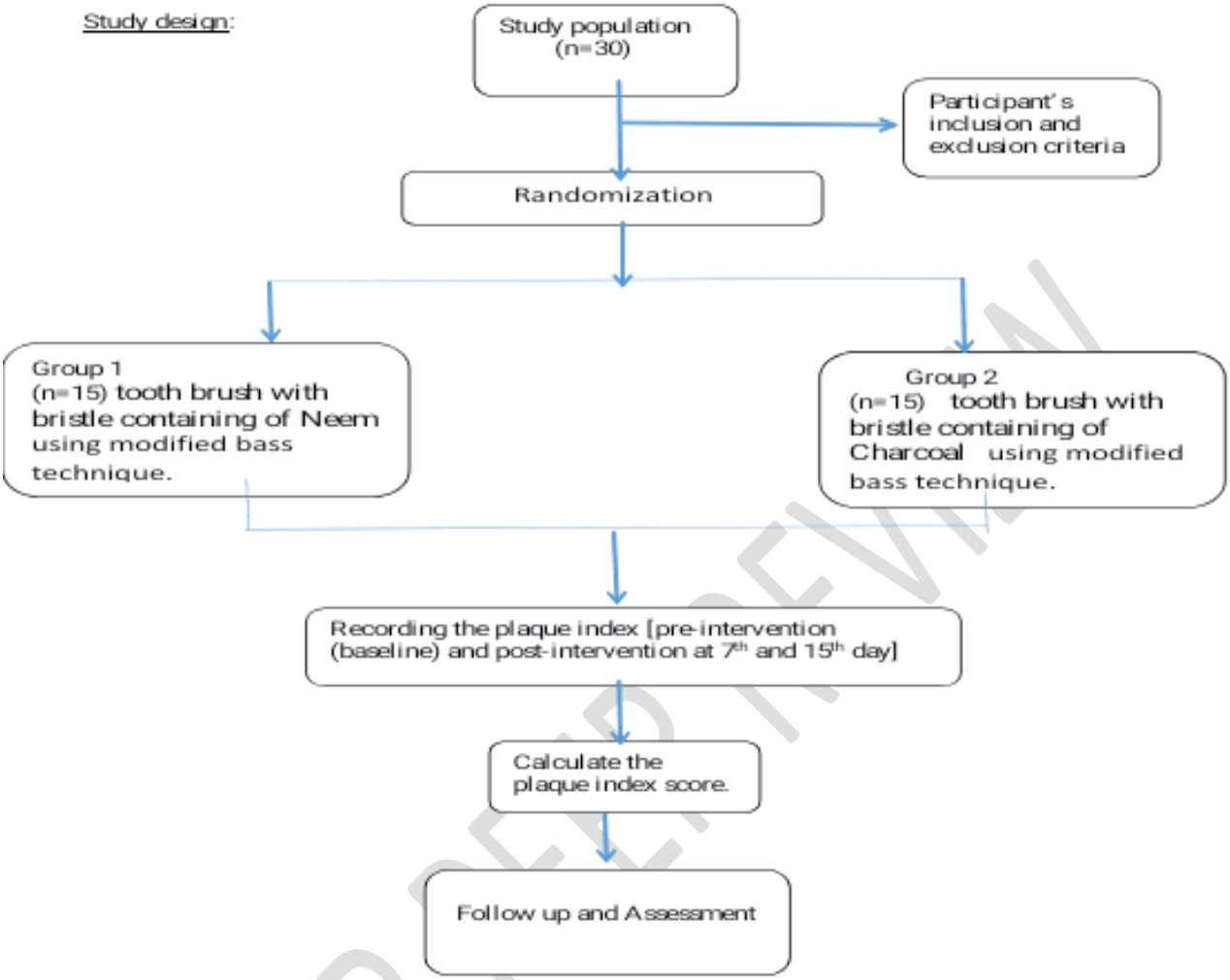


Fig. 1. Study design

Participants:

Inclusion criteria:

- Men and women participant in intervals between 33 to 44 years.
- Availability for a complete interval of the survey.
- Favourable public fitness.
- Least of twenty uncrowned long-lasting natural teeth (eliminate wisdom tooth).
- Original plaque record above 2 as assumed by the utilizing plaque index.
- Approved evidence of features.

Exclusion criteria:

- The composure of orthodontic bracket
- The composure of partial dental prosthesis
- Carcinoma of soft and hard borders of mouth
- Progress in periodontitis (discharging pus, tooth movability, severe destruction of periodontal extension and bony extension)
- Five or more cavities needed urgent treatment
- Aims of immunotoxin any period during 1 month before to access into the survey.
- Expecting female and breastfeeding others
- Records of sensitivity to the toothpaste and own care brand product
- Illness disease which inhibits not consuming or swallowing for 4hr

Sample size estimation:

Sample size is determined using the following formula

$$n = \frac{z_{\alpha/2}^2 \times \sigma^2}{E^2}$$

Where,

σ = previous expected values=16
E =desired Margin of error = 5

$z_{\alpha/2}$, confidence interval of 90%, z = 1.65

n = sample size

Substituting the values in the formula:

$$\textbf{Sample size } n = \frac{(1.65)^2 \times (16)^2}{(5)^2} = \textbf{27.87}$$

With the above-mentioned calculation, sample size determination is 27 in number and considering dropouts, the sample size is determined to be 30. The total minimum sample size with a 90% of confidence interval is 15 for each group. The study is divided into two groups

which will include 15 in each group.

**Methodology:**

The study shall be undertaken after the approval from the Institutional Ethical Committee on the long-suffering detail to the outpatient Department of Sharad Pawar Dental College and Hospital. The patient will be recruited to this study after obtaining informed consent from them. A Randomized clinical trial will be conducted among 30 participants (male and female) in Sharad Pawar Dental Collage in the interval between 33 to 44 years with a least twenty natural teeth (eliminate wisdom tooth and any artificial crown) as per original plaque record at least <1 and >3 as specified by the Plaque Index given by Silness P. and Loe H. in 1970 participated in the study. After randomization, all the participants were assigned, specific available toothbrush. Participants were guided to clean teeth for one min afterwards the plaque score was measured again. Then they were guided to clean their teeth two times a day for less than two min with the selected brush in the morning and night after dinner with a common economically available toothpaste using the modified bass technique of brushing. The plaque chart (Pre and post brushing) were noted, formulated, and evaluated numerically at baseline, 7th and 15th day. The preferred specimen was transferable into consideration the following criteria:

Group I

15 Participants were guided to clean teeth regularly with a Neem toothbrush using a modified bass technique.

Group II

15 Participants were guided to clean teeth regularly with a Charcoal toothbrush using a modified bass technique.

SAMPLING PROCEDURE:

The study sample consists of patients reporting to Out Patient Department of Sharad Pawar Dental College and Hospital.

The first study sitting:

On the first visit, demographic details of the sample patients will be taken for better tracking. The participants were informed to brush the teeth for one minute, following this plaque index score was measured one more time. They were also advised to clean the teeth using an allotted toothbrush, twice a day with common commercially obtainable toothpaste for 1 min in the morning and night after dinner for the subsequent 7 days using a modified bass technique. At baseline, the plaque index score will be documented in the form of pre and post-brushing.

The second study sitting:

Patients will be recalled after 7 days and plaque index score will be measured. The previous score will be compared with the current plaque score. This procedure is performed to examine the impact of plaque removal efficacy of toothbrush on gingival health

The third study sitting:

A patient will be recalled after 15 days and plaque index score will be measured.

Clinical Evaluation

Index teeth:
16 – Maxillary right first Molar
12 - Maxillary right lateral Incisor
24 - Maxillary left first bicuspid
36 - Mandibular left first Molar
32 - Mandibular left lateral Incisor
44 – Mandibular right first bicuspid

Test methods:

SCORING CRITERIA:

Score 0: No plaque.

Score 1: A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen only by running a probe across the tooth surface.

Score 2: Moderate accumulation of soft deposits within the gingival pocket on gingival margin and/or adjacent tooth surface which can be seen by the naked eye.

Score 3: Abundance of soft matter within the gingival pocket and/or on the gingival margin and adjacent tooth surfaces.

INTERPRETATION:

Excellent: 0.

Good : 0.1 - 0.9

Fair : 1.0 - 1.9

Poor : 2.0 – 3.0

ANALYSIS:

Statistical analysis will be conducted by SPPS software version22. The mean and standard deviation of the data will be measured by Descriptive statistics and frequency distribution. Unpaired t test with will be done for intergroup and repeated measures ANOVA for intragroup comparison will be done for determining the significance of p value<0.05

**EXPECTED RESULTS:**

The effective usage of Neem, Charcoal toothbrush on oral hygiene in patients reporting to Sharad Pawar Dental College and Hospital will be assessed to find out the levels of oral hygiene after application of toothbrush containing the extract. The results will provide the impact of

plaque removal efficacy of Neem toothbrush and Charcoal toothbrush by measuring plaque index.

## DISCUSSION:

A communicable relation existing between plaques and the external surface of the tooth inflicts gingival inflammation. The tooth brushing mechanism has a greater impact in controlling plaque hence the most widely and preferably utilized method. Nowadays, lots of variation in manual toothbrushes can obtain easily but there are very few studies correlating the effectiveness of available toothbrushes. The toothbrush is the utmost essential and routinely applied gadget by people to protect the oral cavity from diseases as a favorable mechanical plaque removal tool [10]. The purpose of a toothbrush having an extract of Neem and Charcoal is advising to promote plaque reduction to avoid destruction to the gingival tissues.

The current study is performing for evaluating the effectiveness of 2 commercially available manual toothbrushes with bristles containing Neem and Charcoal for the removal of plaque.

The current study is a randomized clinical trial conducted at Sharad Pawar dental college; in this study, thirty participants of age ranged between 33-44 years are examined at baseline, 7th day, and 21st day. All subjects were advised and motivated to use the given toothbrush and commercially available toothpaste with the modified bass technique of tooth brushing.

A study carried out by Avneet Kaur et al consisted of ten participants of age group from 18 to 22 years were split into 2 phases for twenty days. Colgate sensitive and Colgate- 17 X slim soft charcoal toothbrush were compared. The Results compiled were mean plaque score with 'Colgate sensitive' toothbrush and 'Colgate slim soft charcoal toothbrush were measured. A Colgate-sensitive toothbrush was less effective as compared to the Charcoal toothbrush when plaque controlling effectiveness was observed [11]. NageshwarIyer et al stated that while choosing a toothbrush, the bristles are the most significant reflection. As we observed lots of variations in toothbrushes presently available along with the persistent advancement of innovative brushes, dental specialists need to have a top-level understanding of these products and guide the patients appropriately [12]. A number of related studies are available[13-17]. However, no such study comparing the effect of the toothbrush with bristle containing Neem and Charcoal has been published which can be utilized to correlate the outcome of the same. Hence the addition of a herbal content within the tooth brush can improve the efficacy in reducing plaque content and improving the antibacterial tendency of the brush.This study will enhance the us e of mechanical factors in the removal of plaque and add various other modalities to improve the oral hygiene practices among the population.

## CONCLUSION:

The current study will show relevant changes; in plaque scores by using a toothbrush with bristle containing Neem and charcoals. The continued use of allotted particular toothbrushes led to further notable changes in plaque scores. Accordingly, it will be concluded that Neem and Charcoal Mouth Clean Soft Toothbrush possesses adequate brush structure that supports considerable refinement in plaque control, leads to improve gingival health, oral hygiene status hence, caries, periodontal diseases can be prevented and manage satisfactorily.

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