

THE WHITENING WONDERS OF AN HERBAL CHARCOAL TOOTHPASTE: A NATURAL APPROACH TO A BRIGHTER SMILE - A RANDOMIZED CLINICAL TRIAL

Ayurveda

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ABSTRACT

Objective: Teeth discoloration is a common aesthetic concern caused by factors like diet, smoking, aging, and oral hygiene habits. Whitening toothpaste is a popular solution due to its ease of use and affordability. However, concerns about its effectiveness and safety, such as tooth sensitivity and enamel erosion, necessitate clinical evaluations. The purpose of this clinical research was to determine the cleaning and whitening ability of a charcoal containing toothpastes with ayurvedic herbs. **Methods:** Healthy adult participants were enrolled and instructed to use the test toothpaste twice daily for a minimum of 2 minutes for optimal cleaning. The effectiveness of Dabur Herb'l Charcoal Whitening Toothpaste – Activated charcoal was evaluated in terms of change in teeth Whiteness, Shine and teeth colour From Baseline to Day 01 (Post 15 mins after test product usage for 2 min) and on Day 03, Day 07, Day 14 & Day 28. Teeth whitening and Teeth shine was also evaluated on Day 05. **Results:** There was a statistically significant improvement ($p<0.05$) observed in teeth whiteness from the first brushing. Whitening of teeth further increased significantly post usage of the test product at Day 03, Day 05, Day 07, Day 14 and Day 28 with p value <0.05 . By Day 07, around 1 shade lighter teeth were observed in the 80.64% subjects as supported by statistical significance at $p<0.0001$. **S Conclusion:** Dabur Herb'l Charcoal Whitening Toothpaste demonstrated clinically significant teeth whitening effects in healthy adults over 28 days. No sensitivity or enamel damage was observed, confirming safety for daily use. Thus Dabur Herb'l Charcoal Whitening Toothpaste Effective in teeth whitening with Safety for enamel.

KEYWORDS

Activated Charcoal, Ayurvedic Herbs, Teeth Whitening, Toothpaste, Safety, Efficacy, Clinical Study, Natural.

INTRODUCTION

In recent years, activated charcoal has gained significant attention as a natural alternative for teeth whitening. This innovative approach leverages the unique properties of activated charcoal, which is derived from natural sources such as coconut shells, wood, and other carbon-rich materials. Through a process of superheating, these materials are transformed into a fine, porous powder with a large surface area, enabling it to effectively adsorb substances.

Activated charcoal works by binding to surface stains on the teeth, including those caused by common dietary culprits like coffee, tea, red wine, and tobacco. This binding action helps lift away discoloration, revealing a brighter and whiter smile. Unlike many commercial teeth whitening products that rely on harsh chemicals and artificial additives, charcoal toothpaste offers a gentler, chemical-free option for those seeking to enhance their dental aesthetics naturally.

The benefits of using charcoal toothpaste extend beyond its whitening capabilities. Its detoxifying properties allow it to bind to toxins and impurities in the mouth, promoting overall oral hygiene. This can help reduce bad breath, prevent plaque buildup, and maintain a healthier oral environment. Additionally, activated charcoal is known for its ability to balance the pH levels in the mouth, which can further contribute to oral health.

In summary, charcoal toothpaste presents a promising natural alternative for teeth whitening. Its ability to effectively remove surface stains, coupled with its detoxifying and oral health benefits, makes it a holistic choice for maintaining a healthy and radiant smile. As more people seek natural and chemical-free options for their dental care, activated charcoal continues to stand out as a safe and effective solution.

This study assessed the efficacy of Dabur Herb'l Charcoal Whitening Toothpaste – Activated Charcoal in achieving teeth whitening in healthy adults through a controlled clinical trial.

The aesthetic appeal of a bright, white smile has made teeth whitening a widely sought-after cosmetic enhancement. Whitening toothpastes are among the most accessible and commonly used solutions due to their convenience and affordability. However, the effectiveness of

these products can vary significantly depending on their formulation. Whitening agents and abrasives in toothpastes are designed to remove extrinsic stains and enhance tooth brightness. However, improper use or suboptimal formulations may lead to adverse outcomes such as enamel abrasion, tooth sensitivity, and mucosal irritation. Therefore, it is crucial to evaluate the safety, efficacy, and tolerability of any new whitening toothpaste through rigorous clinical testing.

This study was undertaken to address the need for scientifically validated data on a new Dabur Herb'l Charcoal Whitening toothpaste – Activated Charcoal. By conducting a well-controlled, prospective clinical trial, the study aimed to ensure that the product delivers the desired whitening effects without compromising oral health, thereby providing confidence to consumers and dental professionals alike.

Study Design

This open-label, single-arm, prospective interventional study aimed to assess efficacy of Dabur Herb'l Charcoal Whitening Toothpaste – Activated Charcoal in healthy adults. The study aimed to assess the parameter teeth whiteness.

The study was an open-label, single-arm, prospective interventional clinical trial involving 36 healthy adult participants, of whom 29 completed the study. Participants used the toothpaste twice daily for two minutes, and their teeth were evaluated at baseline (Day 1) and subsequently on Day 3, 5, 7, 14, and 28.

Key Assessments

Tooth whiteness and shine were measured using VITA Easyshade V digital spectrophotometer and VITA Classical shade guide.

Safety parameters included checks for tooth sensitivity and enamel erosion.

Study Population And Eligibility Criteria

Inclusion Criteria:

Healthy adults aged 18 to 55 years.
Good general health with no tooth sensitivity at screening.
No prior teeth whitening treatments.
Presence of six upper front teeth without restorations or cavities.
Willingness to refrain from other whitening products during the trial.

Exclusion Criteria:

History of gum disease, orthodontic treatment, or dental restorations on the front teeth.
Severe intrinsic staining (e.g., due to tetracyclines or fluorosis).
Known allergies to toothpaste ingredients.
Pregnant or breastfeeding women.

Study Visits And Procedures

Screening and Baseline (Day 1), Participants underwent dental and physical examinations. Teeth colour was recorded before and 15 minutes after the first application of the test toothpaste.

Follow-up Visits (Day 3, 5, 7, 14, 28)

Teeth whiteness and shine were assessed using VITA Easyshade V and VITA Classical shade guide.

Test Product

Test products provided for the study were Suitable for human oral use and dental efficacy testing.

Table 1. Test product's Details

Test Product's Details	
Test Products	Dabur Herb'l Charcoal whitening toothpaste – Activated charcoal Sorbitol, Silica, Aqua, PEG – 32, Sodium lauryl sulfate, Aroma, Xanthan Gum, Tetra sodium pyrophosphate, Charcoal powder, Sodium saccharin, sodium benzoate, Herbal extract (Piper nigrum fruit extract, Piper longum fruit extract, Zanthoxylum latum fruit extract, Zingiber officinale root extract), Trisodium phosphate, Tetrapotassium pyrophosphate, Propylene glycol, Mica, CI 77891 (Titanium dioxide), Benzyl alcohol, Eugenol
Mode of application	2 – 3 g twice daily, to be adequately applied on the toothbrush and brush the teeth for at least 2 minutes for better cleaning.

Evaluations**General Physical And Dental Examination**

An abbreviated physical examination and oral/Dental was done by the dentist during screening.

Teeth whitening using VITA easyshade V and Vita classical shade guide

VITA easyshade V digital spectrophotometer measurement device is used for determining the precise shade of the teeth. The spectrophotometer gives precise and reproducible tooth shade determination in seconds, objective and reliable measurements, due to the LED technology. Instrumental assessments using VITA easyshade V was performed in a supine position facing the test site towards the trained instrument operator and dentist trained evaluator.

The evaluation was carried out under same lighting conditions for all the assessed subjects. The maximum efforts were taken to have the same trained operators to take measurement for all the subjects throughout the study. Prior to each series of measurement, the calibration of the device was checked according to the procedure supplied by the manufacturer. Instrumental operators ensured that the instrument tip was placed on the same area of tooth for every subject throughout all visits. The Probe was held perpendicular to the tooth. The VITA classical shade guide was used to compare the shade of subjects' teeth with the shade tabs, under consistent lightening conditions by the dentist. The shade tab that closely matched the subjects' teeth was assigned to the teeth. This process was repeated at all evaluation visits. The score was based on 5-pointer Likert scale, i.e. 1: Very Dull, 2: Dull 3: Slightly shiny, 4: Moderately shiny and 5: Very shiny.

**Figure: Tooth shade Determination using Vita Easyshade V****Methods Of Statistical Analysis**

Continuous variables were described by descriptive statistics (N, Mean, Median, SD, Minimum & Maximum) employing paired T-Test. Categorical variables were expressed by frequency, percentage, Weighted mean and % CFB along with the graphical presentation whenever required. Weighted mean was calculated for categorical variables like no. of shades lighter for VITA easyshade and VITA classical shade guide.

Weighted Mean: (Given score or “X” shade lighter at given time point) (Number of subjects having the same given score or “X” shade lighter at given time point).

Weighted Mean = Addition of number obtained for each score at given time point / Number of subjects (N) for given time point.

The statistical analysis was done by qualified biostatistician using SPSS version 29.0.1.0(171) and Microsoft excel 2019 with 5% level of significance.

Determination Of Sample Size

Based on the recommendations a total of 36 subjects were enrolled in the study. From 36 enrolled subjects 29 Subjects completed the study.

Data Sets Analysed

A total of 36 subjects were enrolled in the study a from them 29 subjects completed the study.

Demographic And Other Baseline Characteristics**Table 2. Baseline Demographics Of Subjects**

Parameter	Statistic	Overall (N = 36)
Gender, n (%)	Male	27(75.00%)
	Female	09(25.00%)
Age (Years)	n	36
	Mean (SD)	38.33(7.47)
	Median	36.5
	Min, max	26.00,54.00
Height(cm)	n	36
	Mean (SD)	161.61(10.07)
	Median	160
	Min, max	133.00,182.00
Weight(kg)	n	36
	Mean (SD)	66.85(10.76)
	Median	66.5
	Min, Max	49.00,88.00

In this study there were 27 males (75.00%), and 09 females (25.00%) subjects enrolled. Average age of the subjects was 38.33 ± 7.47 years and weight were 66.85 ± 10.76 kg.

RESULT AND INTERPRETATION**Teeth whitening assessment using VITA EASYSHADE V Guide**

As compared to the baseline, significant improvements in teeth whiteness were observed post – product usage at T15 minutes, Day 03, Day 05, Day 07, Day 14 & Day 28 ($P < 0.05$). By Day 07 subjects displayed teeth that were 1 shade lighter, also supported by statistical significance ($p < 0.0001$).

Teeth Whitening Using Vita Easyshade V

Parameters	Before applica tion (N=36)	Day 01 (After 15 mins) N= 36	Day 05, (N=30)	Day 07, (N=3 1)	Day 14 (N= 28)	Day28 (N=29)
0 Shade lighter	-	29(80.5 6%)	14(46. 67%)	8(25.8 1%)	6(21.43 %)	5(17.24 %)
1 Shade lighter	-	4(11.11 %)	9(30%)	15(48. 39%)	11(39.2 9%)	13(44.8 3%)
2 Shade lighter	-	3(8.33 %)	7(23.3 3%)	7(22.5 8%)	9(7.14%)	9(6.90 %)
3 Shade lighter	-	0(0%)	0(0%)	1(3.23 %)	2(7.14%)	2(6.9%)
Subjects with at least one shade lighter	0	19.44%	53.33 %	74.19 %	78.57%	82.76%

teeth (1%)						
Weighted Mean	0	0.29	0.77	1.03	1.25	1.28
P - Value	-	1.03%	0.001	<0.00	<0.0001	<0.0001

There was a statistically significant improvement ($p < 0.05$) observed in teeth whiteness from the first brushing at T15 mins. Whitening of teeth further increased significantly post usage of the test product at Day03, Day05, Day07, Day14 and Day 28 with p value < 0.05 . By Day 07, around 1 shade lighter teeth were observed in the 74.19% subjects as supported by statistical significance at $p < 0.0001$. Similarly, at Day 14, 78.57% subjects experienced at least 1 shade lighter teeth ($p < 0.0001$). During last visit at Day 28, 82.76% Subject got at least 1 shade lighter teeth ($p < 0.005$).

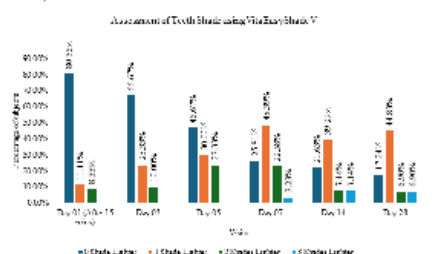


Figure: Whitening of teeth shade as measured using Vita EasyShade V

Teeth whitening assessment using VITA Classic shade guide

As compared to the baseline, there was a statistically significant improvement observed in teeth whiteness post usage of the test product at T 15 min, Day 03, Day 05, Day 07, Day 14 and Day 28 with p-value < 0.05 . By Day 07, 1 shade lighter teeth were observed in the subject as supported by statistically significant at $p < 0.0001$.

Teeth Whitening (Using Vita Classic Shade Guide)

Parameters	Before application (N=36)	Day 01 (After 15 mins) (N=36)	Day 03 (N=30)	Day 05 (N=30)	Day 07 (N=31)	Day 14 (N=28)	Day 28 (N=29)
0 Shade Lighter	-	31(86.11%)	23(76.67%)	19(63.33%)	6(19.35%)	5(17.86%)	4(13.79%)
1 Shade Lighter	-	5(13.89%)	6(20.00%)	9(30.00%)	18(58.06%)	11(39.29%)	14(48.28%)
2 Shades Lighter	-	0(0%)	1(3.33%)	2(6.67%)	7(22.58%)	10(35.71%)	8(27.59%)
3 Shades Lighter	-	0(0%)	0(0%)	0(0%)	0(0%)	2(7.14%)	3(10.34%)
Subjects with at least 1 shade lighter teeth (%)	0	13.89%	23.33%	36.67%	80.64%	82.14%	86.20%
Weighted Mean	0	0.14	0.27	0.43	1.03	1.32	1.34
P-value	-	0.0231	0.0090	0.0007	<0.0001	<0.0001	<0.0001

There was a statistically significant improvement ($p < 0.05$) observed in teeth whiteness from the first brushing at T15 mins. Whitening of teeth further increased significantly post usage of the test product at Day 03, Day 05, Day 07, Day 14 and Day 28 with p value < 0.05 . By Day 07, around 1 shade lighter teeth were observed in the 80.64% subjects as supported by statistical significance at $p < 0.0001$. Similarly, at day 14, 82.14% subjects experienced at least 1 shade lighter teeth ($p < 0.0001$). During last visit at day 28, 86.20% subjects got at least 1 shade lighter teeth ($p < 0.0001$).

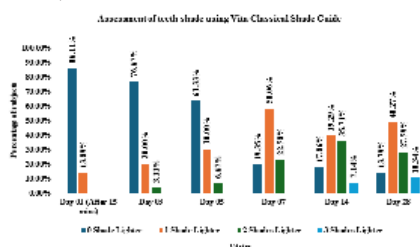


Figure: Change in teeth shade measured using Vita Classic Shade

DISCUSSION

The present study is successfully achieved its determined aims and objectives. The primary stages of the study included Change in teeth whiteness and colour.

The quest for teeth whitening reflects patients' Demands for superior aesthetics and the considerable advancement in teeth whitening agents [1]. "Tooth Whitening is a conservative and effective method to lighten discoloured teeth and has been practiced in dentistry for many centuries" [2]. Management of discoloured teeth was earlier done by tooth whitening material in the form of oxalic acid, ammonia, chlorine, and hydrogen peroxide. Whitening of the teeth can be done professionally in the dental practice by scaling and polishing, bleaching or by using prosthetic crowns. However, these methods may lead to teeth sensitivity, teeth surface erosion or gum bleeding [3]. The safer alternative to this is using over the counter whitening toothpaste. The role of whitening toothpaste is to remove unwanted surface deposits and surface effects with minimal effect on the tooth structure [4].

Abrasive is one of the most important ingredients the whitening toothpaste for mechanical removal of extrinsic stains. Abrasives include sodium bicarbonate, calcium Carbonate, Calcium phosphate, Calcium pyrophosphate, Hydroxyapatite, hydrated silica etc [5]. whitening toothpaste works on mechanical or abrasive activity to remove biofilms or chromophores adhered to the dental enamel surface improving the aesthetics by restoring the natural dental colour [6].

Presently many toothpastes have also started using activated charcoal as whitening agent because it has the capacity of adsorbing pigments and stains [7]. Tested product Dabur Herb'l Charcoal whitening toothpaste – Activated charcoal contains activated charcoal. The activated charcoal binds to all deposits on tooth surface so that brushing leaves the tooth surface free from any deposits [8]. The present study showed the improvement in teeth whiteness.

A study by Jamwal N, et al compiling results from 7 systematic review and 4 meta-analyses concluded that whitening toothpaste typically can lighter tooth colour by about one or two shades is for clinically application for the public and private practitioners [9]. The same results have also been founded in our study where the use of test product resulted in a significant lightening of tooth colour by 1 shade in 7 days of usage.

There has been conflicting regarding the clinical effectiveness of whitening toothpaste for home use of many studies indicating minimal, if any, clinically significant impact on tooth whitening [10-12]. on contrary our study found highly statistically significant results for teeth whitening.

Dabur Herb'l Charcoal whitening toothpaste – Activated charcoal contains piper nigrum fruit extract, piper longum fruit extract, Zanthoxylum alatum fruit extract, Zingiber officinale root extract. Whitening toothpaste have potential to induce dentin hypersensitivity and periodontal inflammation [13]. However, our study reported that none of our subjects experienced teeth sensitivity or dental erosion after 28 days of continuous usage indicating that test product is enamel safe.

In the present study, the result of the teeth whiteness obtained using Vita Easyshade and vita classical shade guide do not have a greater variation between them. Similar results were found in a study by Singh RK et.al [14] in 2021, where they compared tooth shades obtained using Vita Easyshade and Vita classical shade guide on 39 participants. The study revealed a significant correlation between results obtained using both the instruments. Moreover, all the subjects exhibited 100% satisfaction with the use of the test product.

CONCLUSION

Dabur Herb'l Charcoal Whitening Toothpaste demonstrated clinically significant teeth whitening effects in healthy adults over 28 days. By Day 7, 74.19% of participants had at least 1 shade lighter teeth. By Day 28, 82.76% subject experienced significant teeth whitening. No sensitivity or enamel damage was observed, confirming safety for daily use. Thus Dabur Herb'l Charcoal Whitening Toothpaste Effective in teeth whitening with Safety for enamel.

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