



# A Comparative Evaluation of Anticandidal Properties of Denture Cleanser with Triphala, Aloe Vera, And Turmeric in Complete Dentures

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## KEYWORDS

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## ABSTRACT:

**Background and Objectives:** Complete denture restores function and aesthetics for persons whose natural teeth have completely missing. It provides support for facial structures, improves chewing efficiency, and enhances speech clarity. The growing number of dependent elderly individuals has led to an increasing need for natural products for denture cleansing. This study aimed to evaluate the anticandidal effectiveness of denture cleansers with Triphala, Aloe Vera, and Turmeric in complete dentures. Triphala, a blend of equal parts Phyllanthus emblica, Terminalia chebula, and Terminalia bellerica fruit powders, along with Aloe Vera and Turmeric, have long been praised for their therapeutic qualities. Commonly used as antibacterial and medicinal products in India, these natural remedies are known for their potent antifungal activity against Candida.

**Material and method:** The study population consisted of 40 participants who were complete denture wearers; Four groups of participants were formed. Each group was assigned a specific denture cleansing method.

**Results:** The research assessed the anticandidal properties of a commercially available Denture Cleanser, Triphala, Aloe Vera, and Turmeric in complete denture wearer. A total 40 participants were split into four groups, each group using one of the cleansing agents for a period of 30 days. The presence of Candida species was assessed using swab cultures from denture surfaces before and after the treatment period. Statistical analysis indicated that all groups showed significant reductions in Candida colonies ( $p < 0.05$ ). However, the Denture Cleanser group exhibited the most substantial reduction, afterwards Triphala, Aloe Vera, and Turmeric, respectively.

**Conclusion:** The Denture Cleanser proved to be the most effective, then Triphala, Aloe Vera, and Turmeric. These findings suggest that while natural agents such as Triphala, Aloe Vera & Turmeric offer beneficial anticandidal properties, commercially available Denture Cleanser remains the most potent option.

## 1. Introduction

Since the country's age composition has changed over time, the number and percentage of elderly people in India who are 60 years of age or more have gradually

increased. Of these, 75% live in rural areas. The number of older adults who are dependent on others is rapidly rising, necessitating a greater focus on oral health issues associated to ageing.<sup>1</sup>



In the 2013 National Health Survey, 11% of adults over the age of 18 reported having no teeth. The percentage of women who were 60 years of age or older was higher. Although complete tooth loss is not always the outcome of normal ageing, age is a major contributing factor.<sup>2</sup> About 60–65% of denture wearers experience Candida-associated denture stomatitis, a common inflammatory condition that typically appears underneath the palatal mucosa of upper denture's intaglio surface. Although there are several etiological causes, poor denture hygiene practices are one of the main ones.<sup>3</sup>

Several specialized denture cleansing products are available in the market, but elderly individuals who depend on dentures often face limited access to these materials due to financial constraints and living in rural areas. This highlights the need to explore natural alternatives for denture cleaning that are affordable, easily accessible, and not a financial burden for the elderly.<sup>4</sup>

Testing the anticandidal efficacy of such natural products as denture cleansers is essential. Triphala (a blend of equal parts *Phyllanthus emblica*, *Terminalia chebula*, and *Terminalia bellerica* fruit powders), Aloe Vera, and Turmeric are acclaimed for their therapeutic qualities. Therapeutic and antimicrobial agents used extensively in India also have demonstrated potent antifungal activity against *Candida*.

2. **Aim:** The aim of the study was to compare the anticandidal efficacy of Denture Cleanser, Triphala, Aloe vera and Turmeric on complete dentures.

#### Objectives:

- To assess the anti-candidal efficacy of commercially available Denture Cleanser, Triphala, Aloe Vera and Turmeric in Complete Dentures.
- To determine the effectiveness of Denture Cleanser, Triphala, Aloe Vera, and Turmeric in inhibiting *Candida* growth in Complete Denture surfaces through viable count methods and/or microscopic examination.
- To compare the anti-candidal efficacy of Denture Cleanser, Triphala, Aloe Vera, and Turmeric with each other.

3. **Materials and method:** for this study 40 participants who are living in rural Uttarakhand and also Denture

wearers were contributed. There were four groups formed out of them, with ten participants in each group. Each of the 4 treatments— Triphala Churna, Aloe Vera, Turmeric and Denture Cleanser (sodium bicarbonate and sodium perborate monohydrate) (Fig 1) — administered to each groups.



**Figure 1 (Materials used)**

The following inclusion and exclusion criteria were used in the selection of study participants:

#### Inclusion criteria:

- 1) Subjects willing to participate and provide their consent for the study.
- 2) Subjects above 60 years of age.
- 3) Subjects must be individuals wearing maxillary complete dentures.
- 4) Subjects must be in good general health without any systemic conditions.
- 5) Subjects should not be currently receiving antifungal therapy.

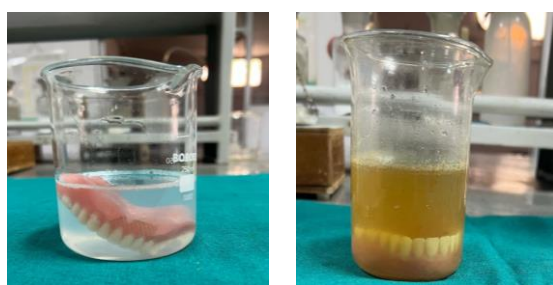
#### Exclusion criteria:

- 1) Subjects uncooperative for clinical examination.
- 2) Subjects unwilling to give consent for the study.
- 3) Subjects less than 60 years of age.
- 4) Subjects with systemic conditions or medications affecting oral health that could significantly impact the outcomes of prosthodontic treatment.



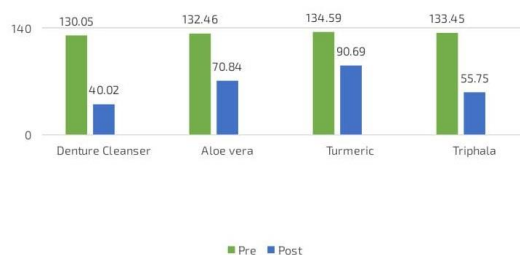
**Method:** In the Denture Cleanser group, dentures were immersed in an effervescent solution for 30 minutes. For the Triphala churna (Patanjali) group, a prepared standardized solution was obtained by dissolving 10 grams of powder in 100 ml of water, and the dentures were soaked in this solution overnight. In the Turmeric group (Patanjali), a similar solution was prepared by mixing 10 grams of powder with 100 ml of water, with dentures also immersed overnight. For the Aloe Vera group, freshly cut aloe vera was used to clean the denture surfaces. This cleaning regimen was followed for 15 days, every other day.

Swabs were collected from the upper denture palatal surface using a 2cm × 2cm template before the treatment began and again on the 16th day. The samples were spread on Sabouraud dextrose agar medium using a 4-mm loop and incubated at 37°C for 48 hours. Candidal colonies come into view as cream-colored, smooth, pasty formations, and their count was recorded using a digital colony counter. The difference in colony-forming units (CFUs) among the baseline swab (before using the cleanser) and the post-treatment swab was analyzed to determine the efficacy of each cleanser in reducing the Candida count (Fig. 2)



(Denture cleanser group) (Turmeric group)  
Figure 2

#### 4. Results:



**Graph 1: Candida count of 4 groups as pre and post-operative.**

Total 40 participants were included, out of which 82% females and 18% males were counted. The average decrease in overall number of Candida count after using denture cleanser was the greatest, followed by Triphala, Aloe Vera and Turmeric with a reduction of  $310.25 \times 10^2$  CFU/4 cm<sup>2</sup>,  $319.5 \times 10^2$  CFU/4 cm<sup>2</sup>,  $103.67 \times 10^2$  CFU/4 cm<sup>2</sup>,  $68.75 \times 10^2$  CFU/4 cm<sup>2</sup>, respectively.

All four substances demonstrated a significant reduction in the measured parameter after treatment. For example, Denture Cleanser showed a decrease from 130.05 pre-treatment to 40.02 post-treatment. Triphala from 133.45 to 55.75. Aloe Vera also showed a substantial reduction, from 132.46 to 70.84. Turmeric reducing from 134.59 to 90.69, (graph)

Overall, while all substances were effective in reducing the parameter measured, Denture Cleanser and Triphala appeared to have the most pronounced reductions, indicating their potential superior efficacy compared to Aloe Vera and Turmeric.

Table 1: Tukey's test showing the comparison between different Denture Cleansers in reducing total candida count

List of Denture Cleansers	P value
Denture Cleansers	0.99
Triphala powder	0.94
Aloe vera	0.21
Turmeric	0.22
Triphala powder	0.94
Aloe vera	0.2
Turmeric	0.21
Triphala powder	0.93
Aloe vera	0.23
Turmeric	0.22

Table 1: Various denture cleansers was compared and analysed with one-way ANOVA followed by Tukey's post-hoc test, 'P' value of <0.05 considered statistically significant. The results showed no significant difference in effectiveness between the denture cleansing tablet and Triphala ( $P>0.05$ ), while a significant difference was observed between Triphala and water ( $P<0.05$ ). Additionally, there was no significant difference in effectiveness among Aloe Vera, water, and Turmeric ( $P>0.05$ ).



## 5. Discussion:

The study investigated the anti-candidal efficacy of commercially available Denture Cleanser with Triphala, Aloe vera and Turmeric in Complete Dentures. According to a review of the literature, while Triphala, Aloe Vera, and Turmeric have been shown to have antifungal and antibacterial properties, their prospective application as Denture Cleansers has not been examined.<sup>5</sup> The findings of this research underscores the effectiveness of various natural and commercially available substances—Denture Cleanser, Aloe Vera, Turmeric, and Triphala—in reducing the measured parameter, potentially microbial load or stain intensity, on dental prosthetics.

The significant reduction observed across all groups suggests that each substance has a strong potential for improving oral hygiene in denture wearers. Among the natural agents, Triphala exhibited the highest anticandidal activity, which can be attributed to its rich polyphenol content and strong antioxidant properties.<sup>6</sup> Aloe Vera also showed considerable efficacy, likely due to its bioactive compounds such as anthraquinones and glycoproteins, which possess antimicrobial properties. Turmeric, known for its active component curcumin, demonstrated moderate anticandidal effects, supporting its traditional use in herbal medicine for managing infections.<sup>7</sup>

Denture Cleanser: a commercially available product specifically designed for maintaining denture hygiene, showed the most dramatic decrease in the parameter, reducing the value from 130.05 to 40.02. This significant reduction reinforces the effectiveness of dedicated denture cleansers in maintaining the cleanliness and safety of dental prosthetics.<sup>8</sup>

Aloe Vera: a natural remedy known for its anti-inflammatory and antimicrobial properties, also demonstrated a substantial decrease from 132.46 to 70.84. While Aloe Vera's reduction was less pronounced compared to Denture Cleanser, the results confirm its potential as a natural alternative in maintaining oral hygiene. This is particularly relevant for individuals seeking natural and less chemical-intensive options for denture care.

Turmeric: known for its anti-inflammatory and antibacterial properties, showed a reduction from 134.59 to 90.69. While its effectiveness was slightly lower compared to the other substances, Turmeric still proved to be beneficial in reducing the measured parameter. Turmeric's role in oral hygiene is supported by its historical use in traditional medicine, and these findings provide a modern scientific basis for its application in dental care.<sup>9</sup>

Triphala: a traditional Ayurvedic formulation known for its antimicrobial and antioxidant properties, demonstrated a notable reduction from 133.45 to 55.75. This reduction highlights Triphala's potential as an effective natural remedy for oral hygiene, aligning with previous studies that have emphasized its broad-spectrum antimicrobial activity. The high efficacy of Triphala is likely due to its rich content of tannins, flavonoids, and other polyphenolic compounds, which have been shown to exert antifungal effects by disrupting the integrity of fungal cell walls and inhibiting biofilm formation.<sup>10</sup>

The study findings demonstrated a marked reduction in *Candida* count following treatment in all groups, underscoring the effectiveness of various denture cleansing methods. Among these, the group using conventional denture cleansers achieved the most significant reduction in *Candida* levels, highlighting their superior efficacy in reducing fungal colonization.<sup>11</sup> Denture cleansers are formulated specifically to target microbial biofilms and plaque buildup, which are primary contributors to denture stomatitis.<sup>12</sup> By effectively managing *Candida* levels, these cleansers help lower the risk of denture-related infections and maintain oral health for denture wearers.

Interestingly, the natural alternatives used—Triphala, Aloe vera, and Turmeric—also yielded favorable results, though with slightly less efficacy compared to conventional denture cleansers. These natural agents are known for their antifungal and anti-inflammatory properties and offer benefits such as widespread availability, affordability, non-toxicity, and ease of use. Their accessibility makes them appealing, particularly for individuals seeking natural or low-cost options.<sup>13</sup>

However, the study notes the need for further research to assess the lasting impacts of denture cleansers derived



from natural ingredients.<sup>14</sup> While preliminary results are promising, more extensive studies are required to validate these agents' efficacy over prolonged use and assess any potential limitations. Long-term research may also explore optimal formulations, frequency of application, and possible synergistic effects when used in conjunction with traditional cleansers, ultimately offering evidence-based guidance for their incorporation into denture hygiene routines.<sup>15</sup>

## 6. Conclusion:

The results of this study demonstrate that all four substances—Denture Cleanser, Aloe Vera, Turmeric, and Triphala—were effective in significantly reducing the measured parameter, which could be microbial load, stain intensity, or another relevant factor. Among the treatments, Denture Cleanser and Triphala showed the most substantial reductions, suggesting they may offer superior efficacy in addressing the condition being studied. Aloe Vera and Turmeric also contributed to marked improvements, though to a lesser extent. These findings suggest that natural substances like Triphala, Turmeric and Aloe Vera could serve as viable alternatives or supplements to traditional denture cleansers in clinical practice.

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