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Preparation and evaluation of herbal tooth powder using herbal resources

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Abstract
The present study evaluated the organoleptic, phytochemical, physicochemical, rheological, and safety parameters of a newly formulated tooth powder. Organoleptic analysis revealed that the powder possesses an olive green color, characteristic odor, astringent taste, fine texture, and a powdered appearance. Phytochemical screening confirmed the presence of alkaloids (Mayer's test), saponins (foam test), steroids and triterpenoids (Salkowski test), carbohydrates (Fehling's test), and flavonoids (lead acetate test). Physicochemical evaluation showed a pH of 6.07, an ash value of 0.91, and a moisture content of 0.47%. Rheological properties included a bulk density of 0.45 g/mL, good foaming characteristics, and an angle of repose of 25.17°, indicating excellent flow properties. Safety testing through patch tests showed no adverse effects such as swelling, redness, or irritation, ensuring its dermal compatibility. The findings suggest that the tooth powder formulation is promising in terms of its physicochemical stability, phytochemical richness, and safety for topical use. These attributes indicate its potential utility as a natural and effective oral hygiene product. Further clinical studies are recommended to validate its efficacy and long-term safety.

Keywords: Herbal tooth powder, formulation, evaluation

Introduction
Oral hygiene plays a crucial role in maintaining a good appearance, creating a positive impression, and boosting confidence. Herbal tooth powders, composed of various natural ingredients, are widely available in the market. These products are often preferred by consumers due to their perceived safety, effectiveness, and low toxicity. Herbal tooth powders promote oral hygiene by acting as abrasives to remove dental plaque and food debris from teeth. They also help prevent conditions such as gingivitis, cavities, and stained teeth.

Tooth powder is a traditional oral hygiene product that has been used for centuries to maintain dental health. It typically consists of fine powdered ingredients with abrasive, cleansing, and therapeutic properties. Common components of tooth powder include natural substances like baking soda, salt, clove, neem, licorice root, and other herbal extracts. These ingredients help remove plaque, prevent cavities, and combat bad breath while promoting overall gum and tooth health. Unlike commercial toothpaste, tooth powders often avoid synthetic chemicals, preservatives, and artificial flavors, making them a popular choice for individuals seeking natural and eco-friendly alternatives. The abrasive nature of tooth powder helps to gently polish teeth, remove surface stains, and maintain a bright smile. Many herbal tooth powders also have antimicrobial properties, which help prevent gum diseases like gingivitis.

The resurgence of herbal and organic products has increased the popularity of tooth powders in recent years. Consumers are drawn to their simplicity, effectiveness, and the perception of fewer harmful side effects compared to chemical-based oral care products. Additionally, tooth powders are lightweight, travel-friendly, and require minimal packaging, reducing their environmental impact. However, the quality of tooth powders can vary due to inconsistencies in raw materials and the lack of standardization in some formulations. This highlights the importance of quality control and the use of modern analytical techniques to ensure the purity, safety, and efficacy of the product.

Tooth powders are versatile, appealing to both traditional users and modern consumers focused on natural health. They are particularly effective in areas where toothpaste is less accessible, offering an affordable and efficient solution for oral hygiene. With growing consumer awareness of sustainable and holistic practices, tooth powder is gaining renewed attention as a reliable and eco-conscious choice for maintaining dental health.

Materials and Methods

Raw materials authentication: Raw materials purchase from local source. Received materials were evaluated macroscopically and microscopically.

Phyto-chemical evaluation

Phytochemical evaluation provides valuable information related types of chemical present in received powder sample.

Preparation method of herbal tooth powder

All the herbal ingredients were weighed according to ascending order of its weight. Weighted ingredients were triturated using motor pestle. The powdered herbal materials were passed through sieve apparatus. Fine powder was collected and mixed well after that store in air tight plastic container.

Table 1: Formulation table

Sr. No	Ingredients	Weight (g)	Uses
1.	Pudina	1	Mouth freshener, Antiseptic
2.	Clove	0.5	Analgesic, improve gum, tissue health increase
3.	Namak	1	Remove stains, reduce gum and inflammation
4.	Babool	2	Anti-bacterial, strengthening gums
5.	Neem	1	Anti-inflammatory, treating tooth decay
6.	Tulsi	2	Anti-ulcer, Anti-bacterial, treats mouth ulcer
7.	Black pepper	0.5	Anti-microbial , Prevent tooth decay
8.	Charcoal	1	Whitening agent, Absorb surface stains
9.	Jethi madh	1	Foaming agent , sweetening agent

Evaluation parameter

Organoleptic properties

Organoleptic properties were tasted manually.

Phyto-chemical evaluation: The formulation was prepared, then performed the various Phyto-chemical test for Alkloids, Steroids, flavonoids, Saponin, Carbohydrate etc.

pH determination

pH of prepared herbal tooth powder was measured by using digital Ph paper. The solution of tooth-powder was prepared by using 100 ml of Distilled water and dip the Ph paper into the beaker. Ph was determined in three times for solution and the average value was calculated.

Moisture Content

This method uses the Loss on Drying (LOD) method. The moisture analyzer weighs a sample, heats it up to dry it, and weighs it again once it's dry. The weight after drying is subtracted from the weight before, so the loss of moisture is determined using the loss of ash.

Flow Properties

Angle of repose: A funnel was taken and fixed with a clamp to the stand. A graph paper was kept below the funnel and the height between graph paper and bottom of the funnel was measured. Then 10gm of powder was weighed and pass through adjusted funnel. After that measure the angle of repose.

Bulk density

10gm of powder was accurately weighed and carefully introduced into a 100ml graduated (1ml) measuring cylinder. The cylinder was dropped at 2sec interval onto a hard surface three times from a height of a one inch to equalize upper surface of powder.

Bulk density =Wt. of drug/bulk volume.

Tapped density

10gm of powder was accurately weighed and carefully introduced into a 100 ml graduated (1ml) measuring cylinder. Measuring cylinder was fitted on the tapped density apparatus. The instrument was switched on. It raised the cylinder on the base from a height of about 4 inches. Number of strokes given until further bulk was changed.

Tapped density =Wt. of drug/Tapped volume

Ash value

To determine the ash value, a porcelain crucible is weighed first. In that weighed porcelain crucible, two grams of sample are taken. This porcelain crucible containing samples is placed in an electric furnace and the temperature is steadily increased (550- 700°C) until the sample is carbon-free. Following that, it is cooled and weighed, and the Ash value in percentage of both experimental medications is calculated.

Result and discussion

Table 2: Results of evaluation parameters

Sr. No	Parameters	Result
Organoleptic Properties		
1	Color	Olive green
2	Odour	Characteristics
3	Taste	Astringent
4	Texture	Fine
5	Appearance	Powder
Phytochemical evaluation		
6	Alkaloides(Mayers test)	Positive
7	Saponin (Foam test)	Positive
8	Steriod & triterpenoids (Salkowsaki test)	Positive
9	Carbohydrate(Fehling test)	Positive
10	Flavonides (Lead acetate test)	Positive
Physico-chemical evaluation		
11	pH	6.07
12	Ash value	0.91
13	Moisture content	0.47%
Rheological Evaluation		
14	Bulk density	0.45 gm/ml
15	Foam	Good
16	Angle of repose	25.17 (good)
Patch Test		
17	Swelling	Negative
18	Redness	Negative
19	Irritation	Negative

Fig 1: Final appearance of prepared herbal tooth powder

Conclusion

The evaluated tooth powder demonstrates favorable organoleptic, phytochemical, physicochemical, and rheological properties, along with excellent safety profiles. The presence of bioactive compounds such as alkaloids, saponins, steroids, triterpenoids, carbohydrates, and flavonoids underscore its potential for oral health benefits. Its optimal pH, low moisture content, and good flow properties ensure stability and ease of use. The absence of adverse effects in patch tests confirms its suitability for safe application. These findings highlight the tooth powder's potential as a natural and effective oral care product. Future research, including clinical trials, will further substantiate its therapeutic claims and commercial viability.

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Conflict of interest

The author declared no conflict of interest.

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