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FORMULATION AND EVALUATION OF HERBAL BATH-BOMBS OF *CAMELLIA SINENSIS* POWDER

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ABSTRACT

A bath bomb is a formulation made for a fragrant and relaxing bath. A bath bomb is generally used for refreshing, soothing and aromatic baths. Although the name is ominous, the formulation is quite intriguing. Typically, ingredients used to make bath bombs include citric acid ($C_6H_8O_7$), sodium bicarbonate ($NaHCO_3$), tapioca starch, tartaric acid, and a variety of essential oils. The citric acid ($C_6H_8O_7$) and sodium bicarbonate ($NaHCO_3$) react in the presence of water to generate CO_2 gas, which also causes the scent in the mixture to change. Introducing therapeutic action like antibacterial and antimicrobial action in bath bombs is a novel idea. Adding green tea powder to the formulation gives it antimicrobial and antibacterial properties. The preliminary phytochemical screening was done to find out the active chemical constituents of the plants. A total 4 batches were formulated. The evaluation of bath bombs was carried out based on the parameters like: - physical appearance, determination of pH, determination of effervescent time and water temperature. And on basis of the results of these evaluation parameters the Batch-F3 was selected as the best batch out of the four. And the formulated bath bombs seemed to be effective.

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INTRODUCTION

Introduction to Bath-bombs:

A Bath bomb is a product invented for bathing purpose. MO. Constantine, a co-founder of Lush Cosmetics, invented and filed for a patent in 1989. It is a tightly packed mixture of wet and dry substances that has been molded into several shapes before drying. Bath water bubbles up at the top of a bath bomb submerged in it, dispersing additives like essential oils, moisturizers, scents, and colors [1, 2].

Composition of bath-bombs:

A bicarbonate base and a moderate acid are bath bombs' key ingredients. When dry these are inert, but when dissolved in water, they react vigorously to produce their distinctive fizzing for several minutes. Citric acid and sodium bicarbonate are transformed into sodium citrate and carbon dioxide in this acid-base reaction:

$$C_5H_7O_5CO_2H_{(aq.)} + NaHCO_{3(aq.)} \rightarrow C_5H_7O_5CO_2{-}Na^{+}_{(aq.)} + H_2O_{(l)} + CO_{2(g)}$$

Bath bombs' additional components might differ significantly. However, most also contain dye and fragrant details to give bathwater a pleasant scent and color [1, 2].

Potential health concern:

Many people tolerate bath bombs well, but somehow some additives, such as fragrances and dyes, can irritate the skin. Due to the significant dilution that occurs when the main ingredients, such as citric acid and sodium bicarbonate, are used as bath additives, they are typically not considered skin irritants [1, 2].

Introduction to green tea:

Green tea is made from the *Camellia sinensis* plant's leaves, and it is a member of the Theaceae family. Green tea's health benefits are attributed to its catechins, especially (-)-epigallocatechin-3-gallate. Studies on animals and in vitro have provided proof of the biological effects and underlying processes of green tea catechins. Green tea powder is used for the preparation of the bath bombs, which can be used for bathing [3- 5].

MATERIALS AND METHODS:

Collection of green tea leaves powder:

The green tea leaves were ordered online from the online website called palmtreeshopping.com. The leaves were grinded to get a fine powder which was passed under sieve.

Figure-1: Green tea leaves.

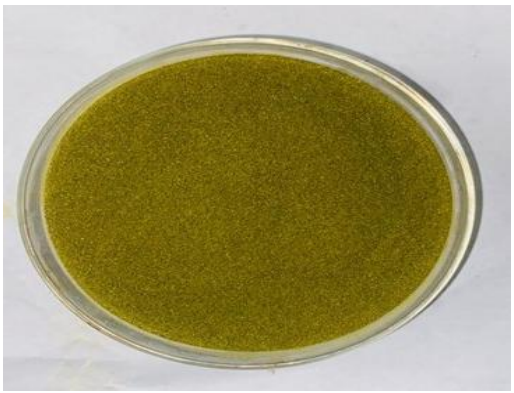

Figure-2: Green tea powder.

Plant profile:

***Camellia sinensis* plant:**

Figure-3: *Camellia sinensis* plant.

Description:

Camellia sinensis L. is a plant of the Theaceae family and Camellia genus, and it is commonly known as "Tea" or "Cha," evergreen shrubs, 1-3 m tall; shoots, tender leaves pilose. The leaves are elongated, oval, coriaceous, short-petiolate, lustrous, dark green, and coarsely serrated and have six–eight petals. The outer petals are sepaloid, and the inner petals are obovate to broadly obovate. There are numerous stamens 0.8-1.3 cm in length. Tea can be grown in moderate temperatures, acidic soils, and high humidity [6-8]. There are many health benefits linked to green tea. It is used for weight loss, cardiac health, arthritis, bone density, stress and theanine, antiviral properties, anti-carcinogenic properties, and metastasis of skin cancer, breast cancer, prostate Cancer etc. [5]

Botanical classification of green tea: [9-10]

- Kingdom Plantae – Plants.
- Subkingdom Tracheobionta – Vascular plants.
- Super division Spermatophyta – Seed plants.
- Division Magnoliophyta – Flowering plants.
- Class Magnoliopsida – Dicotyledons.
- Subclass Dilleniide Family Theaceae – Tea family.
- Genus Camellia L. – Camellia 18 Species *Camellia sinensis* (L.) Kuntze – Tea.

Phytoconstituents: [11-14]

The fresh leaves of Camellia sinensis typically contain 3-4% of methylxanthines, which are alkaloids that include caffeine, theobromine, and theophylline. Furthermore, there are distinctive amino acids like theanine and phenolic acids like gallic. Polyphenols, such as flavanols, flavan diols, flavonoids, and phenolic acids, are also present in green tea. Pigments 2%, Amino acids 4%, Minerals 5%, Epicatechin (EC) 6.4%, Lipids 7%, other carbohydrates 7%, Epicatechin–3–gallate (ECG) 13.6%, Protein 15%, Epigallocatechin (EGC) 19%,Fibre 26%, Phenolic compounds 30% etc are present.

Plant extraction process: [15]

Green tea extract was prepared using the decoction method. 15gm of green tea leaves were mixed in 300 ml of distilled water, and it was boiled for 15–20 minutes. The sample was then filtered through Whatman filter paper. Marc was pressed, and volume was adjusted; this filtrate is called decoction.

Figure-4: Green tea extract.

Preliminary phytochemical screening: [16-18]

Preliminary phytochemical analysis was done to find out the active chemical principle of particular plant.

1. **For Glycoside:-** Cardiac glycosides test: To 2ml of water filtrate was taken, into which 1ml of glacial acetic acid was added followed by 2 drops of ferric chloride, and 1ml of concentrated sulphuric acid. A brown ring at the interface suggested the presence of cardiac glycosides.
2. **For Flavonoids:-**5ml of diluted ammonia solution was added to the aqueous extract, followed by concentrated H_2SO_4. A yellow hue indicates the presence of flavonoids.
3. **For Terpenoids:-** A grey-colored solution indicates the presence of terpenoids. 2ml of chloroform was taken into which added 5ml of plant extract (which was then evaporated in a water bath). Next, 3ml of concentrated H_2SO_4 was added (which has been boiled on the water bath).
4. **For Tannins:-** Broine water test: 10 ml of bromine water was mixed with 0.5 gram of plant extract.
5. **For Saponins (Foam test):-** Each aqueous tea extract was diluted with 5ml of distilled water in a test tube. Saponins were detected by aggressively shaking the mixture for 2 minutes, observing the persistent appearance of foam for 5 minutes.
6. **For Phenol (Fecl3 test):-** 1 ml of 1% ferric chloride solution was mixed with 2 ml of aqueous tea extract. The appearance of blue or green colours confirms phenols.
7. **For Carbohydrates:-** Mixed aqueous extract with 5ml of 5% KOH solution. A canary colouration indicates the presence of starch.
8. **For Phlobatannins:-** HCl test: For the HCl test, 2ml of aqueous tea extract and 2ml and 1% HCl solution were mixed and boiled. A crimson precipitate indicates the presence of phlobatannins.

EXPERIMENTAL WORK:

Formulation:

Formulation table:

Sr. No.	INGREDIENTS	QUANTITY				ROLE
		F1	F2	F3	F4	
1.	Sodium Bicarbonate(gm)	22.5	21.5	20	19.5	Weak Base
2.	Citric Acid(gm)	12.5	11.5	10	9.5	Weak Acid
3.	Tartaric Acid(gm)	5	5	5	5	Stabilize product, adds volume and give uniform texture.
4.	Tapioca Starch(gm)	5	5	5	5	Binder
5.	Green Tea Powder(gm)	3	5	7	9	Antibacterial and antimicrobial
6.	Ylang-Ylang(ml)	3-5	3-5	3-5	3-5	Essential oil
7.	Water	Qs	Qs	Qs	Qs	Binds the Product

Figure-5: Formulation 1.

Figure-6: Formulation 2.

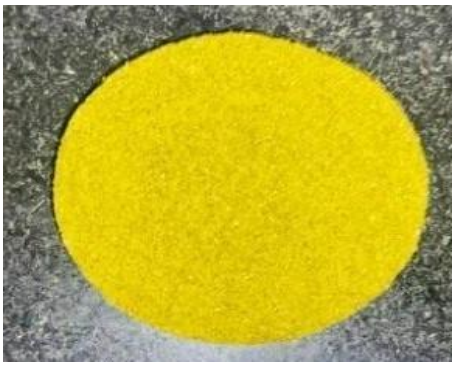

Figure-7: Formulation 3.

Figure-8: Formulation 4.

Preparation of Bath Bombs: [1,2]

1. Weigh all dry ingredients.
   - In the mortar, add sodium bicarbonate, citric acid, tartaric acid, tapioca starch, and green tea powder.
   - Mix all the dry ingredients with a pestle, and make sure that there are no clumps.
2. In the mortar, add 3-4 ml of ylan-ylang oil and a few drops of water, and mix all the dry and wet ingredients together.
3. Check the texture of the bath bomb mixture; squeeze a handful, and if it doesn't hold the shape, spray water onto the mixture. The texture should be similar to wet sand.
4. Then fill the moulds with the mixture by packing them tightly. Keep the mixture in moulds for about 5–10 minutes.
5. Turn the moulds over onto butter paper and gently push on the other side of mould to release the bath bombs. Let the bath bombs dry overnight.

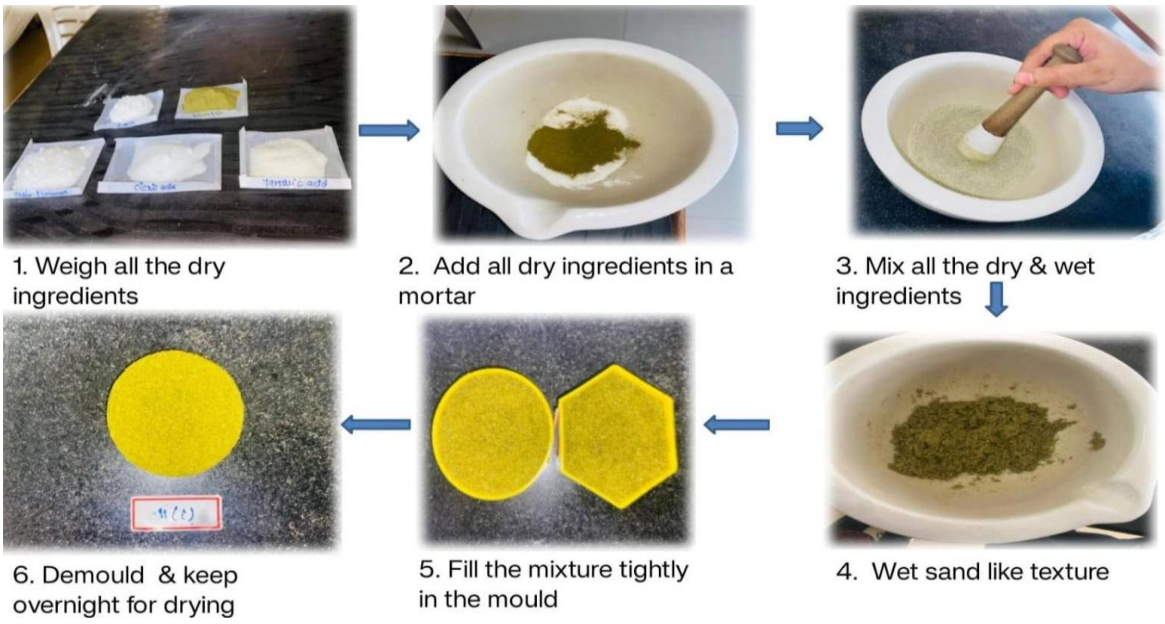

Figure-9: Preparation of Bath-bombs.

EVALUATION PARAMETERS OF HERBAL BATH-BOMBS: [1-2, 19]

1. Physical Appearance: The four samples of the bath-bombs were arranged, and their physical appearance was assessed.

2. Determination of pH: Sample pH analysis has been measured and compared. The bath bomb pattern was mixed with 150ml distilled water, and the pH of the design was measured. Likewise, samples without tapioca starch and Epsom salt were assessed.

3. Determination of effervescence: Time a bath bomb made up of only one component is placed, at room temperature, 150 ml of distilled water in a beaker. Every formulation's average four sizes must be stated. Bubbling time is over when a precise mixture devoid of effervescence is obtained.

4. Study of water temperature: Using a thermometer, gauge the temperature of various bath bomb samples. Keep track of and analyze sample temperatures precisely.

RESULTS:

Physical characteristics of extract *C. Sinensis* dried leaves:

Sr. No.	SOLVENT USED	PHYSICAL CHARACTERISTICS		
		COLOUR	CONSISTENCY	ODOUR
1.	Distilled water	Brownish golden	Aqueous liquid	Organic

Phytochemical Analysis of C. Sinensis:

TEST	RESULT
Test for Terpenoids	Positive
Test for Phenol ($FeCl_3$ Test)	Positive
Test for Carbohydrates	Positive
Test for Tannins	Positive
Test for Saponins	Positive
Test for Flavonoids (ammonia test)	Positive
Test for Glycosides	Positive
Test for Phlobatannins	Negative

Evaluated parameters of herbal bath-bombs; the obtained data is as below:

Sr. No.	FORMULATION	PHYSICAL APPEARANCE		pH	Effervescent time
		COLOUR	ODOUR		
1.	F-1 Batch	White green	Floral	5.64	1 min 24.89 sec
2.	F-2 Batch	Light green	Floral	5.55	27.12 sec
3.	F-3 Batch	Green	Floral	5.55	15.32 sec
4.	F-4 Batch	Dark green	Floral	5.72	36.54 sec

Water temperature:

The prepared formulation of bath bombs has been evaluated for water temperature, and the obtained data is as follows: The optimal temperature for your bath is between 104 and 112 °F, which is enough thermal energy for a regular bath bomb to start fizzing.

Stability Testing:

Samples of bath bombs were stored at room temperature for 2 weeks, and the modifications, if any, were noted.

- No significant modifications were observed.

DISCUSSION

The herbal bath bombs using *Camellia sinensis* were formulated and evaluated. *C. sinensis* leaves were used to formulate the herbal bath. The preliminary phytochemical screening was done to find out the active chemical constituents of the plants. Tests for glycosides, carbohydrates, tannins, phenols, etc. were done. A total of 4 batches were formulated using the green tea powder. After the preparation, the bath bomb of batch F3 was selected as the best batch based on the fact that it has the best effervescence in comparison to other batches. The evolution of bath bombs was carried out based on parameters like physical appearance, determination of pH, determination of effervescence, skin inflammation, and study of water temperature. Batch F3 was tested and passed almost all the criteria that were evaluated. Hence, the formulated bath bombs can be said to be effective.

CONCLUSION

Camellia sinensis was used in the formulation and assessment of the herbal bath bombs. Here, the herbal bath bombs were made using powdered C. sinensis leaves. To identify the plants' active chemical components, a preliminary phytochemical screening test was conducted. Tests were conducted for glycosides, carbohydrates, tannins, phenols, terpenoids, phlobatanins, and flavonoids. Formulations were created for four batches, and green tea powder was added. Due to its higher effervescence over the other batches, batch C's bath bomb was chosen as the best batch after preparation. Bath bombs were evaluated using parameters such as physical appearance, pH and effervescent measurement, and water temperature analysis. Hence, the formulated bath bombs can say to be effective.

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CONFLICT OF INTREST:

There is no conflict of interest, according to the authors.

ABBREVATIONS:

C. Sinensis – *Camellia sinensis*
Etc – Etcetera
Sr. No. – Serial Number
$FeCl_3$ – Ferric chloride
H_2SO_4 – Sulfuric acid
KOH – Potassium hydroxide
HCl – Hydrochloric acid
Sec – Seconds

REFERENCES

1. Pathak K, Vaidya A. A textbook of cosmetics science concepts and principles. 2nd ed. Pune: Nirali Prakashan; 2021.
2. Vimladevi M. Textbook of cosmetics. Reprint 2020 ed. New Delhi: CBS Publishers & Distributors; 2020.
3. Jugale P, Kadam A, Kadam A, Jetithor N, Kore P, Mohite S, et al. Preparation and Evaluation of Antifungal Bath Bomb of Ethanolic Extract of Betel Leaves. SGVU J Pharma Res Edu. 2020; 5(1): 465-70.
4. Darne CS, Maske MP, Gore PA, Baheti JR. Formulation and Evaluation of Antifungal and Muscle Relaxant Herbal Bath Bomb Containing Cinnamon Oil. Inter J Pharm Sci. 2023; 1(08): 1-1.
5. Shrivastava RR, Pateriya P, Singh M. Green Tea- A Short Review. Int J Indig Herb Drug. 2018; 3(2): 12-21.
6. Jigisha A, Nishant R, Navin K, Pankaj G. Green tea: A Magical Herb With Miraculous Outcomes. Int. Res. J. Pharm. 2012; 3(5): 139-48.
7. Kar S, Saloni S. Green Tea-Its Chemical Constituents and Health Benefits. Int J Eng Res Tech. 2016; 5(1): 565-569.
8. Sharma BD, Sanjappa M, editors with assistance from Balakrishanan NP. Flora of India. Volume 3. Calcutta: Botanical Survey of India; 1993.
9. Wiart C. Medicinal plants of the Asia-Pacific- Drugs for the Future. Singapore: World Scientific Publishing Co. Pte. Ltd; 2006.
10. Lockwood R, Van der Vossen, H.A. M and Wessel M, editors. Plant Resources of South-East Asia- stimulants. Netherlands: Backhuys Publishers; 2000.
11. Namita P, Mukesh R, Vijay KJ. Camellia sinensis (green tea): a review. Global J Pharmacol. 2012; 6(2): 52-59.
12. Sultan Z, Zafar M, Shahab S, Najeeb S, Naseem M. Green tea (Camellia Sinensis): Chemistry and Oral Health. Open Dent. J. 2016; 10: 3-10.
13. Musial C, Kuban-Jankowska A, Gorska-Ponikowska M. Beneficial Properties of Green tea Catechins. Int J Mol Sci. 2020; 21(5): 1744.
14. Zhao T, Li C, Wang S, Song X. Green tea (Camellia sinensis): A Review of its Phytochemistry, Pharmacology, and Toxicology. Molecules. 2022; 27(12): 3909.
15. Graham HN. Green tea composition, consumption, and polyphenol chemistry. Preventive medicine. 1992; 21(3): 334-350.
16. Yamamoto T, Juneja LR, Kim M. Chemistry and applications of green tea. New York: CRC press; 1997.
17. Agrawal SS, and Paridhavi M. Herbal drug technology. 2nd ed. Hyderabad: Universities Press (India) Private Limited; 2007.
18. Shaikh JR, Patil M. Qualitative tests for preliminary phytochemical screening: An overview. Int J Chem Stud. 2020; 8(2): 603-608.
19. Magoma GN. Phytochemical screening and antimicrobial studies of green, orthodox and black Kenyan tea. J Agri Sci Tech. 2014; 16(3): 82-93.
20. Kokate CK. Practical pharmacognosy.5th ed. Delhi: Vallabh Prakashan; 2013.
21. Thasni KS, Silpa VS, Sreekumar CN, Vandhana V, Gupta DP, Nazeer N. A Review on Formulation and Evaluation of Herbal Derived Bath Bomb. Int J Creative Res Thoughts. 2022, 10(4): 273-280.