

“Formulation And Evaluation Of Stress Relieving Chocolate Using Ashwagandha And Tulsi”

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ABSTRACT

Development and Evaluation of a Stress-Relieving Herbal Chocolate Containing Ashwagandha (*Withania somnifera*) and Tulsi (*Ocimum sanctum*)

Stress is a major health concern that adversely affects both physical and psychological well-being. Herbal medicines such as Ashwagandha (*Withania somnifera*) and Tulsi (*Ocimum sanctum*) have been extensively recognized for their adaptogenic, anxiolytic, and stress-relieving properties. However, the unpleasant taste of conventional herbal formulations often reduces patient acceptance and compliance. The present study aimed to formulate and evaluate a palatable herbal chocolate incorporating Ashwagandha and Tulsi extracts as a novel stress-relieving dosage form.

Hydroalcoholic extracts of Ashwagandha roots and Tulsi leaves were prepared using the Soxhlet extraction method. The extracts were incorporated into a chocolate base containing cocoa butter, cocoa powder, sugar, coconut oil, lecithin, vanilla, and corn starch. The prepared herbal chocolate was molded, cooled, and subjection demonstrated good handling characteristics, patient acceptability.

KEYWORD

**Ashwagandha (*Withania somnifera*),
Tulsi (*Ocimum sanctum*)
Herbal Chocolate
Stress Relief
Adaptogenic Herbs
Nutraceutical Formulation
Phytochemical Screening
Herbal Drug Delivery System
Antioxidant Activity
Anxiety Management
Functional Food
Soxhlet Extraction**

1.0 INTRODUCTION:

Stress

The idea of stress has become one of the central themes in modern biology, psychology, and medicine. Initially confined to biological sciences, the term has now extended into diverse domains such as psychology, physiology, sociology, and even environmental sciences. However, in its broad use, the word stress often carries overlapping meanings—sometimes used to describe the stimulus that causes stress (stressor), sometimes the biological or psychological response to it, and at other times the consequences or effects of this response. To clearly understand stress as a scientific concept, it is important to recognise how it has evolved and how modern frameworks define it.

Definition

“A real or perceived challenge to homeostasis, arising from internal or external stimuli (stressors), that triggers adaptive or maladaptive responses at the molecular, cellular, physiological, or psychological level.”

Modern Definition

Today, stress is more precisely understood as a state in which homeostasis (the body's internal balance) is challenged. This challenge may occur at a systemic level (involving the entire body, such as activation of the hypothalamic–pituitary–adrenal axis) or at a local level (for example, oxidative stress in a specific tissue).

- A specific stressor (like infection, trauma, or social conflict) may trigger localized stress in certain organs.
- If the intensity or duration of stress crosses a threshold, the body shifts to a systemic response—commonly involving the HPA axis, sympathetic nervous system, and endocrine mediators like cortisol.

This dual recognition of local vs. systemic stress provides a more flexible and realistic framework compared to earlier models. [1,2]

sequential physiological responses to stress and their consequences on health. GAS is divided into three distinct stages: the alarm reaction, the resistance stage, and the exhaustion stage. The alarm reaction stage represents the body's initial response to acute stress, characterized by activation of the sympathetic-adrenal-medullary (SAM) system and the hypothalamic–pituitary–adrenal (HPA) axis. This initiates the “fight-or-flight” response, leading to a surge of catecholamines and cortisol, which elevate heart rate, blood pressure, and energy availability. Following this acute phase, the body attempts to repair and stabilize itself by gradually lowering cortisol levels and normalizing vital functions such as heart rate and blood pressure. However, the heightened state of vigilance persists as long as the stressor remains present. If the stressful stimulus continues, the body transitions into the resistance stage, during which physiological systems adapt to maintain an elevated response to ongoing stress. Stress hormone levels remain above baseline, and the individual often experiences irritability, poor concentration, and frustration. While this stage allows temporary adaptation, prolonged activation taxes the body's regulatory systems.

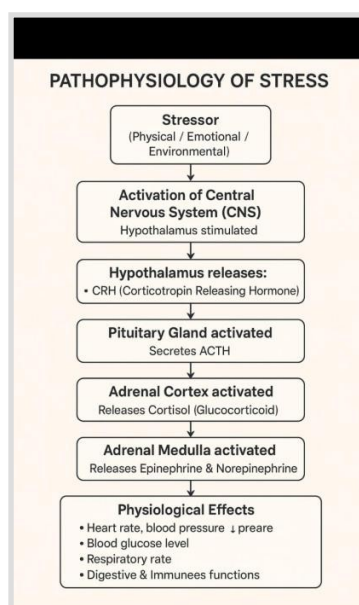


Figure No. 03 (Pathophysiology of Stress)

Eventually, if the stressor is not resolved, the body enters the exhaustion stage. Here, adaptive reserves are depleted, and the persistent elevation of stress hormones begins to exert harmful effects. Symptoms include fatigue, burnout, anxiety, depression, and a reduced ability to tolerate further stress. Immune suppression becomes prominent due to the inhibitory effects

of glucocorticoids on lymphocytes and cytokine production, increasing susceptibility to infections and reducing wound-healing capacity. At this stage, stress transforms from an adaptive mechanism into a pathological state. [10]

Stress relieving Chocolate formulation

In pharmaceutical development, medicated chocolate refers to a dosage form in which active drugs are incorporated into a chocolate base, allowing controlled release from the matrix. This delivery system is particularly suitable for pediatric patients due to its palatability and ease of administration. The present study aimed to prepare a Pediatric Herbal Chocolate using an aqueous extract of *Ocimum sanctum* (Tulsi) for its antitussive activity, and to evaluate its physicochemical properties for potential commercial application. In addition, the concept of herbal chocolate has been extended to address women's hormonal imbalances using plants such as *Vitex agnus-castus*, which may benefit conditions like polycystic ovarian syndrome (PCOS), ovulatory dysfunction, menopause, and infertility.

Chocolate-based herbal formulations provide multiple benefits as a drug delivery system. The chocolate matrix allows for enhanced patient compliance, particularly in children and individuals sensitive to bitter-tasting medications. [10,11]

Chocolate: A food product derived from cacao beans, often combined with sugar, milk, and fats, which can be adapted for various taste and texture experiences. In pharmaceutical applications, chocolate acts as an anhydrous medium that resists microbial growth and protects water-sensitive active compounds from degradation.

Medicated Chocolate: A dosage form in which an active pharmaceutical ingredient (API) or herbal extract is incorporated into a chocolate base to allow controlled drug release. This system improves patient compliance, particularly in pediatric patients, due to its palatability.

Herbal Chocolate: A type of medicated chocolate that contains herbal extracts or nutraceuticals, designed to deliver specific health benefits such as antitussive activity, hormonal balance, or stress management.

Chocolate is widely loved, especially among children, whereas conventional medicines are often poorly tolerated due to their taste. The primary objective of this study was to develop a medicated chocolate formulation incorporating *Ocimum sanctum* extract to provide

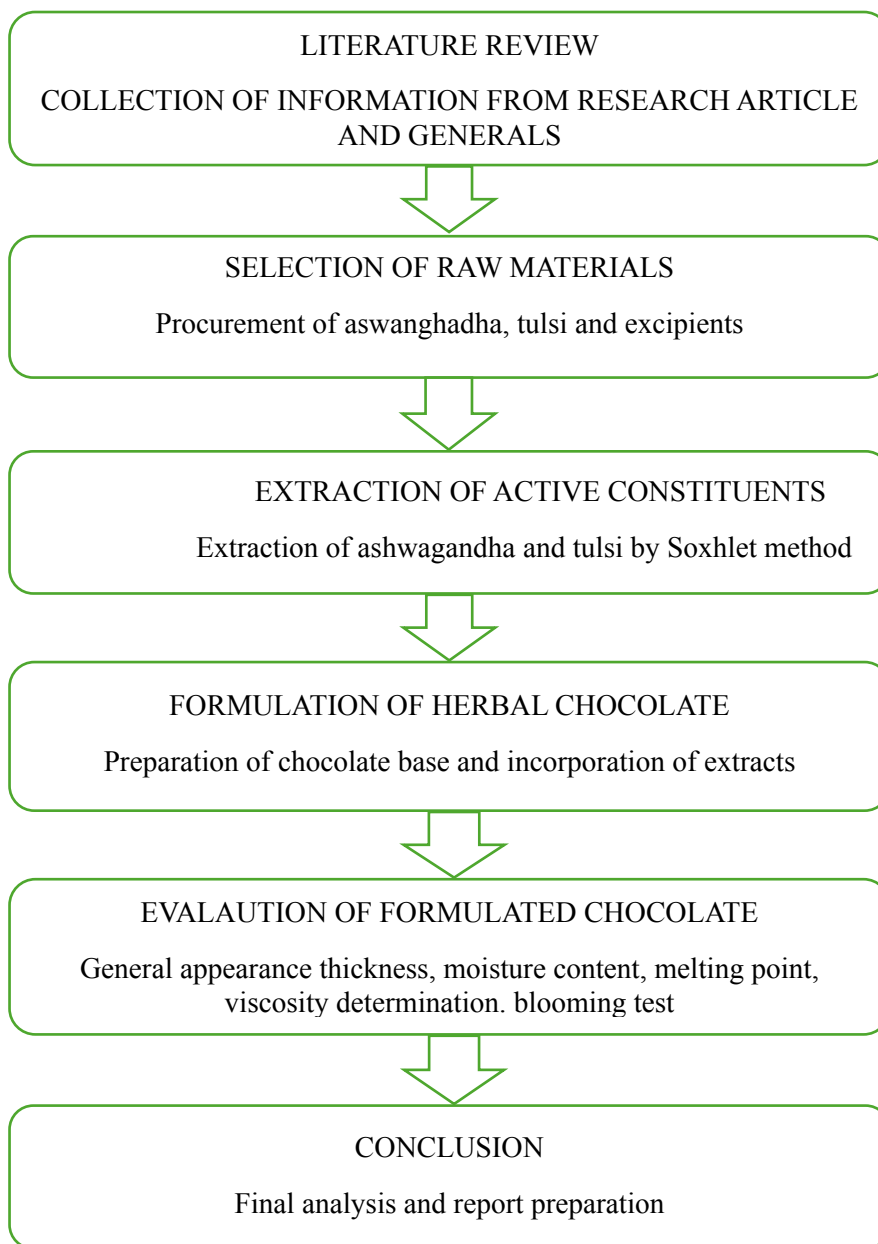
antitussive activity in pediatric patients. The prepared chocolate was evaluated for physicochemical characteristics, including appearance, dimensions, hardness, blooming, drug content, and physical stability. **Advantages of Medicated Chocolate**

- Chocolate consumption has been shown to stimulate serotonin production, promoting relaxation and improved mood.
- It provides rapid onset of action for incorporated drugs.
- Drug doses can be optimized, reducing the quantity of active ingredient needed.
- The chocolate matrix enhances drug-loading capacity.
- Medicated chocolate masks the bitter taste of many drugs, improving compliance, particularly in pediatric patients. [12]

Types of Chocolate

- **Milk Chocolate:** Primarily made using medium-roasted West African and Ecuadorian cocoa beans, milk chocolate offers a crisp, nutty flavor with subtle fruity notes. Care must be taken when adding more acidic beans from Malaysia or Brazil to maintain the creamy taste.
- **Light Milk Chocolate:** Characterized by a lighter color and creamy taste, light milk chocolate is produced using mildly roasted cocoa beans, sometimes combined with lightly roasted coffee beans, yielding a soft flavor suitable for coatings.
- **High-Quality Semisweet Chocolate:** Produced using light to medium-roast West African cocoa beans combined with beans from Caracas and Trinidad, this chocolate emphasizes subtle nutty and sweet-spice flavors while minimizing bitterness.
- **Bittersweet Chocolate:** Mainly used as a protective coating for extremely sweet or strongly flavored fillings, bittersweet chocolate has an intense, highly bitter profile.
- **Semisweet Cookies Drop:** Designed for cookie applications, this chocolate combines West African, Brazilian, and other high-quality beans to achieve optimal chocolate flavor and texture for baked goods. [11,12]

2.0 PLAN OF WORK:



3.0 LITERATURE REVIEW:

1. **Pagare et al. (2025)** Chocolate is one of the most widely consumed and enjoyed food products across all age groups, including children, adolescents, and elderly individuals. It is primarily produced from cocoa powder, blended with fats and sugar, resulting in a semi-solid or solid confectionary product. Traditionally, chocolate has been appreciated for its appealing flavor and texture; however, its excessive consumption has been associated with health concerns such as obesity, diabetes, hypertension, and cardiovascular disorders. Consequently, the development of functional or medicated chocolates has gained attention as a potential approach to combine taste with health-promoting benefits.
2. **Karade et al. (2025)** In recent years, there has been a significant global trend toward preventive healthcare and the consumption of functional foods, leading to the development of innovative nutraceutical products. Among these, pediatric herbal chocolates have emerged as a novel and promising delivery system that merges the enjoyable taste of chocolate with the therapeutic potential of herbal ingredients. Traditional herbal formulations are often rejected by children due to their unpleasant or bitter flavor, making chocolate a more suitable and palatable medium for delivering essential bioactive compounds.
3. **Choudhari et al. (2018)** Chocolate and cocoa products have long been valued not only for their pleasant taste but also for their potential health benefits. Over the years, chocolate has been explored as a promising vehicle for drug delivery, particularly in pediatric formulations. Many conventional drugs possess an inherently bitter taste, leading to poor patient compliance among children. To address this limitation, researchers have investigated the development of chocolate-based dosage forms, which combine therapeutic efficacy with high palatability.
4. **Jain et al. (2021)** Herbal chocolate — a functional food that combines traditional herbal actives with chocolate as the delivery vehicle — is emerging as a convenient, palatable way to administer phytomedicines. Chocolate itself contains bioactive compounds (notably cocoa flavonoids, methylxanthines and tryptophan-related precursors) that have been associated with short-term mood elevation and modulation

of physiological stress markers, which makes it an attractive base for stress-relief formulations.

5. **Ravinder et al.** Developmemt of a brain boosting herbal chocolate formulation containing aswanghadha, shatavari, brahmi, almond, and tulsi enhance memory and metal health.
6. **Karande et al.** Herbal chocolate formualation for children with immune boosting and digestive herbs shows good stability and sensory appeal, no specific participants or study number mentioned.
7. **Gore et al.** Formulation and evaluation of multivitamin and antioxidant herbal chocolate containing Ocimum sanctum, zeylalicum, cinnmomum, Elettaria cardamoum, moringa oilfera, beta vulgaris, sachharum officinarum, Theobroma cacao.
8. **Yash et al.** Herbal chocolate formulation with maca powder effectively delivers benefits for hormonal imbalance in women preliminary testing conducted.
9. **Kushwah and Jaisawal** Herbal chocolate formulation using aswanghada show promise for addressing hormonal imbalances with favorable consumer acceptability and stability, further clinical evaluation are needed to validate therapeutic efficacy.
10. **Shelke et al.** Herbal chocolate formulation for hormonal imbalance in women were developed and evaluated based on physical and chemical properties no clinical findings or participant data are mentioned.

4.0 SELECTION AND EXTRACTION OF HERBS:

Ashwagandha



Figure No. 01 (Ashwagandha (*Withania somnifera*))

Parameter Details [13,14]

Table No. 01

<i>Biological source</i>	Dried roots of <i>Withania somnifera</i> (L.) Dunal
<i>Botanical name</i>	<i>Withania somnifera</i> (L.) Dunal
<i>Family Common names</i>	Solanaceae
	Ashwagandha, Indian ginseng, Winter cherry
<i>Part used</i>	Root (main), also leaves, fruits, seeds
<i>Geographical source</i>	Widely distributed in India, Pakistan, Sri Lanka, Mediterranean regions, Africa, Canary Islands, and Australia
<i>Indian distribution</i>	Grown in Madhya Pradesh, Rajasthan, Punjab, Gujarat, Uttar Pradesh
<i>Cultivation</i>	Dry subtropical climate, sandy loam/light red soil; propagated by seeds; harvested in winter (150–180 days after sowing)

5.0 PROCEDURE:

A. Sample Collection and Preparation

Fresh root samples of Ashwagandha (*Withania somnifera*) and leaf samples of Tulsi (*Ocimum sanctum*) were collected from the local market (e.g., Hyderabad, Pakistan). Each plant sample (10 g) was cleaned thoroughly to remove soil particles, dust, and other impurities. The cleaned materials were then shade-dried at room temperature to preserve the phytoconstituents and prevent thermal degradation. Once dried completely, the Ashwagandha roots and Tulsi leaves were separately ground into fine powder using a mechanical grinder. The powdered material was passed through a 1 mm sieve to obtain a uniform particle size suitable for extraction. [27]



Figure No. 06 (Fresh root sample of Ashwagandha and leaf sample of Tulsi)

B. Selection of Solvent

A hydroalcoholic solvent system consisting of ethanol and water in a 70:30 ratio (v/v) was selected as the extraction medium because this combination efficiently extracts both polar and moderately nonpolar phytochemicals such as alkaloids, flavonoids, and glycosides. For each extraction, 150 ml of this solvent was used to ensure sufficient solvent-to-sample contact for complete leaching of bioactive compounds. [28]



Figure No. 07 (Beaker containing hydroalcoholic solvent – ethanol + water mixture)

C. Soxhlet Extraction Setup

The powdered Ashwagandha and Tulsi samples were separately packed into cellulose thimbles. Each thimble was carefully placed in the Soxhlet extractor chamber. The extraction solvent (150 ml of ethanol-water mixture) was poured into a round-bottom flask, which was connected to the Soxhlet apparatus below the chamber. A reflux condenser was fitted on top of the apparatus to cool and condense the solvent vapors continuously. This setup ensured a closed-loop operation, preventing solvent loss and maintaining constant reflux conditions throughout the extraction. [29]



Figure No. 08 (Soxhlet setup)

D. Extraction Process

The round-bottom flask containing the hydroalcoholic solvent was heated gently using a heating mantle. As the solvent began to boil, the vapors rose through the side arm.

Soxhlet apparatus and entered the condenser, where they condensed back into liquid form. The condensed solvent then dripped into the extraction chamber containing the plant material. The solvent gradually filled the chamber, dissolving the phytoconstituents from the powdered Ashwagandha and Tulsi.

Once the solvent level reached the top of the siphon tube, it automatically siphoned back into the distillation flask, carrying the dissolved phytochemicals with it. This process of boiling, condensation, percolation, and siphoning continued cyclically for 6 hours, ensuring repeated washing and exhaustive extraction of the active compounds from the plant materials. [30]



Figure No. 09 (Solvent reached Siphon tube)

E. Re-Extraction to Ensure Completeness

After the completion of the first extraction cycle, the residue (marc) from both Ashwagandha and Tulsi was re-extracted twice under the same conditions using fresh portions of the hydroalcoholic solvent. This repeated extraction ensured that no phytochemicals remained unextracted and maximized the recovery of bioactive constituents such as withanolides from Ashwagandha and eugenol, ursolic acid, flavonoids from Tulsi. [31,32]



Figure No. 10 (Extracted Material)

F. Filtration

The combined extracts obtained from each re-extraction cycle were filtered separately using Whatman No. 5 filter paper to remove coarse particles and insoluble residues.

The clear filtrates containing dissolved phytoconstituents were collected in clean beakers for further processing.

G. Solvent Evaporation

The filtered hydroalcoholic extracts were concentrated using a rotary evaporator maintained at 60°C under reduced pressure.

The reduced pressure helps remove excess solvent gently without exposing the extract to high temperatures, preventing thermal degradation of the thermolabile bioactive compounds.

This process yielded a concentrated crude extract of Ashwagandha and Tulsi. [31,33]

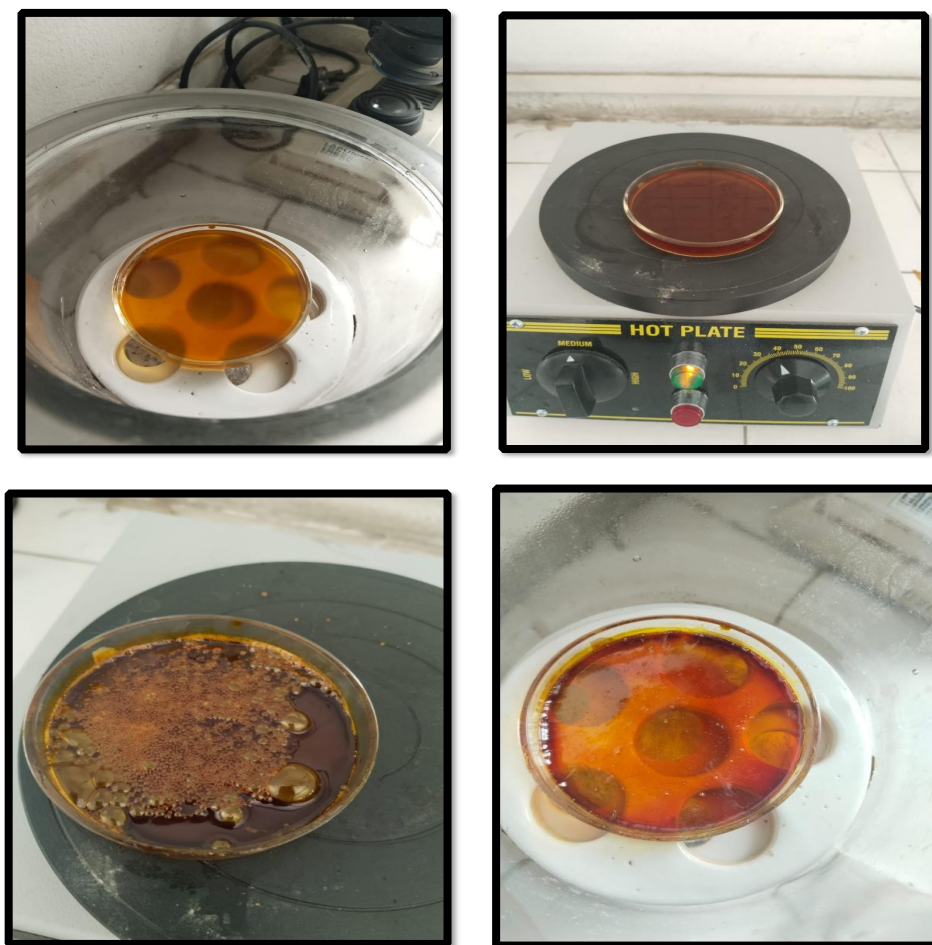


Figure No. 11 (Solvent Evaporated)

H. Storage of Extracts

The dried crude extracts were carefully transferred into sterile amber-coloured glass bottles to protect them from light and oxidative damage. The bottles were tightly sealed and stored at – 8°C until further phytochemical, antioxidant, or pharmacological evaluation. [34]

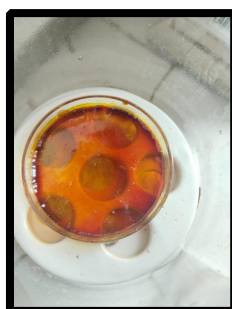


Figure No. 12 (Extract)

Procedure for chocolate formulation :**Table No. 02 (Formula)**

Ingredients:	quantity	Role of ingridients
Cocoa butter	2gm	Main fat base giving texture and structure.
Edible coconut oil	3ml	Softens and aids smooth melting.
Cocoa powder	10gm	Adds flavor, color, and antioxidants.
Sugar	20gm	Sweetens and masks bitterness.
Vanilla	q.s. (as required for flavor)	Enhances aroma and taste.
Lecithin	0.5 gm	Emulsifier for uniform mixing.
Ashwagandha extract	0.3 g	Acts as stress reliever.
Tulsi extract	0.2 g	Boosts immunity and prevents infection.
corn starch	5 g	Provides thickness and stability.

Procedure:-**1. Preheating of Water bath**

The water bath was preheated and maintained at 50°C to ensure uniform heating during the preparation of the chocolate base.



Figure No. 13 (Water Bath)

2. Preparation of Sugar Syrup:

- A clean beaker was taken, and 20 g of sugar was mixed with a small quantity of purified water (enough to dissolve it).
- The beaker was placed in the preheated oven for 4–5 minutes until a clear syrup formed.
- The syrup was stirred occasionally to prevent crystallization and achieve a smooth consistency. [35,36]

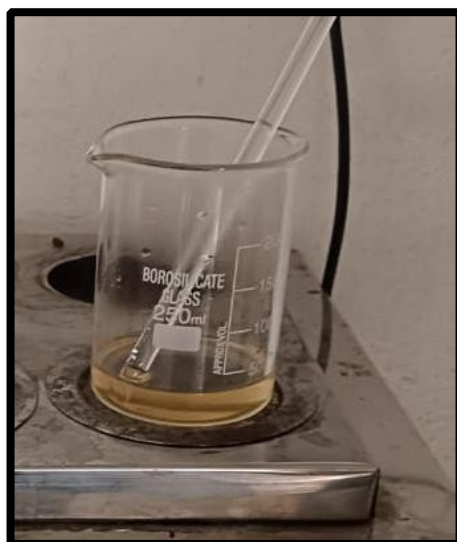


Figure No. 14 (Sugar Syrup)

3. Melting of Fat Base:

- In another beaker, 2 g of cocoa butter and 3 ml of edible coconut oil were added.
- The beaker was placed in the oven for 1–2 minutes until both fats melted completely to form a clear liquid.
- The mixture was removed and allowed to cool slightly (around 40–45°C) to avoid overheating. [37]



Figure No. 13 (Melted fat base)

4. Addition of Cocoa Powder:

- 10 g of cocoa powder was gradually added to the melted fat mixture while stirring continuously.
- The mixing was continued until a smooth, lump-free chocolate paste was obtained.

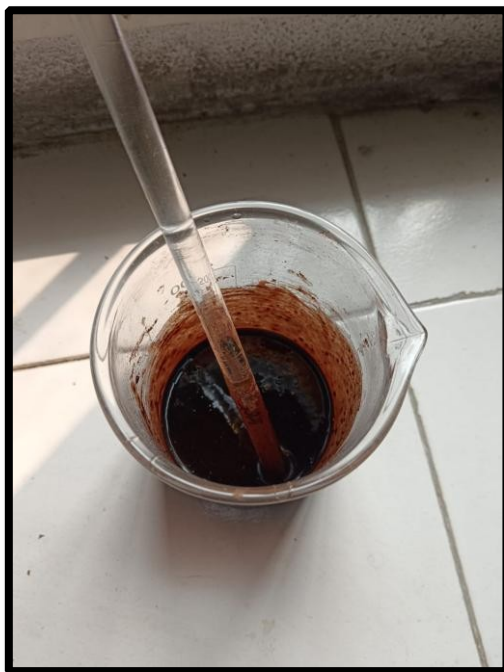


Figure No. 15 (cocoa powder added)

5. Incorporation of Corn Starch and Sugar Syrup:

- 5 g of corn starch was slowly added to the chocolate mixture and mixed thoroughly to improve body and texture.
- The prepared sugar syrup was then added gradually with constant stirring to ensure complete blending of the aqueous and fat phases.

6. Addition of Lecithin and Vanilla:

- 0.5 g of lecithin was added as an emulsifier to achieve uniform dispersion of ingredients and to prevent separation of fat and solids.
- A few drops of vanilla essence were added to enhance aroma and taste. [38,39]

7. Incorporation of Medicinal Powders:

- The accurately weighed Ashwagandha powder (0.3 g) and Tulsi powder (0.2 g) were finely sieved and added slowly to the warm chocolate base.
- The entire mixture was stirred continuously using a magnetic stirrer for 5–10 minutes to ensure even distribution of the herbal powders throughout the chocolate mass.

8. Molding:

- The uniform medicated chocolate mixture was poured carefully into clean, dry molds of desired size and shape.
- The molds were gently tapped to remove any trapped air bubbles.



Figure No. 16 (Chocolate Molding)

6. OBSERVATION:**Table No. 03 (Observation table)**

S. No.	Constituent Tested	Name of Test	Observation / Expected Result
1	Alkaloids	Dragendorff's Test	Formation of reddish-brown precipitate confirms presence of alkaloids.
		Mayer's Test	Appearance of cream or yellow precipitate indicates alkaloids.
		Wagner's Test	Formation of reddish-brown precipitate confirms alkaloids.
2	Flavonoids	Alkaline Reagent Test	Intense yellow color appears, which disappears on addition of dilute HCl.
		Shinoda Test (Mg–HCl Test)	Pink to crimson red coloration confirms flavonoids.
3	Saponins	Foam Test	Persistent foam formation after shaking indicates saponins.
		NaHCO ₃ Test	Stable honeycomb-like froth confirms saponins.
4	Steroids / Triterpenoids	Liebermann–Burchard Test	Bluish-green color indicates steroids or triterpenoids.
		Salkowski Test	Reddish-brown color in lower chloroform layer indicates steroids.

5	Phenolics / Tannins	Ferric Chloride Test	Blue-black or green coloration confirms tannins/phenolics.
		Gelatin Test	White precipitate forms, indicating tannins.
6	Glycosides	Borntrager's Test	Pink or red coloration in ammoniacal layer confirms anthraquinone glycosides.
		Keller–Killiani Test	Blue or green color in upper acetic acid layer indicates cardiac glycosides.

7. EVALUATION TEST:

1. General Appearance / Organoleptic Characteristics

Objective:

To evaluate the overall physical and sensory characteristics of the medicated chocolate formulation.

Procedure:

1. Each chocolate formulation was visually inspected under daylight.
2. The color, shape, and surface texture were observed to ensure uniformity.
3. The odor was checked by gently smelling the sample to detect any unpleasant or rancid smell.
4. The taste was evaluated by a small portion to check sweetness, bitterness, or presence of any off-taste.
5. The texture was analyzed by gently touching and breaking the sample to assess smoothness, brittleness, or softness.
6. Observations were recorded for each parameter, ensuring all batches showed uniform appearance and acceptability.[46,47]

2. Determination of Viscosity

Objective:

To measure the flow property of the melted medicated chocolate using a digital viscometer.

Procedure:

1. Approximately 25 g of medicated chocolate was melted at $40 \pm 2^{\circ}\text{C}$ using a water bath.
2. The melted sample was transferred into a clean beaker.
3. The spindle of a Viscolead Digital Viscometer was dipped into the melted chocolate.

4. The instrument was set at a constant rotational speed (e.g., 50 rpm).
5. The viscosity was noted in centipoise (cP) at room temperature.
6. The test was repeated thrice and the average value was recorded. [47]

3. Weight Variation Test

Objective:

To ensure uniform distribution of weight among different chocolate units in a batch.

Procedure:

1. As per USP guidelines, five chocolates from each batch were randomly selected.
2. Each piece was individually weighed using an analytical balance.
3. The average weight of all pieces was calculated.
4. The percent deviation for each sample from the average was computed using the formula:

$$\% \text{Deviation} = \frac{\text{Individual Weight} - \text{Average Weight}}{\text{Average Weight}} \times 100$$

5. The deviation was compared with the permissible limits specified in the pharmacopeia. [47,48]

4. Moisture Content

Objective:

To determine the amount of moisture retained in the medicated chocolate formulation.

Procedure:

1. About 2 g of the sample was accurately weighed and placed in a pre-weighed moisture dish.
2. The dish was kept in a hot air oven at 105°C for 2 hours.

3. The dish was removed, cooled in a desiccator, and weighed again.
4. The drying was continued until a constant weight was obtained.
5. The % moisture content was calculated using the formula:

$$\text{Moisture Content (\%)} = \frac{W_1 - W_2}{W_1} \times 100$$

where,

W_1 = weight of sample before drying, W_2 = weight of sample after drying. [42,47]

5. Thickness / Dimensions

Objective:

To determine the uniformity in the thickness of medicated chocolates.

Procedure:

1. Five chocolate pieces were selected randomly from each batch.
 2. The thickness and diameter were measured using a Vernier Caliper.
 3. Each measurement was taken at three different points and the mean value was calculated.
 4. Results were expressed in millimeters (mm) and compared among batches.
- [48]

6. Hardness Test

Objective:

To determine the resistance of chocolate to mechanical stress or breaking force.

Procedure:

1. Five chocolates from each batch were randomly selected.
2. The hardness of each sample was measured using a Pfizer Hardness Tester.

8. RESULT AND DISCUSSION:

The phytochemical analysis confirmed that alkaloids, flavonoids, saponins, phenolics, steroids/triterpenoids, and glycosides were present in the herbal extract used in the formulation. This indicated that the active constituents responsible for adaptogenic and anti-stress activity were stable after being incorporated into the chocolate base.

The formulated herbal chocolate was found to exhibit a uniform appearance, smooth texture, and pleasant taste, which was suitable for improving consumer acceptability. The weight variation, thickness, viscosity, and hardness values were within acceptable limits, indicating that the manufacturing process was well-controlled and consistent.

Table No. 04 (Result of Evaluation Parameters)

S.No.	Parameter	Observed Result	Remark
1	General Appearance	Smooth, uniform surface, brown colour, pleasant chocolate aroma, acceptable sweet taste	Acceptable
2	Viscosity (Melted sample)	~ 420 - 470 cP	Within suitable flow range
3	Weight Variation	Individual weight ranged 2.8 - 3.2 g; deviation within $\pm 5\%$	Within acceptable limit
4	Moisture Content	~ 1.8 - 2.4 % w/w	Low moisture, good stability
5	Thickness/ Dimensions	~ 4.5 - 5.2 mm	Uniform
6	Hardness	~ 5.5 - 6.8 kgf	Adequate mechanical strength
7	Melting Point	~ 33 - 35°C	Compatible with body temperature
8	Blooming Test	No fat or sugar bloom observed during test	Stable

S.No.	Parameter	Observed Result	Remark
9	Physical stability (30 Days)	No change in colour, odour, hardness, or surface	Stable formulation

DISCUSSION: The herbal antistress chocolate formulation was successfully prepared, and its physical and organoleptic characteristics were found to be uniform and acceptable. The phytochemical screening confirmed the presence of alkaloids, flavonoids, saponins, tannins, steroids, and glycosides, which are known to possess antistress and adaptogenic activities. The viscosity of the melted chocolate was found to be in the range of 420–470 cP, indicating smooth meltability and easy processability. The weight variation test showed deviations within $\pm 5\%$, suggesting uniform filling and proper molding. The moisture content remained low (1.8–2.4%), indicating reduced chances of microbial growth and improved shelf stability. The hardness values (5.5–6.8 kgf) suggested adequate mechanical strength for handling and packaging. The melting point (33–35°C) confirmed that the product melts near body temperature, ensuring desirable mouthfeel. Neither fat bloom nor sugar bloom appeared during the blooming test, and no physical changes occurred during stability study, confirming that the formulation was physically stable over the storage period. Overall, the evaluation results demonstrated that the herbal chocolate formulation was stable, palatable, and pharmaceutically acceptable for delivering antistress herbal actives in an enjoyable dosage form.

9. SUMMARY AND CONCLUSION:

Summary: The present research work was undertaken to formulate and evaluate an anti-stress herbal tablet containing extracts of Ashwagandha and Tulsi. Both herbs were selected for their well-documented adaptogenic, antioxidant, and stress-relieving properties. The study was designed to develop a convenient solid dosage form that could deliver these herbal actives effectively and improve patient compliance. The extracts of Ashwagandha and Tulsi were subjected to preliminary phytochemical screening, which confirmed the presence of alkaloids, flavonoids, phenolics, saponins, glycosides, and steroids—compounds known to contribute to stress reduction and nervous system support. The tablets were prepared by the wet granulation method using suitable excipients to achieve good compressibility and uniformity. The granules were evaluated for flow properties such as angle of repose, bulk density, and compressibility index, all of which were found within acceptable ranges. The finished tablets were evaluated for physical parameters including weight variation, thickness, hardness, friability, disintegration time, and moisture content. All results were found to comply with pharmacopeial specifications. The prepared tablets exhibited smooth surface, uniform color, and acceptable mechanical strength. The disintegration time was within 10–15 minutes, and the moisture content was low, ensuring good stability. These results indicated that the formulation process was optimized and the herbal actives remained stable after compression.

Conclusion: The study concluded that the anti-stress herbal tablet containing Ashwagandha and Tulsi extracts was successfully formulated and evaluated with satisfactory physicochemical characteristics. The phytochemical constituents retained their integrity, suggesting that both herbs were compatible with the excipients used. The developed tablets were found to be stable, uniform, and pharmaceutically acceptable. The combination of Ashwagandha and Tulsi provided synergistic adaptogenic and antioxidant benefits, helping to manage stress naturally. Thus, the formulation offered a safe, effective, and convenient herbal approach for stress relief.

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