

Design and Development of Herbal Chocolate “Chococycle – Where Cravings Meet Care” For Female Hormonal Balance

Supriya Londhe¹, Sakshi Rakunde², Pratiksha Patil², Rutuja Patil², Sakshi Patole², Prachi Kadam², Prerna Deshmukh², Dr. S. V. Patil³

¹Assistant Professor, Adarsh College of Pharmacy Vita.

²Student, Adarsh College of Pharmacy Vita.

³Associate Professor, Adarsh College of Pharmacy Vita.

Corresponding Author:

Supriya Londhe Email: supriyalondhe25@gmail.com

Abstract:

“Chococycle” was developed as a herbal chocolate formulation intended to provide a convenient food-based approach for supporting women’s health and hormonal balance. The formulation incorporated Shatavari, Ashoka, Lodhra, Amla, and Licorice powders, selected on the basis of their traditional use and reported biological properties. The herbal powders were sieved, accurately weighed, incorporated into melted chocolate with continuous mixing, and transferred into silicone molds for setting. The prepared formulations were subjected to preliminary evaluation, including organoleptic assessment, stability testing, weight variation, hardness, blooming, and pH determination. The obtained observations indicated that the selected herbal ingredients could be incorporated into the chocolate matrix while maintaining acceptable physical and sensory characteristics. Further studies are required to establish efficacy, safety, and long-term stability.

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Introduction:

Hormones are chemical messengers produced by specialized endocrine glands and transported through the bloodstream to target tissues. They regulate numerous physiological functions, including maintenance of internal balance, energy utilization, growth and development, and reproduction.

- 1.Maintaining internal balance
- 2.Managing the body’s energy needs.
- 3.Growth and development
- 4.Reproduction

Without hormones, these processes would not happen properly. Each hormone is produced by a specific gland and works on specific target organs. When a hormone is released, it travels through the blood and produces its effect in different parts of the body. The study of hormones also includes understanding diseases that occur when hormone levels become too high or too low. There are many endocrine disorders, and research in this area is still continuing. Understanding how hormones normally function helps doctors identify and treat hormonal diseases correctly.[1]

Major Hormones and Their Functions

1.Pituitary Gland (Master Gland):This gland controls many other glands in the body.

- TSH (Thyroid Stimulating Hormone): Tells the thyroid gland to make thyroid hormones.
- ACTH: Tells adrenal glands to produce cortisol (stress hormone).

- Growth Hormone (GH): Helps the body grow, especially bones and muscles.
- FSH & LH: Control reproduction and sex hormone production.
- Prolactin: Helps in breast milk production.
- Oxytocin: Helps during childbirth and milk release.
- ADH (Vasopressin): Controls water balance in the body by acting on kidneys.

2. Thyroid Gland

- Thyroxine (T4) & Triiodothyronine (T3): Control body metabolism and energy level.
- Calcitonin: Helps reduce calcium level in blood.

3. Adrenal Glands

- Cortisol: Helps manage stress, controls metabolism, blood pressure, and inflammation.

4.Pancreas

- Insulin: Decreases (lowers) blood sugar level.
- Glucagon: Increases (raises) blood sugar level.

5. Reproductive Glands (Ovaries and Testes)

- Estrogen: Helps in female body development and controls the menstrual cycle.
- Progesterone: Prepares the uterus for pregnancy.

- Testosterone: Helps in male body development and sperm production.[2,3,4]

Hormonal Imbalance

Hormonal imbalance refers to an abnormal increase or decrease in the concentration of one or more hormones. Because endocrine hormones participate in the regulation of several physiological processes, alterations in their levels may affect normal body functions. Such changes can arise from dysfunction of endocrine organs, including the pituitary, thyroid, pancreas, adrenal glands, ovaries, and testes.

Causes of Hormonal Imbalance

- Gland Problems – If endocrine glands do not function properly (like thyroid problems).
- Chronic Stress – Long-term stress increases cortisol (stress hormone).
- Poor Diet & Lifestyle – Junk food, lack of exercise, poor sleep.
- Medical Conditions – PCOS, diabetes, thyroid disorders.
- Tumors – Growth in glands may affect hormone production.

Introduction of Herbs

1. Shatavari

Botanical Name: *Asparagus racemosus*

Family: Asparagaceae

Part Used: Root



Fig.1. Shatavari Roots

Shatavari is derived primarily from the roots of *Asparagus racemosus* and has a long history of use in Ayurvedic practice. It is traditionally regarded as a supportive herb for women's reproductive health and is also associated with general restorative and adaptogenic uses. The plant is commonly known as satavar or satavari and has been used in Indian traditional medicine for generations.

2. Ashoka

Botanical Name: *Saraca asoca*

Family: Caesalpinaceae

- Pregnancy, Puberty, Menopause – Natural hormonal changes.

Symptoms of Hormonal Imbalance: Common Symptoms (Both Men and Women)

- Fatigue (tiredness)
- Weight gain or weight loss
- Mood swings
- Anxiety or depression
- Sleep disturbances
- Hair fall
- Skin problems (acne, dryness)
- Irregular periods
- Heavy bleeding
- PCOS symptoms
- Infertility
- Hot flashes (during menopause)

Common Disorders Caused by Hormonal Imbalance

- Thyroid disorders (Hypothyroidism / Hyperthyroidism)
- Diabetes (Insulin imbalance)
- PCOS

Part Used: Bark



Fig.2. Ashoka Bark

Ashoka (*Saraca asoca*) is a medicinal tree traditionally used in Ayurveda and is particularly associated with women's health. The bark contains several classes of phytoconstituents, including glycosides, flavonoids, tannins, and saponins. Traditional applications include use as a uterine tonic and in menstrual disorders. Reported pharmacological activities have also contributed to continued interest in this plant as a herbal medicinal ingredient. [13–16]

3. Lodhra

Botanical Name: *Symplocos racemosa*

Family: Symplocaceae

Part Used: Bark



Fig.3.Lodhra Bark

Lodhra (*Symplocos racemosa*) is a small evergreen tree found in tropical and subtropical regions. Its stem bark is the principal part used in traditional preparations, although other plant parts have also been described in traditional practice. In Ayurveda, Lodhra is commonly associated with women's reproductive health and is traditionally used as a supportive female tonic. Its broader traditional applications include digestive, skin, and inflammatory-related uses.

4. Licorice

Botanical Name: *Glycyrrhiza glabra*

Family: Fabaceae

Part Used: Bark



Fig.4.Licorice Bark

Licorice (*Glycyrrhiza glabra*) is a medicinal plant with a long history of traditional use. Its reported biological activities include antioxidant, anti-inflammatory, antimicrobial, and potential hormone-modulating effects. Experimental research has investigated its influence on androgen-related pathways and reproductive parameters, including in models of PCOS. These findings provide a rationale for further investigation, although clinical efficacy

should not be inferred from preliminary or experimental evidence alone.

5. Amla

Botanical Name: *Emblica officinalis*

Family: Phyllanthaceae

Part Used: Fruit



Fig.5.Amla fruit

Amla consists of both fresh and dried fruits of the plant *Emblica officinalis*, also known as *Phyllanthus emblica* Linn, which belongs to the family Euphorbiaceae. Amla is a small to medium-sized tree widely distributed in the deciduous forests of India. Amla is therefore a key component of the traditional Ayurvedic preparation Chyawanprash which is believed to delay ageing and promote longevity. Amla is one of the most commonly used ingredients in Ayurveda. It serves as both a food and a medicine and offers numerous health benefits. The term “amla” means sour, which reflects its main taste. In Ayurveda, amla is regarded as a powerful Rasayana (rejuvenating agent) and an immunity enhancer. It is rich in vitamin C and polyphenols.[19]

Materials and Equipments

1. Herbal Ingredients (Powder Form)

1. Ashoka powder (*Saracaasoca*)
2. Shatavari powder (*Asparagus racemosus*)
3. Amla powder (*Emblicaofficinalis*)
4. Lodhra powder (*Symplocosracemosa*)
5. Licorice powder (*Glycyrrhizaglabra*)

2 .Base Ingredients

1. Dark chocolate
2. milk chocolate

Equipments:

1. Mixing bowl
2. Spoon or spatula
3. Weighing balance
4. Gas burner
5. Sieve
6. Chocolate molds
7. Refrigerator

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8. Butter paper or foil
9. Knife



Fig.6. Ingredients and mould

Method of Formulation of Herbal Chocolate:

1. Sieving the powders

Sieve ingredients Shatavari, Ashoka, Lodhra, Licorice, Amla using fine mesh sieve.

2. Weighing ingredients

Using analytical weighing balance weigh required quantity of all ingredients.

3. Melting of base

Set a heat-safe bowl over a pot with a small amount of gently simmering water, ensuring the bowl sits above the water without touching it.

Place the chocolate in the bowl and stir steadily with a rubber spatula until it melts into a smooth, uniform consistency.

Stir continuously during melting to prevent overheating.

4. Addition of herbal components

After melting the chocolate base completely lower the heat.

Gradually mix the herbal powders one by one with continuous stirring into melted chocolate base.

5. Molding and setting

Transfer the prepared mixture into suitable molds. Lightly tap the mold to eliminate trapped air bubbles. Allow the mixture to solidify by refrigerator for two hours.

6. Removal and Storage

Carefully remove the chocolate from molds.

Store the chocolate in dry place or at cool place. [20]

Formulation Table

Table No.1: Formulation

Sr. No.	Ingredients	Quantity (10 gm)	Quantity (50 gm)	Quantity (100 gm)	Role

1.	Shatavari	0.80gm	1.5gm	2gm	Hormonal balance
2.	Ashoka	0.60gm	1gm	2gm	Uterine tonic
3.	Amla	0.50gm	1gm	4gm	Antioxidant
4.	Lodhra	0.60gm	0.5gm	1gm	Menstrual regulation
5.	Licorice	0.30gm	0.5gm	1gm	Sweetening agent
6.	Dark compound	3gm	20gm	45gm	Base
7.	Milk compound	3gm	20gm	45gm	Base

Evaluation test parameter for chocolate

1. Organoleptic Properties

Organoleptic evaluation was used to assess the sensory quality and acceptability of the formulations. The parameters considered included colour, odour, taste, texture, mouthfeel, and overall appearance. These observations provide a preliminary indication of product consistency and consumer acceptability.

2. Blooming Test

There are two types of Blooming tests are performed:

1. Fat bloom

2. Sugar bloom

3. Hardness

Hardness was evaluated as a measure of the mechanical strength of the chocolate. The formulations were assessed using a Monsanto Hardness Tester, and the readings were recorded in kg/cm².

4. Dimensions

Vernier calipers were used to determine the physical dimensions of the prepared chocolates and to assess uniformity of size and shape.

5. Stability

Performed to determine stability of prepared herbal chocolate including organoleptic properties like appearance, colour, odour, taste and storage condition where the chocolates are stored for one month at 2-8°C and 20-25°C.

6. pH

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Performed to check the pH of prepared chocolate whether it is acidic or alkaline.

7. Weight variation test

Weight variation was assessed by weighing six individual chocolate units separately. The mean weight was calculated, followed by determination of the percentage deviation of each unit from the mean. The observed deviation was compared with the specified acceptable range.

Formula of percentage deviation:

$$\left[\frac{\text{Individual weight} - \text{Average weight}}{\text{Average weight}} \right] \times 100$$

Results and Discussion

1. Organoleptic properties

Table No.2 : Organoleptic Properties of formulation

Parameter	F1	F2
Color	Dark Brown	Dark Brown
Odour	Chocolaty	Chocolaty
Taste	Sweet and slightly bitter	Sweet and slightly bitter
Mouth feel	Smooth and pleasant	Smooth and pleasant
Appearance	Smooth	Smooth

2. Blooming Test

No fat bloom and sugar bloom is obtained.

3. Hardness Test

To check hardness of chocolate **Monsanto Hardness Tester** is used.

Table No.3: Hardness

Parameter	F1	F2
Reading	3 kg/sq.cm	3kg/sq.cm

4. Dimensions

Equipment – Vernier Caliper

Table

No.4:Dimension

Parameter	F1	F2
Length	2.2 cm	2.2 cm
Width	2 cm	2 cm

5. Stability study

Table No.5:Stability study

Parameter	Storage Condition	At Preparation	After One Month
Appearance, Colour, Odour, Taste	2-8°C and 20-25°C	Smooth, Brown, Chocolaty,	No change

		Slightly bitter	
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6. pH

Table No.6:pH

Formulation	F1	F2
pH	6.5	6.7

7. Weight Variation

Table No.7: Weight variation

Percentage deviation	2.3% Within range (±5%)
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Conclusion

The present work demonstrated the preparation of a herbal chocolate formulation containing Ashoka, Lodhra, Amla, Licorice, and Shatavari in a milk- and dark-chocolate base. The formulations exhibited acceptable sensory characteristics, including colour, odour, taste, mouthfeel, and appearance. No visible fat or sugar bloom was observed, and the recorded hardness, dimensions, pH, and weight-variation results indicated satisfactory preliminary physical characteristics under the conditions evaluated. The one-month stability observations also showed no reported change in the assessed sensory parameters. These findings support the feasibility of incorporating selected herbal powders into a chocolate-based dosage/food format. However, the present study is a preliminary formulation and evaluation study; therefore, claims regarding clinical effectiveness, hormonal correction, or therapeutic benefit require confirmation through appropriately designed safety, efficacy, stability, and clinical investigations.

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