

Formulation and Evaluation of Herbal Chocolate for Anthelmintic Activity

T.Pradeepa¹, Arul Madhavan. A², Sakthivel.S³, Sivapriya.M⁴, Swathi.S⁵, Yuvaraj. M⁶

¹Assistant Professor, Kg College Of Pharmacy And Research Institute, Villupuram

^{2,3,4,5,6}B.Pharm Final Year Students, Kg College Of Pharmacy And Research Institute, Villupuram

ABSTRACT:

The chocolate is most loving food of children where as the medicine is hating substance. So, objective of present study was to formulate the chocolate that contain drug i.e., medicated chocolate to prevent the disease.

Herbal and medicated chocolates have the potential to be excellent functional herbs, combining therapeutic benefits with great taste. Ingredients like Neem, Tulsi, Pomegranate Bark Powder, Banana peel Powder, and Honey not only add nutrients but also support immunity, digestion, and overall health. Honey's natural sweetness balances the herbal flavors, making the product more enjoyable and easier for patients to take. The chocolates were rigorously tested for factors like taste, texture, and stability, proving their quality and appeal. By effectively delivering medicinal ingredients in a tasty, smooth form, these chocolates offer a more palatable alternative to traditional medicines. With more research and consumer feedback, they could become a popular choice in the health food market.

KEYWORDS: Chocloate, Herbs, Earthworms, Honey, Neem

INTRODUCTION

Anti helmintic is a type of anti parasitic medicine used to treat infection from parasitic worms, such as nematodes, cestodes and trematodes, remain significant global health issue, particularly in tropical and subtropical region. Hookworm infection is primarily responsible for anemia, with prevalence rates ranging from 38% to 65.6%. The positive impact of anthelmintic treatment on improving anemia in pregnant women and children is well-established.

Eg; flukes and tapeworms.

Anemia is a common consequence of gastrointestinal nematode infections, which negatively impact the host's nutritional status, reduce appetite, and hinder physical, cognitive, and social development.

According to the World Health Organization (WHO), controlling helminthiasis involves pharmacological treatments, biological controls, proper hygiene, and health education, growth and replication.

Helminths are worms made up of many cells. Nematodes—roundworms, cestodes—tapeworms, and trematodes—flatworms—are some of the most prevalent helminths found in the human intestine. Typically, helminths cannot reproduce inside the human body^[1]

In a survey of five primary schools and one secondary school in and around the Njala University College environment, in Southern Sierra Leone, 1820 school children were examined. *Ascaris lumbricoides* was the most common helminth encountered (33.3%) followed by *Trichuris trichiura* (14.6%) and hookworm infection (10.4%). There was striking differences in the rate of infection between the various schools with the International School being the least affected by all parasites. Multiple infections were quite common, with 53.1% having one type of helminth infection, 40% had two types of helminth infections, while 6.9% had three or more helminth infections.^[2]

This study focuses on the formulation and evaluation of a herbal chocolate infused with selected anthelmintic plant extracts. The aim is to develop an effective, safe, and consumer-friendly dosage form that combines the therapeutic benefits of herbal medicine with the acceptability and appeal of chocolate. Phytochemicals such as alkaloids, tannins, and flavonoids have shown promising activity against various helminths. Chocolate is rich in Polyphenols, saturated fat, methylxanthines and aliphatic alcohols. Phenylethylamine, sometimes known as "The love drug" which promotes feelings of happiness and pleasure. This drug delivery method offers benefits such as potentially bypassing first-pass metabolism and reducing pre-systemic elimination in the gastrointestinal (GI) tract.

The herbs and fruits used in this polyherbal medicated chocolate have a vast variety of pharmacological use with context to stomach worms and their related issue.^[3]

Bananapeel (*Musa acuminata* and *Musa balbisiana*): contain compounds like tannins saponins alkaloids having a anthelmintic activity.^[4]

Tulsi (*Ocimum sanctum*): extract contain Eugenol shows anthelmintic activity, it is also used as antioxidant, anti-inflammatory, stress reduction, anticancer etc.^[4]

Pomegranate (*Punica granatum*): Alkaloids from the bark influence ion channels necessary for muscle contraction.^[4]

Neem (*Azadirachta indica*): Contains compounds like azadirachtin and nimbin that paralyze and disrupt worms, preventing reproduction.^[5]

The current research investigates the application of chocolate as a new drug delivery system for herbal anti-helminthic agents. Chocolate has a number of advantages, such as being palatable, highly acceptable across various age groups, and having the ability to hide the bitter taste of some drugs. Through the entrapment of herbal anti-helminthic agents in a chocolate matrix, we hope to develop a more acceptable and palatable treatment that enhances patient compliance and maximizes therapeutic results. This method may possibly change the nature of helminthic infections treatment, especially among susceptible populations.

Chocolate due to its anhydrous nature prevents microbial growth and hydrolysis to a large extent as compared to normal drug delivery systems. In many active agents it acts as a well suited vehicle. Due to its organoleptic characteristics, it gives the formulation an appealing look, masks the unpleasant taste of the drug if any and a creamy texture thus aiding in patient compliance of the drug formulation. Chocolate is a relatively high in calories and sugar and its consumption should be looked after, excess intake can contribute to weight gain and can backfire the patient with hypertension, diabetes, and other metabolic disorders in general. Hence frequent dosage drugs cannot be incorporated in this delivery system.

Medicated chocolate is prepared by using chocolate base and the drug is incorporated into prepared chocolate base. As the drug is incorporated within the chocolate and the drug is released from the chocolate, it is called as Chocolate drug delivery system.^[6]

Chocolate containing the drug in suitable quantity is known as medicated chocolate. There are four types of taste modalities, salty, sour, bitter, sweet through the combination of these elements we can detect the “flavours” Children’s tastes sensation is much differed than adult infants and more over children prefer sweet-tasting substance.^[7]

Dark chocolate is been used for many medical preparations naturally. The important property of chocolate is Anti-oxidant property. The main anti-oxidant phytonutrient present in the coca bean is polyphenols. The most presented Flavonoids in cocoa powder are composed of catechins, anthocyanins etc. The chocolate consumption is parallel to the reduction of activity of cardio vascular. Hence, they consideras functional food mean while among the types of chocolate the dark chocolate are preferred due to its high flavonoid and polyphenol content.^[8]

A 2021 systematic review of the health effects of chocolate and cocoa found high-quality research had still not been performed to evaluate physiological outcomes. The only health effects observed were improvements in lipids profiles; control subjects showed no significant differences in terms of skin, cardiovascular, anthropometric, cognitive and quality of life outcomes.^[9]

This shows us the unique nutritional value of dark chocolate, including high dietary fiber, minerals and includes flavonoids Dark chocolate cardiovascular health and general well-being There are benefits, but There are also drawbacks to overeating, including high calorie intake and health problems The study identifies market trends and consumer preferences.^[10]

More over the dark chocolate contains pure cocoa extraction as the milk & white chocolate contains the derivates of milk this leads to contamination when compare to dark chocolate. It contains lower amount of fats and sugar content than other chocolate types. It possesses the medicinal properties but also contains high shelf-life period than other types, with this profound Sreason dark chocolate can be used in herbal preparations.^[11]

Advantages^[12]

Palatable Delivery Form: Chocolate masks the bitter taste of herbal extracts, increasing patient compliance, especially in children.

Natural Ingredients: Herbal actives reduce dependency on synthetic drugs, offering a more natural treatment option.

Dual Benefits: Combines the medicinal effect of anthelmintics with the nutritional/antioxidant benefits of cocoa.

Improved Acceptability: Easier to consume compared to syrups or tablets, especially in populations averse to traditional medicine.

Enhanced Bioavailability: Lipids in chocolate may improve the absorption of fat-soluble herbal compounds.

Cost-Effective: Herbal formulations can be more economical, particularly in areas where medicinal herbs are locally available.^[11]

Enhanced Drug Delivery: The lipid-based, anhydrous (water-free) matrix of chocolate protects volatile active ingredients, prevents microbial growth, and improves the stability of herbal compounds.

Synergistic Action: Cocoa contains antioxidants and polyphenols that may complement the anthelmintic action of the herbs.

Disadvantages^[12]**1. Enhanced Palatability and Patient Compliance**

Problem: Herbal anthelmintics often have a bitter taste or unpleasant smell.

Benefit: Chocolate masks the bitterness, improving compliance, especially in children and the elderly who are often more sensitive to taste.

2. Synergistic Effect

Chocolate, especially dark chocolate, contains bioactive compounds like flavonoids, which may enhance the bioavailability or effectiveness of certain herbal components. The combination may result in synergistic therapeutic effects.

3. Novel Drug Delivery System

Introducing a chocolate-based delivery system offers a novel way to administer natural medications, improving acceptability and convenience. Suitable for nutraceutical markets where functional foods are in demand.

4. Stability and Shelf-life

Chocolate can act as a protective matrix, potentially enhancing the stability of volatile or sensitive herbal compounds. Helps in developing a product with a longer shelf-life.

5. Dosage Accuracy

Formulation allows for standardized dosing, especially important in herbal medicine where active component concentrations can vary.^[12]H1

IDEAL PROPERTIES

1. Palatability and Acceptance
2. Pharmaceutical and Chemical Properties
3. Therapeutic and Pharmacological Activity
4. Physical Characteristics
5. Additives and Safety

PLANT PROFILE;

Bananapeel (*Musa acuminata* and *Musa balbisiana*);

Tannins, Saponins, Alkaloids

Contain compounds like tannins saponins alkaloids having a anthelmintic activity.

Tulsi (*Ocimumsanctum*);

Eugenol

Extract contain Eugenol shows anthelmintic activity, it is also used as antioxidant, anti-inflammatory, stress reduction, anticancer etc.

Pomegranate (*Punica granatum*);

Alkaloids.Polyphenols.Flavonoids.Anthocyanins

Alkaloids from the bark influence ion channels necessary for muscle contraction.

Neem (*Azadirachta indica*);

Nimbin.Nimbidin.Nimbinin.Quercetin

Contains compounds like azadirachtin and nimbin that paralyze and disrupt worms, preventing reproduction.

A.Bananapeel ;^[4]



Synonyms;

plantain.

Biological Source;

Musa acuminata and Musa balbisiana,

Chemical Composition;

Tannins, Saponins, Alkaloids, Bananas are primarily water (around 75%) and carbohydrates (sugars like sucrose, glucose, fructose, and starch), providing energy, with significant amounts of potassium, Vitamin B6, Vitamin C, fiber, and manganese, plus antioxidants like phenolics and carotenoids, all contributing to their nutritional value and health benefits.

uses;

Quick energy,

Digestive supports,

Heart health

Mood boosting due to nutrients like potassium, fiber, and Vitamin B6, often eaten raw, in smoothies, baked goods, or as a natural snack, benefiting athletes, kids, and general wellness by aiding blood pressure, gut regularity, and providing essential vitamins.

B. Tulsi:⁴**Synonyms;**

Hindi : Tulsi

Malayalam : Tulsi, trittav, Krishna tulsi

Sanskrit : Tulsi ,surasah

Tamil : Tulsi

Telugu : Tulsi

Unani : Tulsi

Biological source;

Ocimum sanctum Linn.

Chemical Composition;

Eugenol, carvacrol, nerol, eugenolmethylether, Bornyl acetate, cadinene, camphene, camphor, carvacrol, beta-caryophellene, eugenol, eugenol methyl ether, humelene, methyl chavicol, limonene etc.

Uses;

Extract contain Eugenol shows anthelmintic activity, Antifertility activity, Biochemical clearance, Hypoglycaemic effect, Hypotensive effect, Mosquito larvicidal as well as mosquito-repellent action, Antibacterial activity, Antifungal activity, Antiviral activity, Anti-stress activity

C.Pomegranate;⁴



Synonyms;

wineapples or wine-apples

Biological source;

Punica granatum

Chemical Composition;

phenolics like punicalagins and ellagitannins, responsible for strong antioxidant effects, alongside flavonoids (anthocyanins, quercetin), organic acids (citric, malic), vitamins (C, K, B-group), and minerals (potassium, phosphorus).

Uses;

To fight intestinal worms and parasites like roundworms,
Powerful antioxidants in promoting heart, brain, and skin health,
Fighting inflammation, and boosting immunity.

D.NEEM;⁵



Synonyms;

Azadirachta indica, Melia Azadirachta, Arishth, Margosa, Neem tree, Nim.

Biological source;

Azadirachta indica.

Chemical composition;

Its Alkaloids, Nimbin, and Saponins can cause paralysis. potent Antibacterial, Antifungal, and Anti-inflammatory properties, Benefiting skin (acne, eczema), Hair (dandruff), and Oral health (gum disease, plaque).

Uses;

potent Antibacterial, Antifungal, and Anti-inflammatory properties, Benefiting skin (acne, eczema), Hair (dandruff), and Oral health (gum disease, plaque).

MATERIALS AND METHODS

Soxhlet apparatus (including condenser, extraction chamber, and round-bottom flask).

Herbs: Banana peel, Tulsi, Pomegranate, Neem.

Solvent (e.g. Ethanol, Methanol,).

Heating mantle or water bath.

Cotton or filter paper.

Procedure**1. Preparation of Sample & Weighing**

Dry the herb completely and grind it into a fine powder for better extraction. Weigh the required amount of powdered herb (50 g).

2. Setting up the Soxhlet Apparatus

Place the extraction chamber between the condenser and the round-bottom flask. Fill the round-bottom flask with an appropriate amount of 70% methanol (500 ml).

3. Extraction Process

Heat the solvent using a heating mantle or water bath. The solvent evaporates, condenses in the condenser, and drips onto the sample in the extraction chamber.

The solvent extracts the active compounds from the herb and flows back into the flask through the siphon mechanism.

This cycle repeats continuously for 6-8 hours, ensuring thorough extraction.



4. Completion of Extraction

Stop heating once the solvent in the siphon tube appears colorless, indicating that no more extraction is occurring.

Allow the apparatus to cool down before dismantling it.

5. Solvent Evaporation & Concentration

Filter the extract & remove the solvent using a digital water bath to obtain the concentrated herbal extract.

6.Storage

Store the extract in an airtight container at a low temperature to preserve its active compounds.



PHYTOCHEMICAL ANALYSIS

NEEM

1. **Test for Phenol:** 1g of sample is dissolved in Distilled water. Boil and add a few drops of 10% of Ferric chloride solution.
2. **Test for alkaloids:** Extract + Dragendorff's reagent

BANANA PEEL

1. **Test for Flavanoids:** 2 ml of extract + few drops of conc. HCl
2. **Test for Tannins:** 2ml of extract + few drops of 1M Ferric chloride

TULSI

1. **Test for alkaloids:** Extract + Mayer's reagent (potassium mercuric iodide)
2. **Test for flavanoids:** Extract + lead acetate solution

POMEGRANATE

1. **Test for tannins:** Extract + dissolved in distilled water and add few drops of 10% ferric chloride solution

Test for phenol: Extract + dissolved in distilled water and add few drops of 10% ferric chloride solution

FORMULATION OF CHOCOLATE^[14]

- a) Weight the whole ingredient Measure the extract, Chocolate Base 35g & Honey as per volume make up.

- b) Chocolate Base Preparation Melt 35 grams of chocolate base in a water bath or double boiler or microwave until smooth. Allow to cool slightly.
- c) Mixing
In a mixing bowl, combine the melted chocolate with the extract Chocolate Base 35g,Neem-20ml,Pomegranate-20ml,Banana peel-16ml,Tulsi-16ml& QS Honey Stir the mixture thoroughly until all ingredients are well incorporated.
- d) Molding & Setting Pour the chocolate into molds and tap to remove air bubbles. Refrigerate at 10-15°C for 1-2 hr.



- a) De-molding & Packaging Once hardened, remove from molds and wrap in food-safe packaging. Store in cool, dry place.



EVALUATION PARAMETERS FOR HERBAL CHOCOLATE^[15]

1. General Appearance

The visual appeal and overall sophistication of the chocolate formulation determine its appearance. This factor plays a crucial role in consumer acceptance and ensures smooth manufacturing processes.

2. Dimensions

The dimensions of the chocolate were measured using Vernier calipers to ensure uniformity and consistency in size.

3. Moisture Content Analysis

The moisture content was assessed using a desiccator. This test determined the moisture level in the dried chocolate formulation. The precisely weighed chocolate sample was placed in a desiccator containing anhydrous silica gel. After 24 hours, the sample was removed, reweighed, and the percentage of moisture absorption was calculated using the formula.

4. Weight Variation

Five different chocolate samples were weighed both individually and collectively. The average weight was calculated and compared to the individual weights. The percentage deviation in weight variation was determined

5. Stability

Stability refers to the ability of a formulation to retain its physical, chemical, microbial, therapeutic, and toxicological properties over time. A medicinal product is considered stable if it maintains at least 90% of its labeled potency throughout its shelf life. Chemical, physical, and microbiological changes can lead to degradation, potentially reducing the product's effectiveness or increasing toxicity. Ensuring stability is critical for maintaining product safety and efficacy.

6. Anthelmintic Activity (Experimental Model)

Adult earthworms were collected and categorized into groups for the study. Piperazine citrate was used as the standard anthelmintic drug for comparison. Different concentrations of both the standard drug and the herbal chocolate formulation were prepared for testing.

RESULTS AND DISCUSSION

PHYTOCHEMICAL ANALYSIS

NEEM

No	Test	Observations	Inference
1	Test for Phenol: 1g of sample is dissolved in Distilled water. Boil and add a few drops of 10% of Ferric chloride solution.	violet colour solution	Positive
2	Test for alkaloids: Extract + Dragondorff's reagent	Red colour Precipitate	Positive



BANANA PEEL

No	Test	Observations	Inference
1	Test for Flavanoids: 2 ml of extract +few drops of conc.Hcl	Red or pink colour	Positive
2	Test for Tannins: 2ml of extract +few drops of 1M Ferric chloride	Greenish black or bluish black	<i>Positive</i>



BANANA PEEL

TULSI

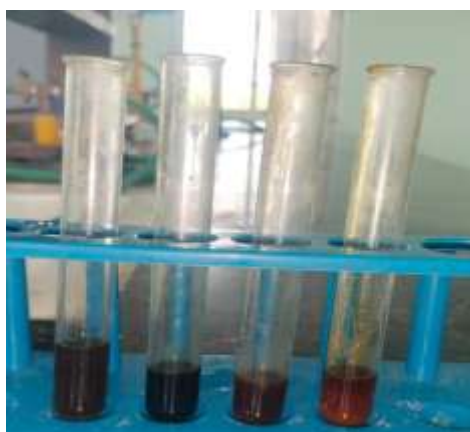
No	Test	Observations	Inference
1	Test for alkaloids: Extract+Mayer's reagent(potassium mercuric iodide)	Pale yellow precipitate	Positive
2	Test for flavanoids: Extract+lead acetate	Yellow precipitate	Positive

	solution		
--	----------	--	--



TULSI POMEGRANATE

No	Test	Observations	Inference
1	Test for phenol: Extract+dissolved in distilled water and add few drops of 10% ferric chloride solution	Blue or green	Positive
2	Test for tannins: Extract+dissolved in distilled water and add few drops of 10% ferric chloride solution	Blue or green	Positive



POMEGRANATE

General Appearance

Sr. No	Parameter	Result
01	Colour	Brown
02	Odour	Chocolaty
03	Taste	Sweet
04	Appearance	Shiny and smooth

The chocolate had a uniform texture, smooth surface, and good color, no cracks, discoloration which shows that the product is of good quality

Dimensions

It was measured by Vernier' calipers

Height - 1.5cm

Diameter (width) - 2.6 cm

The chocolates were uniform in shape and size, thus maintaining uniformity in formulation and dosing. Minor differences were within acceptable range, verifying good manufacturing control

Moisture Content

Weight of Formulated chocolate = **7.9gm**

Weight of empty Crucible = **44.39 gm**

Weight of formulated chocolate + weight of empty crucible = **52.29gm**

Weight after moisture loss = **52.04 gm**

Therefore, the final weight obtained = **0.25 gm**

Weight of one formulated chocolate = Final weight obtained

$X = \frac{0.25}{7.8} \times 100$

7.8

X=3.2%

Weight Variation

The weight of single chocolate pieces was determined and found to be within acceptable pharmaceutical ranges is **7.82 ,7.96 ,7.89 ,7.92 and 7.84.**

Average weight is = $\frac{7.82+7.96+7.89+7.92+7.84}{5}$

=7.88

Individual Weight – Average Weight

Weight variation= $\frac{\text{Individual Weight – Average Weight}}{\text{Average Weight}} \times 100$

Weight Variation = 1.2

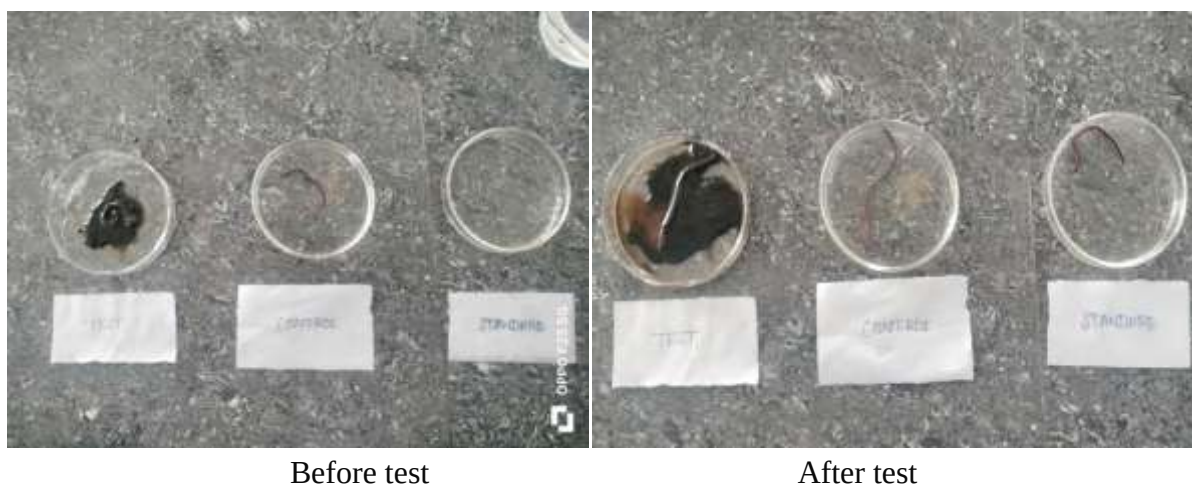
Anthelmintic Activity on Earthworms

Assessment of Anthelmintic Activity

Adult earthworms were collected and categorized into groups. Piperazine citrate served as the standard anthelmintic drug for comparison. Different concentrations of the standard drug and the herbal chocolate formulation were prepared for testing.

The earthworms were divided into the following treatment groups.

1. Control Group: Treated with normal saline
2. Test Group: Treated with the herbal chocolate formulation
3. Standard Group: Treated with Piperazine citrate.



Before test

After test

TEST GROUP; The test drug exhibited significant anthelmintic activity, as evidenced by a shorter time to worm death compared with the standard drug.

STANDARD GROUP ; Standard drug caused paralysis first, and test drug caused death first in a shorter time than the standard drug

7. CONCLUSION

The chocolate is most loving food of children where as the medicine is hating substance. So, objective of present study was to formulate the chocolate that contain drug i.e., medicated chocolate to prevent the disease.

Herbal and medicated chocolates have the potential to be excellent functional herbs, combining therapeutic benefits with great taste. Ingredients like Neem, Tulsi, Pomegranate Bark Powder, Banana peel Powder, and Honey not only add nutrients but also support immunity, digestion, and overall health. Honey's natural sweetness balances the herbal flavors, making the product more enjoyable and easier for patients to take. The chocolates were rigorously tested for factors like taste, texture, and stability, proving their quality and appeal. By effectively delivering medicinal ingredients in a tasty, smooth form, these chocolates offer a more palatable alternative to traditional medicines. With more research and consumer feedback, they could become a popular choice in the health food market.

It can be concluded that opting for an infused herbal chocolate offers greater health benefits compared to chocolates crafted with artificial sweeteners and preservatives. Consumption of artificial sweeteners can contribute to the development of chronic conditions such as obesity, diabetes and many others. Thereby herbal infusion which has been incorporated in herbal chocolate preparation makes amplification of medicinal values and used as functional food/ nutraceutical

REFERENCES

1. Sanjay Pawar¹, Abhay Jalan^{2*} formulation & evaluation of anthelmintic herbal chocolate World Journal of Pharmaceutical Research Vol 14, Issue 11, 2025.
2. G Bakima, A. A, Sherpard, M., & White, P. T. (1994). Intestinal helminth infections in rural school children in Njala, Sierra Leone. East African medical journal, 71(12): 792-796.
3. Dipali N. Hagir^{1*} , Akanksha Kumbhar² Formulation and Evaluation of Medicated Chocolate international journal of pharmaceutical sciences Int. J. of Pharm. Sci., 2024, Vol 2, Issue 9, 307-313.
4. Miss. Kalyani Sheshrao Marathe, Mr. Ibrahim I. Qureshi, formulation and evaluation of anthelmintic herbal chocolate for pediatric EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal Volume: 11| Issue: 6| June 2025|.
5. Mohammad A Alzohairy, Therapeutics Role of *Azadirachta indica* (Neem) and Their Active Constituents in Diseases Prevention and Treatment Evid Based Complement Alternat Med. 2016 Mar 1;2016:7382506.
6. Yogesh S. Kolekar, Sajid A. Mulani, Firoj A. Tamboli, Harinath N. More and Ashish A. Misal; formulation and evaluation of pediatric herbal chocolate EJBPS, 2021; 8(6): 458-462.
7. L. Gopi, V. Ramya, S. Sandhiya formulation and evaluation of chocolate containing albendazole and ivermectin World Journal of Pharmaceutical Research Vol 12, Issue 9, 2023.
8. Elsevier B.V. Dark chocolate Current Research in Food Science, 5 (2022) 1916-1943 Available online 15 October 2022; 2665-9271/0 2022 (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)
9. https://en.wikipedia.org/wiki/Dark_Chocolate .
10. Mr. Rushikesh Bhaskar Mehankar The Impact of Dark Chocolate on Health, Culture, and Industry, and Identifying Knowledge Gaps for Future Research International Journal of Scientific Research in Science and Technology 11(6):565-578.
11. Usha Kiran Reddy T, Shaik Mahabob Sohel Formulation and Evaluation of Herbs Infused Chocolate mathews journal of pharmaceutical science Volume 8, Issue 3 – 2024
12. Miss. Swati Bhimrao Dapke, Miss. Geeta Bhagwan Khote formulation and evaluation of anthelmintic herbal chocolate for pediatric EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal Volume: 11| Issue: 6| June 2025| Journal DOI: 10.36713/epra2013
13. Smita Irnak² and Vaibhav Arakh² formulation & evaluation of anthelmintic herbal chocolate World Journal of Pharmaceutical Research Vol 14, Issue 11, 2025.
14. Divya K, Dharani K, Reddy OVS, Apparao Ch, Murthy SDS Formulation and Evaluation of Herbs Infused Chocolate mathews journal of pharmaceutical science Volume 8, Issue 3 – 2024
15. Dr. D. Narendra, N. Srirama Naresh Formulation and Evaluation of Herbal Medicated Anti Helminthic Chocolate International Journal of Pharmacy and Pharmaceutical Research (IJPPR) Volume 31, Issue 4, April 2025
16. https://en.wikipedia.org/wiki/Dark_Chocolate
17. Ritesh Rajesh Jabde formulation and evaluation of herbal medicated chocolate in treatment of intestinal worms and related problems World Journal of Pharmaceutical Research Vol 13, Issue 1, 2024
18. T. Usha Kiran Reddy, sheik. Mahaboob shoal, Venkata Anusha, k. G. Rajyalakshmi, Sindhu, Bhargavi, s. Sandhya. Apparao exploring the health benefits of infused herbal chocolates: a review 2024 IJCSPUB volume 14, issue 1 February 2024 ISSN: 2250-1770.