IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

Formulation and Evaluation of Anthelmintic Herbal Chocolate

Komal Dhondiba Kapratwar and Prof. Manisha Virkar
Gajanan Maharaj College of Pharmcy, Chh. Sambhajingar

Abstract: *Anthelmintic diseases also known as helminthiasis, are infections caused by parasitic worms. these include roundworms (nematodes), flukes (trematodes), and tapeworms (cestodes).*
Anthelmintic drugs are used to treat who are infected by helminths parasites.
The chocolate is most loving food of children whereas 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.
Ocimum Sanctum (Tulsi) is the herbal drug which having several medicinal properties, anthelmintic activity is one of them. Thus, we have to formulate the chocolate with aqueous extract of Tulsi that gives anthelmintic activity. Further, prepared medicated chocolate is evaluated for general appearance, dimension, weight variation, physical stability, moisture content determination etc,
Oral drug delivery is one of the most common routes of drug administration due to its patient compliance and easy of use, But this route is an immense challenge for the drug delivery to the pediatric patients. Our present research work emphasizes on the solution to this problem.
The present research work deals with the formulation and evaluation of a medicated herbal chocolate which is one of the most common medicines used for pediatrics for the treatment of intestinal worms and related problems..

Keywords: Formulation, Evaluation, Anthelmintic, Herbal drug, Herbal chocolate

I. INTRODUCTION

Helminthic disease:
Helminthic diseases are brought on by helminths, which are parasitic worms.
The three primary subgroups of these worms are tapeworms, roundworms, and flukes. There are about 300 helminths known to infect people. Direct encounters primarily transmit helminths with the parasite or ingest contaminated water or food. From contaminated soil or water, parasites can occasionally enter humans through their skin.
The most underprivileged and underdeveloped areas are affected by soil-transmitted helminthic diseases, among the most prevalent illnesses worldwide. This condition is caused by an infestation of one or more, intestinal parasitic roundworms.
Helminths can exist as parasites in aquatic and terrestrial habitats or without a host. Intestinal nematodes, also known as soil-transmitted helminths (STH), schistosomes are parasites that cause schistosomiasis, and filarial worms cause lymphatic filariasis (LF) and onchocerciasis, are the most prevalent forms of a worldwide scale. .

Classification of helminthic parasite:
Based on their morphology (structure) and method of transmission, helminths can be divided into three main groups.
1 flukes or trematodes,
2 tapeworms or cestodes,
3 roundworms or

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

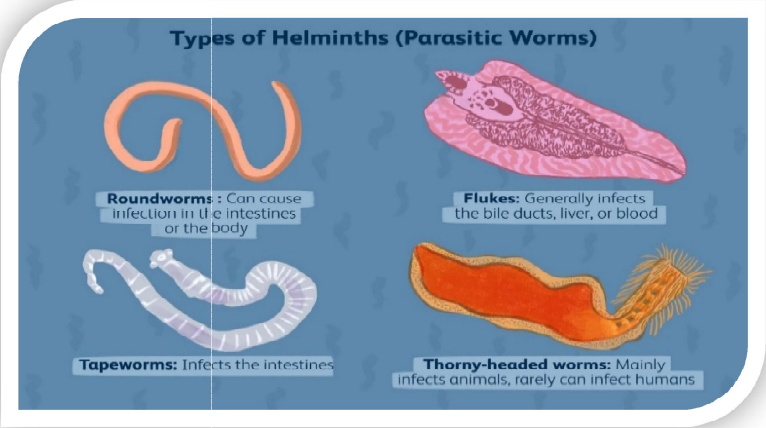

Fig: types of parasitic worms

Transmission of helminthic disease:

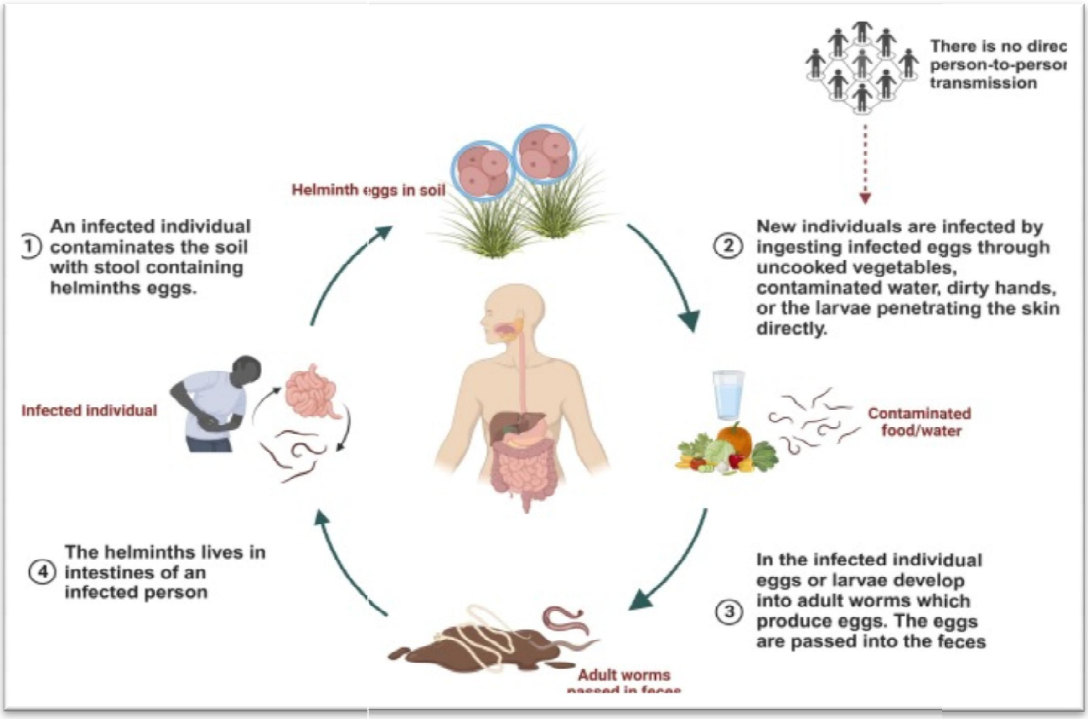

Fig : transmission of Helminthic disease

Prevention:

1 Personal Hygiene:

Regular handwashing with soap, especially after defecation and before eating.

2 Safe Food Practices:

Washing vegetables and fruits.

Avoiding raw or undercooked fish or aquatic plants.

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

3 Sanitation:
Use of clean toilets and safe disposal of human feces.
Access to clean and safe drinking water.

4 Public Health Measures:
Mass deworming programs in endemic areas.
Health education

Introduction of herbal chocolate:
Chocolate is one of the most popular foods among children, while medicine is often disliked. This study aims to create a "medicated chocolate," combining chocolate with a medicinal ingredient to aid in disease prevention. Common ailments in children include anthelminthic and viral infections. Ocimum sanctum, or Tulsi, is herb known for its medicinal properties, including anthelminthic effects. This project focuses on formulating a chocolate Infused with Tulsi extract to provide anthelminthic benefits.

Characteristics of herbal chocolate:
when chocolate is used as a vehicle to deliver medication, it enables the controlled release of drugs directly from the chocolate matrix, creating what is known as a "chocolate drug delivery system." This method is especially effective for children, combining a familiar and enjoyable food with medicinal benefits, making it a highly suitable drug delivery method for pediatric patients.
The primary goal of this study is to develop a Pediatric Herbal Chocolate containing an extract of Ocimum sanctum (Tulsi) banana peel , a herb known for its medicinal qualities, including its anthelminthic properties. Given that helminths and viral infections are common ailments among children, the therapeutic profile of Tulsi makes it an ideal choice for formulating a medicated chocolate aimed at health prevention.
Chocolate acts as an anhydrous medium, which helps prevent microbial growth and protects water-sensitive active ingredients from hydrolysis. These properties make chocolate an excellent vehicle for delivering medicinal compounds. Its versatility allows it to be customized to create various taste and texture profiles, making it a sophisticated option for food formulations.
Chocolate contains a lipid rich matrix and natural antioxidants, making it a promising medium for drug delivery. using chocolate as a novel approach that combines the nutraceutical properties of chocolate with herbal medicine to enhances effectiveness, palatability, and patient compliances and enhanced bioavailability.

Advantages of chocolate:
Lipid rich matrix
Melts as body temperature
Taste masking
Biocompatibility & edibility
Antioxidant properties

Drug Material for anthelminthic chocolate formulation:
1. Banana peel (Musa paradisiaca linn)
2. Tulsi (Ocimum sanctum)
3. Pumpkin seed (Cucurbita pepo)
4. Papaya seed (Carica papaya)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

1. Banana peel:

Banana peel

Banana peel powder

Scientific Name: Musa paradisiaca Linn.
Family: Musaceae
Common Names: Banana (English), Kela (Hindi), Vazha (Tamil)
Uses: Consumed as fruit, cooking ingredient, source of fiber and vitamins, and in some cultures, the leaves are used for cooking or wrapping food. Banana peel is rich in tannins, flavonoids, and polyphenols.
These compounds exert an anthelmintic effect by disrupting the membrane integrity of parasites and inhibiting their motility.

2. Tulsi:

Tulsi

Tulsi powder

Scientific Name: Ocimum Sanctum
Family: Lamiaceae
Common Name: Ajaka, Manjari (Sanskrit), Tulsi (Hindi),
Uses: Drugs, Flavouring, Insecticide, Perfumery etc,

3 pumpkin seed:

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

Scientific Name: Cucurbita pepo (for most common varieties)
Family: Cucurbit
Distribution: Cultivated worldwide in temperate and tropical regions.
Uses: Consumed as a vegetable, ingredient in cooking, traditional medicinal use.

4. papaya seed:

Scientific Name: Carica papaya
Family: Caricacea
Common Name: Papaya
Varieties: Hawaiian, Mexican, Solo, Sunrise
Active compounds: Tannis, steroid, alkaloids
Distribution: Tropical regions worldwide
Uses: Culinary, Medicinal, Cosmetic, Seeds as Vermifuge, anthelmintic act

Excipient profile:
1. Honey:
Honey as an excipient in pharmaceutical formulation due to its physiochemical & biological properties. Improves palatability, in pediatric formulation.

2. Dark Chocolate base:
Dark chocolate base for drug delivery is an innovative approach in pharmaceutical formulation.

Plan of work:
Formulating and evaluating an anthelmintic herbal chocolate involves several key steps. Here's plan of work to guide the process:

1. Literature Review
2. Selection of Anthelmintic Herbs
3. Formulation of Anthelmintic herbal chocolate
4. Evaluation of Anthelmintic herbal chocolate
   a. General appearance
   b. Weight variation
   c. Sugar bloom test
   d. Stability
   e. Dimension
   f. Anthelmintic activity

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

Literature survey:

1. Aditi. A. Ghadage, et al, [2024]

In the indigenous medical system, Calotropis gigantean is one of the most widely used and advantageous medical herbs for the treatment of asthma disorder. This thorough analysis offers the most recent information on the traditional uses, phytochemistry, pharmacological data, toxicological data, clinical. efficacy, safety and efficacy of Calotropis gigantean. It also lays out plans for future studies and development of substantiate the plant's therapeutic potential through.

2. Najmin Ansar Shaikh, et al [2024]

The consumption of chocolate is enjoyed by people of all ages, yet health concerns such as obesity, high blood pressure, diabetes, and coronary artery disease persist. The consumption of chocolate is enjoyed by people of all ages, yet health concerns such as obesity, high blood pressure, diabetes, and coronary artery disease persist.

3. Mahendra Dwivedi1, et al, [2022]

The goal of this study is to develop and assess a polyherbal medicated chocolate for stomach deworming and other related issues that has higher bioavailability and compliance than standard treatment options. An effort was undertaken to create a chocolate with a chocolate base with the addition of herbal fruits and spices for an easier and faster commencement of the action.

4. K. Khan, Viraj. Et al, [2023]

the indigenous medical system. Tamminalia arjuna is one of the most widely used and advantages medicinal herb for the westment of cardiovascular disorders. This though analysis offen the most mcent information on the traditional uses, phytochemistry, pharmacological data, toxicological data, clinical efficacy, safety and efficacy y of Terminalia arjuna. It also lays out plans for development to substantiate the plant's therapeutic potential through scientific means. further study and development to substantiate the plant's therapeutic potential through scientific means. further study and Materials and Methods

5. Dhanashree R. Thakare et al, [2023]

The chocolate is most loving food of children whereas medicine is hating substance. So, the objective of this study is to fabricate and design chocolate. The essential target of this study was to formulate and evaluate nutritious chocolate and nutritional supplement containing antioxidant and anti- cancer property., Ocimum sanctum, Tulsi is the herbal drug which having several medicinal properties, like antitussive property, antioxidant property, from the prevention of heart disease and also for the treatment of skin.

Material & method:

1. Extraction of banana peel Used in Formulation:

Fig: extract of banana peel

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

Banana fruits were purchased from a nearby fruit market. Manually separating the peels, allowing them to dry in the shade, and preserving a sample allowed for future research. The dried peels were mechanically ground into powder. The powdered plant material is extracted repeatedly using various solvents, including water, methanol, and chloroform. Soxhlet apparatus is used to produce an aqueous extract. The process that was used was as follows: For six days, chloroform is macerated with the powder. Then vacuum filtration is used to filter the contents. The same solvent is used to treat the marc once more for three days. Filtered, blended, and concentrated materials are used. Following methanol extraction, the solid material was suitably dried before being subjected to an eight-hour Soxhlet extraction with water. It was a concentrated extract. A desiccator was used to store each extract.

2 Extraction of Tulsi leaves:

Fig: extraction of Tulsi

leaves of Ocimum sanctum L. (tulsi) were collected & washed with sterile water and dried in shades. Then the samples were powered in mechanical grinder. The dried tulsi (50g) powder was placed in the thimble of Soxhlet and ethanol was used for extraction procedure and the experiment was done separately for all the two solvents and distilled water. The extraction was continued till clear solvent or water was seen in the thimble.

The extract was concentrated using rotary evaporator. Then the extract was dried in a digital water bath till a residue was obtained.

3. Extraction of papaya seed:

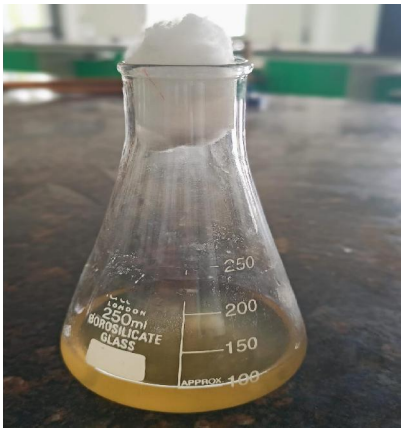

Fig: Extract of papaya seed

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

1. Start by grinding the papaya seeds into a fine powder using a mortar and pestle or a grinder.
2. Packing the Soxhlet apparatus: Place the ground papaya seed powder into the thimble of the Soxhlet extractor. Make sure the thimble is properly packed but not too tightly to allow for proper extraction.
3. Solvent selection: Choose an appropriate solvent for extraction. Ethanol or a mixture of ethanol and water is commonly used for extracting phytochemicals from plant materials.
4. Solvent circulation: Set up the Soxhlet apparatus with the extraction flask containing the selected solvent and the condenser. Heat the flask to boil the solvent, causing it to vaporize and rise into the condenser.
5. Continuous extraction: As the solvent vapor condenses, it drips onto the packed papaya seed powder in the thimble, extracting the desired compounds. The solvent then evaporates, rises, and repeats the cycle. This continuous process ensures efficient extraction.
6. Extraction duration: Allow the Soxhlet apparatus to run for several hours or overnight to ensure maximum extraction efficiency.
7. Collection: The extracted solution collects in the extraction flask. Once the extraction is complete, remove the flask from heat and allow it to cool down.
8. Concentration: If necessary, concentrate the extract by evaporating the solvent using a rotary evaporator or similar equipment.
9. Filtration: Filter the concentrated extract to remove any remaining solid particles or impurities.
10. Storage: Transfer the filtered extract into a clean, airtight container and store it in a cool, dark place to maintain its stability and efficacy

4. Pumpkin seed:

Fig: pumpkin seed

Selecting and Cleaning: Start by selecting fresh, high-quality pumpkin seeds. Remove any debris or dirt from the seeds.
Grinding: Once the pumpkin seeds are dry, transfer them to a food processor or a high- powered blender.
Storage: Transfer the pumpkin seed powder to an airtight container and store it in a cool, dry place away from direct sunlight.

Formulation of Anthelmintic Herbal Chocolate:
• Procedure:
1. Prepare the Ingredients:
- Grind banana peels and Tulsi leaves separately and extract the juices. You should have 2 grams of banana peel extract and 1 grams of Tulsi extract.
- Grind papaya seeds and pumpkin seeds separately into fine powders. You should have 0.4grams of each powder.
- Measure qs grams of honey.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

2. Chocolate Base Preparation:
- Melt 2 grams of chocolate base in a double boiler or microwave until smooth. Allow it to cool slightly.
3. Mixing:
- In a mixing bowl, combine the melted chocolate with the following:
- 2 grams of banana peel extract
- grams of Tulsi extract
- grams of papaya seeds powder
- grams of pumpkin seeds powder
- QS grams of honey
- Stir the mixture thoroughly until all ingredients are well incorporated.
4. Pouring and Setting:
- Pour the mixture into a chocolate mold or onto a lined baking sheet.
- Allow the chocolate to set at room temperature or in the refrigerator until firm.
5. Storage:
- Once the chocolate has set, store it in an airtight container in a cool, dry place.
6. Dosage Consideration:
- Determine the dosage per serving based on the potency of your extracts and powders. Label the chocolate accordingly with dosage information.
7. Testing and Packaging:
- Test the medicated chocolate for taste, texture, and potency.
Once satisfied package the chocolate attractively and include dosage information on the packaging

Anthelmintic herbal chocolate:

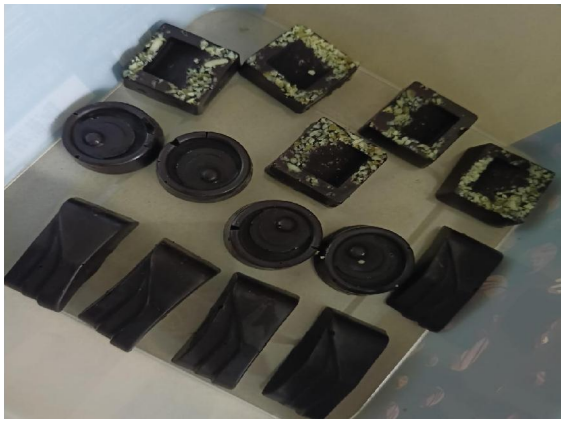

Fig: Herbal Chocolate image

Formulation table of Anthelmintic herbal chocolate:

SR.NO	Ingredients	intended use	Quantity gm/ml
1.	Banana peel extract	Antiparasitic, Preventing Constipation Anthelmintic	2ml
2	Tulsi extract	Antimicrobial & anthelmintic effects, antitussive Reduces inflammation, boost digestive health.	0.6ml

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 2, June 2025 Impact Factor: 7.67

3	Papaya seed extract	It help to expel parasitic worms paralyzes or kills worms.	0.4ml
4	Pumpkin seed powder	Paralyzing the worms preventing them from holding onto the intestinal walls.	0.2gm
5	Chocolate base	Palatability, bioavailability, masking flavor.	2.5gm
6	Honey	Sweetening agent	Qs

Evaluation of Anthelmintic Herbal Chocolate:

1. General appearance:

The visual identity and overall elegance of a chocolate formulation are what determine its overall appearance, which is important for consumer acceptability and trouble-free manufacture.

2. Dimensions:

The dimension of the chocolate was evaluated while using Vernier's callipers .

3. Weight Variation: Five chocolate recipes were weighed separately and collectively. The weight of all the chocolate was used to calculate the average weight. The average weight was contrasted with the individual weights The weight variation's percentage difference must stay within the allowed bounds. The following formula was used to determine the per cent deviation.

%Deviation = (Individual weight –Average weight)/Average weight ×100

4. Stability: Medicinal products are defined as being stable if they can maintain their physical, chemical, microbial, therapeutic, and toxicological specifications in a specific formulation in a specific container. To put it another way, the stability of a drug is its capacity to withstand degradation. The lowest permissible potency level is typically accepted to be 90% of the labelled potency. Due to changes in its physical, chemical, and microbiological properties, drug degradation can happen in a variety of ways. The modifications could reduce the preparation's medicinal efficacy or raise its toxicity.

5. Sugar bloom test: This is a rough and irregular layer on top of the chocolate formulation.

Sugar bloom is caused by condensation (when the chocolate is taken out of the refrigerator). This moisture will dissolve the sugar in the chocolate. When the water evaporates afterwards, the sugar crystallizes into rough, irregular crystals an the surface This gives the chocolate an uppicasant look Each sample was subjected to treatment cycles comprised (1) 30°C for 11hours,

(2) temperature shifting for 1 hour, (3) 18°C for 11 hours, and (4) temperature shifting for 1 hour. A chocolate formulation observed, after the step at 18°C for 11 hours, whether or not blooming has taken place.

Results and Discussion:

Sr. no.	Characteristics	Result
1.	Color	brown
2.	Odor	Pleasant
3.	Taste	Bitter & sweet
4.	surface	Solid & smooth

- Organoleptic Properties

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

II. CONCLUSION:

In conclusion, based on the above-mentioned study, we can say that medical chocolate with ingredients like banana extract, Tulsi extract, papaya seed extract, pumpkin seed powder & honey which have a bland flavor, are smooth in texture, pleasant to the taste, and have patient compliance and safety for stomach deworming & shows anthelmintic activity. The shape, size, taste, texture, dimensions moisture content, bloom test, viscosity, weight variation, hardness, and stability of the formed chocolate were all analyzed. We concluded from the study that medicated chocolate gives the formulation a smooth and creamy texture and is effective at disguising unpleasant tastes while achieving a greater therapeutic effect.

REFERENCES

1.Mahendra Dwivedi, (2015) Formulation and Evaluation of Herbal Medicated Chocolate in Treatment of Intestinal Worms and Related Problems, IJFANS International Journal of Food and Nutritional Sciences Volume 11, page no 1426-1439

2. Yogesh S. Kolekar1, Sajid A. (2021) FORMULATION AND EVALUATION OF PEDIATRIC HERBAL CHOCOLATE, European Journal of Biomedical AND Pharmaceutical sciences, page no 458-46

3. Sunil R, Mounika K, Venkatesham A. (2017) DESIGN AND FABRICATION OF MEDICATED CHOCOLATE FORMULATION BY CHOCOLATE DRUG DELIVERY SYSTEM. Int J Curr Pharm page no128–33. from:https://innovareacademics.in/journals/index.php/ijcpr/article/view/22156

4 F, Masked MT-, Chocolates M, An FOR, Proton E, Lansoprazole et al (2021) DESIGN AND FABRICATION OF MODERN TASTE- MASKED MEDICATED CHOCOLATES FOR AN ESTABLISHED PROTON PUMP.

5 Naqvi RF, Khan A, (2022) Design and Optimization of Novel Taste-Masked Medicated Chocolates of Dextromethorphan with In vitro and In vivo Taste Evaluation. J Pharm Innov page no 376–90.

6 Chaudhari SA, Devare RR, (2018) Chocolate Formulation As Drug Delivery System. Indian J Drugs [Internet]. Page no 136–41. Available from: www.drugresearch.in

7 Gravina SA, Yep GL, Khan M. Human Biology of Taste. Ann Saudi Med [Internet]. 2013 May page no 217–22

8 J. A. Pereira, I. Oliveira and A. Sousa et al, (2007) Walnut (Juglans regia L.) Leaves, Phenolic Compounds, Antibacterial Activity and Antioxidant Potential of Different Cultivars, Food Chem. Toxicol, page no 2287-95

9 S. B. Kosalge (2009) Investigation of in Vitro Anthelmintic Activity of Thespesia Lampas (cav.), Asian J. Pharm. page no 69-71

10 Of F, Masked MT-, (2022) Chocolates M, An FOR, Proton E, Lansoprazole I, et al. DESIGN AND FABRICATION OF MODERN TASTE- MASKED MEDICATED CHOCOLATES FOR AN ESTABLISHED PROTON PUMP. Page no 1037–58.

11 Sastry SV, (2000). Recent technological advances in oral drug delivery – a review. Pharm Sci TechnoloToday,Pageno138–45. https://linkinghub.elsevier.com/retrieve/pii/S1461534700002479

12 Neck L, Data RUSA. (2012) Delivery of active agents using a chocolate vehicle. Vol. 2.

13 Mayank S, Dinesh Kumar J, Sharma M (2012) Chocolate Formulation As Drug Delivery System for Pediatrics. J Pharm. Page no:216–24

14 Chaudhari SA, Devare RR, (2018) Review: Chocolate Formulation As Drug Delivery System. Indian J Drugs [Internet].page no 136–41. Available from: www.drugresearch.in

15 Sunil R, Mounika K, (2017) A. DESIGN AND FABRICATION OF MEDICATED CHOCOLATE FORMULATION BY CHOCOLATE DRUG DELIVERY SYSTEM. Int J Curr Pharm Res [Internet]. Page no 128–33.

16 Haque R. (2007) Human intestinal parasites. J Health Popul Nutr [Internet].page no 387–91. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18402180

17 HERBAL APPETIZER LOLLYPOPS: A NOVEL DRUG DELIVERY SYSTEM FOR PEDIATRIC PATIENT Patil Sonali R.*, Pawar Abhishek S., Dudhgaonkar Trupti D. Rajarambapu College of Pharmacy, Kasegaon, page no 415 404.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, June 2025
Impact Factor: 7.67

18 Lopez FL, Ernest TB, Tuleu C, Gul MO. Formulation approaches to pediatric oral drug delivery: benefits and limitations of current platform.

19 Sharma, M., & Jain, D. K. (2012). Chocolate formulation as drug delivery system for Pediatrics. Indonesian Journal of Pharmacy, 23(4), page no 216-224.

20. Chaudhari, S. A. (2018). Review: chocolate formulation as drug delivery system. Indian Journal of Drugs, page no 136-141.