Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

Antibiotic Haritaki Churna Chocolates- A Sweeter Way to Treat Paediatric

Sukanya Jitendra Patil*[1], Rushikesh Shivaji Hingmire[2], Sneha Shrikant Kavitake[3], Pranali Manohar Pinage[4], Priyanka Dinkar Hankare[5].

[1,2,4,5]Assistant Professors, Govindrao Nikam College of Pharmacy, Sawarde, Maharashtra.

[3] Lecturer, College of Pharmacy (Poly), Sawarde, Maharashtra.

(Received: 27 October 2023 Revised: 22 November Accepted: 26 December)

KEYWORDS

Haritaki, Churna, Herbal approach, Lesser Side-effects, Antibiotic chocolate.

ABSTRACT:

The present study was aimed at formulating a medicated chocolate, comprising of Haritaki churna exhibiting antibiotic effect. There are wide range of antibiotics available in the market treating various bacterial and fungal infections, but each also comes with several side effects. Which may also turn out to be serious in the case of paediatric patients. Hence, a need of alternative approach with fewer side effects is necessary. The presented formulation fulfils this necessity, having Haritaki churna which shows antibiotic effect and being herbal originated shows no side effects. Haritaki Churna was prepared and evaluated for its pH, ash value, extractive value, crude fibre content, heavy metal contamination, and antimicrobial activity. But, the churna alone exhibited unpalatable behaviour leading to the problem of patient compliance. This drawback was compensated by incorporation of Haritaki churna in chocolate- the most loved food item among paediatrics. Following, final formulation was then evaluated for physical parameters, dimensions, weight variation and antimicrobial activity.

INTRODUCTION

Most Common Diseases in Paediatric

- Bronchitis
- Most ear infection (Otitis media)
- Sinus infection (Sinusitis)
- Sore throat/ Strep throat
- Urinary tract infection
- Pneumonia
- Nasty bacterial skin infections (impetigo)
- Common cold and Runny nose
- Influenza (Flu)

Fig. No. 1- Impetigo

Above mentioned diseases in Paediatric are a result of either Bacterial infection or Viral infection. Most of them are due to Bacterial infection and can be treated by the use of Antibiotics, except Common cold, Runny nose and Influenza[1].

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

Antibiotics

Antibiotics are substances used to treat bacterial and fungal illnesses. These are incredibly helpful medications that have helped several kids with life-threatening conditions like meningitis, pneumonia, and septicaemia (blood poisoning) survive. Antibiotics are also useful in treating common bacterial infections in children, such as skin and middle ear infections. Antibiotics are among the most useful medications we have when administered properly. Antibiotics, however, are only effective against bacterial and fungal illnesses. They don't affect viruses in any way. Numerous illnesses, including common colds and some stomach disorders that result in diarrhoea, are virus-based and can only be eliminated by the body's defensive mechanisms[2]. It is frequently impossible to distinguish between infections caused by viruses or bacteria. This is especially true when upper respiratory tract infections are present. These infections are fairly prevalent and can cause earaches, runny noses, coughing, and sore throats. Most kids will have between five and ten of these illnesses' year, especially in the beginning when they start interacting with lots of other kids. The length and severity of the sickness as well as the existence of any other aggravating conditions will all play a role in the decision to prescribe an antibiotic in these situations. In order to identify the specific germ causing the infection, tests can be required[3,4].

Right One Antibiotic[5,6].

Physicians have a variety of antibiotics to select from. Some antibiotics are exclusive to a single type of bacterium, whereas others—referred to as "broad spectrum antibiotics"—are effective against a large range of germs. The goal of treatment is to match the appropriate antibiotic to the most likely pathogen responsible for the illness.

Antibiotic resistance makes bacterial illnesses more difficult to treat when drugs are abused or misused. When bacteria adapt and change, antibiotics that were formerly effective against that type of bacteria become ineffective. This is known as antibiotic resistance.

Side Effects of Antibiotic[7,8].

Antibiotics are not an exception to the rule that no medication is completely safe from adverse effects. When side effects do arise, though, they are often minor. It is diarrhoea that is most prevalent. Antibiotic allergies that are very severe are rare and often manifest as rashes. bloating and indigestion, diarrhoea, vomiting, nausea (feeling like you might throw up), stomach discomfort, lack of appetite, and many more side effects are the most frequent ones caused by antibiotics. Usually minor, these side effects should go away when your therapy is over. One in fifteen persons experience an allergic response to antibiotics, particularly cephalosporins and penicillin. Usually mild to severe, the allergic response manifests as a raised, itchy skin rash known as urticaria, or hives, as well as coughing, wheezing, and tightness in the throat that can make breathing difficult. Antihistamines are often an effective treatment for these mild to severe allergic responses. Anaphylaxis is a severe allergic reaction that can be fatal in rare instances when an antibiotic is used. The above-mentioned symptoms are frequently the initial ones that occur first and can include a fast heartbeat, breathing difficulties brought on by swelling and tightness in the neck, an abrupt and intense feeling of dread and anxiety, a sharp and sudden drop in blood pressure that leaves you dizzy and confused, and even unconsciousness. Anaphylaxis is a medical emergency and can be life-threatening if prompt treatment is not given.

ANTIBIOTICS	SIDE EFFECTS
Amoxicillin	• Upset stomach • Diarrhoea • Vomiting • Rash
Gentamicin	• Nausea • Loss of appetite • Injection site reactions (pain, irritation, and redness)
Ciprofloxacin	• Mild diarrhoea • Stomach ache • Watery bowel movements
Cefixime	• Constipation • Gas • Increased night-time urination • Loss of appetite
Azithromycin	• Diarrhoea and loose stools • Abdominal pain • Rash
Cefdinir	• Indigestion • Diaper rash in an infant taking liquid cefdinir

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

	• Itching
Cephalexin	• Vaginal itching or discharge • Joint pain
Trimethoprim	• Stomach cramps and pain • Watery bowel movements • Upset stomach, throwing up

(Table No. 1 Mostly Used Antibiotics in Paediatric and Their Side Effects)

As use of above-mentioned allopathic Antibiotics leads to such number of side effects and can prove harmful to infants and children. So, instead of them use of Haritaki churna would prove beneficial to treat bacterial infections with not so severe and minimum side effects. Also, they are as potent as conventional antibiotics.

Churna[9]

According to Ayurveda, Churna is a mixture of powdered herbs and or minerals used in Ayurvedic medicine. After being individually ground, all of the ingredients are combined. Raj and Kshada are other names for Churna. Churnas come in a wide variety, and each kind has a distinct market need.

Haritaki (Terminalia chebula)[10,11].

T. chebula is referred to as the "King of Medicine." Since it is believed to be sacred to God Siva (Hara) or to carry away all ailments, it is commonly known as "Haritaki." There are many intriguing synonyms for "Haritaki". Terminalia chebula is a flowering evergreen tree of the family Combretaceae. It has several common names such as black myrobalan, ink tree, or chebulic myrobalan.

A medium- to large-sized, densely branching deciduous tree, Terminalia chebula may reach heights of up to 30 metres and girths of 1 to 1.5 metres. The elliptical leaves are 10–30 cm long, having a cordate base and a sharp apex. There are six to eight pairs of veins in the leaf vasculature. Located in short panicles or simple terminal spikes, the flowers are monoecious, short stalked, dull white to yellow, and have a strong, disagreeable scent. Fruits are yellowish-green, ovoid drupes that are 3-6 cm long and 1.3–1.5 cm wide, with one oval seed.

Fig. No. 2- *Haritaki* Fruits

Chocolates[12]

Chocolate is a culinary preparation made from ground and roasted Theobroma cocoa beans that has a distinctively sweet taste and is usually scented with vanilla. It can be produced as a liquid, paste, block, or as a flavouring for other desserts. With evidence of chocolate beverages reaching back to 1900 BC, the Mokaya (Mexico and Guatemala) are the people from whom the oldest uses are known to have originated. Actually, most people in Mesoamerica drank chocolate-flavoured drinks; this includes the Maya and Aztecs, who created a beverage called "bitter water" in Nahuatl. Chocolate is a very versatile and sophisticated food that can be used to create a wide range of flavour and texture experiences. Additionally, because chocolate is an anhydrous media, it resists the development of microorganisms and the hydrolysis of active ingredients that are sensitive to water. In many ways, chocolate is an excellent delivery system for active ingredients. For instance, the organoleptic properties of chocolate work wonders in mitigating the unpleasant flavours associated with certain active agents and in imparting a smooth and even texture to otherwise unpleasantly grainy active agent compositions.

Delivering Haritaki Churna through chocolate-based dosage form will be an interesting approach to overcome the limitation associated with conventional therapies and also it will bridge the gap of traditional and modern system of medicine. *Churnas* are traditionally acclaimed effective but there are no or less evident, hence to give a scientific background to all traditional claims, this study can be a supportive adds on. As such *churna* preparations are not

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

that much palatable to patients so to make it more palatable or patient friendly.

Fig No. 3- Chocolate bars

MATERIAL AND METHOD

Drug Review

- **Plant Profile (Haritaki Gunakarmas)**[13,14,15,16].

A blooming evergreen tree in the Combretaceae family is Terminalia chebula. It is also known by a number of colloquial names, including chebulic myrobalan, black myrobalan, ink tree, and haritaki in Sanskrit and Bengali, harad in Hindi, harada in Marathi and Gujrati, Karkchettu in Telugu, and Kadukkaya in Tamil. T. chebula is referred to be the "King of Medicine" in Tibet. Since it is believed to be sacred to God Siva (Hara) or to carry away all ailments, it is commonly known as "Haritaki". Haritaki has a number of intriguing synonyms, including "pathya," which means that it clears obstructions from the body's channels and pathways; "abhaya," which means that it instills fearlessness; "amrta," which means ambrosia; "divya," which means a divine herb; "medhya," which means a nerve tonic; "pranada," which means life-saving; "jivaniya," which means a vitalizing herb; "vayahstha," which means one that maintains youth and longevity; "rasayana phala," which means a fruit, etc. According to Indian legend, this portion formed from the ambrosa (Amrita) droplets that fell to Earth after God Indra drank them.

Biological Source

It consists of dried ripe fruits of *Terminalia chebula* Retz. belonging to the Family Combretaceae.

Botanical Description (Taxonomy)

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Myrtales
Family: Combretaceae
Genus: Terminalia
Species: chebula

Fig. No. 4- Dried *Haritaki* Fruits

Habit and Habitat

With a height of up to 30 metres and a girth of 1-1.5 metres, Terminalia chebula is a medium- to big, densely branching deciduous tree. The elliptic, 10-to 30-cm-long leaves have a cordate base and a sharp tip. Six to eight pairs of veins make up the leaves' vasculature. Simple terminal spikes or short panicles of flowers with short stalks, monoecious, dull white to yellow colour, and a strong, disagreeable scent are common. One oval seed is contained in the yellowish-green, ovoid, drupe fruits, which are 3-6 cm long and 1.3-1.5 cm wide. Clayey and shady soils are not the only conditions in which T. chebula may thrive. The trees may reach heights of up to 2000 metres above sea level, as well as temperatures between 0 and 17 degrees Celsius and annual rainfall of 100 to 150 centimetres. Nevertheless, chebula is native to Asia and may also be found in Pakistan, Yunnan, Tibet, Guangdong, and Guangxi region in China, as well as in Egypt, Nepal, Sri Lanka, Iran, and Turkey. It is found in India's deciduous woods in West Bengal, Uttar Pradesh, Andhra Pradesh, Kerala, Himachal Pradesh, and Karnataka.

Plant Fruits Varieties

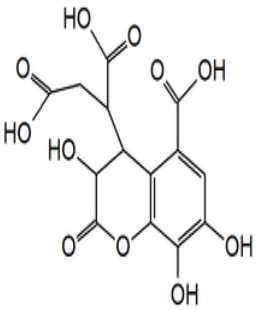
There are seven varieties of T. chebula (haritaki) depending on the kind of fruit; Vijaya is regarded as the finest.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

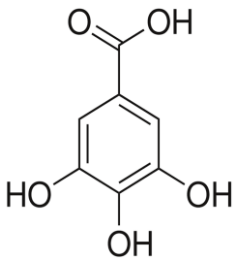
1) Vijaya, in Vindhya, has an oval form.
2) Rohini: a spherical, ubiquitous plant.
3) Pototana, Sindh: compact and less voluminous.
4) Bulky Amruta- Champaranya.
5) Five lines represent eye problems on the Abhaya-Champadesha fruit.
6) Coloured in yellow, Jeevanti, Saurashtra.
7) Chetaki- found in the Himalayas- having three lines on it.

Chemical Constitution

32% of T. chebula is made up of tannin. T.chebula belongs to the pyrogallol (hydrolyzable) type and has 14 hydrolyzable tannin constituents (gallic acid, punicalagin, chebulanin, corilagin, neochebulinic, ellagic acid, chebulegic acid, chebulinic acid, 1,2,3,4,6,-penta-O-galloyl-β-D-glucose, 1,6,-di-O-galloyl-D-glucose, casuarinin, 3,4,6-tri-O-galloyl-D-glucose and terchebulin). The diversity in geology affects the tannin concentration. Other chemicals that were recovered included phenolic compounds, triterpenoids, coumarin conjugated with gallic acid termed chebulin, and flavonol glycosides. Furthermore, T. chebula fruit was used to separate luteolin and ethyl gallate. Nutrients including protein, amino acids, and vitamin C are also included.



Chebulic acid



Gallic acid

Therapeutic Uses

Because of its incredible healing abilities and broad variety of biological and pharmacological applications, T. chebula is known as the "King of Medicines" in Tibet. gastrointestinal motility enhancing and anti-ulcerogenic, hepatoprotective, cardioprotective, radioprotective, antidiabetic and radioprotective, antispasmodic, wound healing, purgative, immunomodulatory, and chemo preventive, among other properties.

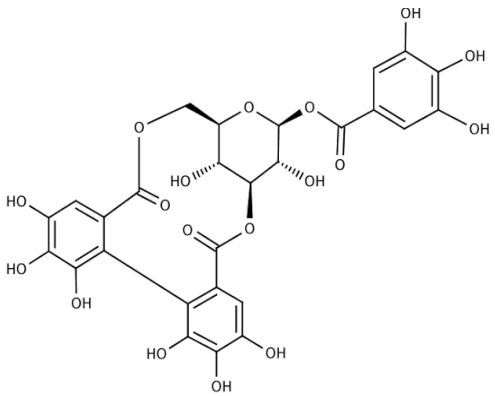
Collection of Haritaki fruits

One of the biggest issues that researchers have when working with herbal compounds is sample collecting. It is exceedingly difficult to prevent the effects of habitat differences, collecting times, and geographical changes in the same species on the quality of the medication. In addition to these seasonal fluctuations, collecting techniques also contribute to the problems that undermine the consistency of raw medication. All of these elements have an impact on the finished outcome, thus in a research project, these mistakes should be kept to a minimum. It is quite difficult to obtain pure samples of a single location that are gathered during the same season since market samples are frequently collected from several habitats and mixed together.

Classics have noted that medications lose their efficacy after a year in their natural condition. All of these factors were taken into account when gathering fresh fruits. Ripe fruits that naturally fall from trees were gathered. Small, immature, and partly ripened fruits were not consumed. Additionally, mature fruits with worm indications or minor damage sustained after falling were not chosen. Approximately thirty fruits were gathered.

Place of Collection

Fruits were collected from the trees grown wild in natural habitat,



Village: Janai Malai
District: Satara
State: Maharashtra
Latitude: 17.6501° N
Longitude: 74.0329° E
Period of Collection:
Type of Soil: Laterite soil
Weather Conditions: Temperature: 20 + 10° C; Humidity: 60% + 20%

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

Fig. No. 5- Collected *Haritaki* Fruits

Authentication of raw material (Haritaki fruits)

The fresh fruits collected were further dried and authentified to be Terminalia chebula by Head of the Botany Department of Lal Bahadur Shastri College, Satara.

Organoleptic properties

- **Colour** - Intact fruit yellowish-brown.
- **Shape** - Ovoid.
- **Size** - 20-35 mm long, 13-25 mm wide, wrinkled and ribbed longitudinally, pericarp fibrous, 3-4 mm thick, non-adherent to the seed.
- **Taste** - Astringent (Kashaya Pradhan- five rasas).

Fig. No. 8- Fruits rejected in Ghana test

Selection of fruits (Prashasta Haritaki Lakshana)

All of the fruits that had been gathered were put through tests, such as Prashasta Haritaki Lakshanas, which Bhavaprakasha Nighantu described. The results were as follows,

- **New**

Every fruit that was gathered when it was still fresh met this requirement.

- **Snigda**

Fruits that were dry and scaly were separated and not included for additional testing.

Fig. No. 7- Fruits rejected in Snigda test

Ghana

Fruits that were solidly hollowed out were discarded. This finding was connected to the appearance of worms in apples.

Fig. No. 6- Fruits which passed new test

- **Vritta**

Haritaki fruits came in a variety of forms, from round to oval, and with three to five ridges on them. In most cases, ridges were only partially apparent, and the number of ridges varied not just across plants but even between fruits on the same tree.

Fig. No. 9- Vritta (Variety of fruits)

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

Guru

Assessment was done with below mentioned submerging test.

- **Submerging in water**

Every fruit that met the requirements was submerged in water. Fruits that floated were discarded, while those that sank in the water were collected for analysis. A few fruits were hanging in between; they were also left out of the research.

Fig. No. 10- *Guru* (Submerging test)

Weighing 2 karsha (~20gm)

The weight of the fruits varied greatly, ranging from 3 to 16 grammes. Fruits should weigh no more than 8 to 12 grammes, with certain exceptions. Although scriptures have said that the fruits of the two Karsha are Shrestha, these fruits were not present in the current investigation. Fruits weighing less than 6 grammes were discarded and not taken into consideration. Fruits weighing between 6 and 16 grammes that passed every test but two karsha weight were used to prepare the medication. [14]

Haritaki fruits which possess these qualities turned out to be 18 out of 30 and are termed as Shrestha which can be further used for preparation of Churna.

Preparation Of Haritaki Churna[17]

- Freshly picked Haritaki fruits that passed the Prasheetha Lakshana test were consumed.
- These fruits were then crushed using metallic Mortar and pestle to get coarse powder of fruits.
- Further the fine powder was obtained by grinding using mechanical grinder.
- The fine powder was then passed through the Sieve of mesh size 80 to get uniform particles.
- Then, the Churna was prepared and weighed. Packets weighing two grammes each were placed in zip-lock bags after being weighed on an analytical balance to prevent dose variations and ensure uniform pharmaceutical distribution. [14]

Fig. No. 11- Haritaki churna

VALUATION OF HARITAKI CHURNA CHOCOLATES (MEDICATED CHOCOLATE)[18,19].

1. **Determination of pH**

The 1% pH Using a pH metre, the Churnas solution was ascertained.

2. **Determination Of Ash Value**

- **Total Ash Value:** In a silicon crucible that had been previously burned and tarred, two grammes of churna were precisely weighed. After that, the substance was ignited by progressively raising the heat to 500–600℃ until it became white, signifying the lack of carbon. After cooling in a desiccator, the amount of total ash in milligrams per gramme of air-dried material is determined.
- **Acid Insoluble Ash Value:** After adding 25 millilitres of HCl to the crucible holding all of the ash and slowly boiling it for five minutes, around

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

5 millilitres of hot water were added and put into the crucible. A filter paper with less ash was used to gather the insoluble material. After that, the filter paper and the insoluble material were placed in a crucible and burnt to constant weight. The filtrate was then cleaned with hot water until it was neutral. After letting the residue cool, it was weighed.

3. Determination Of Extractive Value

- **Water Soluble Extractive Value**

Five grammes of churna were precisely weighed and then added to a conical flask with a glass stopper. It is then macerated for eighteen hours in 100 millilitres of chloroform water. After filtering, around 25 millilitres of the filtrate were placed in a China dish and dried over a water bath. After six hours of drying at 105° C, it was chilled and then weighed.

- **Alcohol Soluble Extractive Value**

The extraction process remained the same, however ethanol was utilised as the solvent instead of chloroform water.

4. Determination Of Crude Fibre Content

A round-bottom flask containing 2 grammes of precisely weighed churna was filled with 100 millilitres of 0.128 M sulfuric acid, refluxed for an hour, and then filtered through ash-free filter paper. The residue was then rinsed with water until the filtrate turned neutral. After that, the residue was weighed (a), burned to ash, and the weight of the ash (b) was calculated.

Based on dry weight, the difference between a and b indicated the crude fibre content.

5. Determination Of Heavy Metal Contamination

- **Preparation Of Sample**

Preparation of Churna solution

One gramme of churna was diluted with one hundred millilitres of distilled water to create the churna solution. This is used to do qualitative testing for mercury as well as limit tests for iron and lead as well as tests for arsenic levels.

- **Arsenic Content**

Preparation of Standard Solution (10PPM):

After dissolving 0.33 grammes of arsenic trioxide in 5 millilitres of 2M sodium hydroxide solution, the mixture was diluted to 250 millilitres using water. After that, one litre was diluted with 100 volumes of water.

Procedure:

Pipetting out 10 millilitres of churna solution into a flask, followed by the addition of around 10 millilitres of concentrated nitric acid and drying on a water bath are the next steps. After drying the residue for thirty minutes at 130° C, 10 millilitres of hydrazine molybdate reagent were added, and the mixture refluxed for twenty minutes. Following cooling, the solution was tested using a UV spectrophotometer for absorbance at 800 nm in both the test and reference solutions.

- **Limit Test for Iron**

Preparation of Standard Solution (20 PPM):

Distilled water was used to dilute one volume of 0.1726% w/v ferric ammonium sulphate solution in 0.05 M sulfuric acid to ten litres.

Procedure:

In Nessler's cylinder, a limit test was run. Two millilitres of the test and reference solutions were placed in individual cylinders, followed by the addition of two millilitres of a 20% citric acid solution and 0.1 millilitre of thioglycolic acid. After mixing the mixture and adding iron-free ammonia, the solution was diluted to 50 millilitres using purified water. After allowing it to stand for five minutes, the sample's colour was compared to the standard colour. The sample was considered to fail the limit test if the colour generated during the test was greater than that of the standard solution, and to pass the test if the opposite happened.

a. **Limit Test for Lead**

Preparation of Standard (20 PPM):

250 millilitres of water were created by dissolving 0.4 grammes of lead nitrate in 2 millilitres of nitric acid. Distilled water was used to dilute about one volume of the aforesaid solution to ten volumes.

Procedure:

In Nessler's cylinder, a limit test was conducted. One milliliter each of the test and standard lead solutions were placed in separate cylinders. The 25 milliliters of

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

distilled water were then used to dilute the solutions to a volume of 35 milliliters. The pH was then adjusted to a value of 3–4 by adding diluted ammonia solution or acetic acid. Ten milliliters of freshly made hydrogen sulfide solution were added to each solution, combined, and diluted to fifty milliliters with water. After five minutes of standing, it was observed looking down over a white surface. If the color generated in the test solution is not more vivid than that of the reference solution, the sample is said to have passed the lead limit test.

b. **Test For Mercury**

A white precipitate was obtained by adding 6M HCl to 10 drops of test solution. After that, a 6 M ammonia solution was used to treat the precipitate. There may be mercury present if the precipitate turns gray or black in color.

6. Determination Of Microbial Content

The amount was adjusted to 100ml using the same medium after 1g of churna was dissolved in lactose broth. After adding around 10 millilitres of sample to 100 millilitres of MacConkey broth, the mixture was incubated at 43–45 degrees Celsius for 18–24 hours. On a plate containing MacConkey agar, a subculture was created and cultured for 18 to 24 hours at 43 to 45°C. The presence or absence of Escherichia coli is indicated by the formation of red, usually non-mucoid colonies of gram-negative rods that show as reddish zones.

7. Anti-Microbial Activity[20]

The antimicrobial activity of Haritaki using ethanol solvent against strains of aerobic and anaerobic micro-organisms was evaluated by standard cup and plate method. The culture medium utilised for this nutrient is agar medium. We utilised pre-sterilized petri dishes to conduct an antibacterial test. We incubated the petri plates at 370C for 24 hours. The aseptic conditions were then maintained as the agar culture medium was evenly applied to the petri dish. To harden the agar medium, it is spread out, covered with a second petri plate, and refrigerated for a full day. Once this was done, the plates were taken out and cups were constructed on them. Bacillus subtilis and E. Coli strains of microorganisms were evenly distributed on both plates in an aseptic environment. Gentamicin 1 ml of the standard solution was pipetted into one of the petri plates in the cups that were made, and Haritaki churna solution was pipetted into the other plate under aseptic conditions. Following that, 370C was used to incubate these two plates for a full day. The inhibitory zones that developed on petri plates after the incubation time were measured.

8. Formulating Chocolate base[21]

It was 50°C in the oven. Syrup was made by placing sugar and water in a beaker and heating it for four to five minutes. After that, cocoa butter was taken and baked for one minute in a beaker. Following the removal of the sugar syrup from the oven, cocoa powder was added and thoroughly combined. Next, lecithin was added and well combined. The process of making chocolate is carefully monitored to make sure that the mixture's temperature is not too high. The chocolate foundation mixture above was then chilled to solidify. Here, additional flavour of vanilla essence was added in order to mask the strong odour of Cocoa powder and pungent smell of Lecithin. Also, when chocolates are properly solidified and are to be removed from the moulds, there is a possibility that the formulation would break during removal, which would cause the formulation to not shape properly. Dicalcium phosphate, an adsorbent, was thus added to the formulation to solve this issue.

S	INGREDIENTS	CATEGORY	QUANTITY (gm)
1.	Cocoa powder	Principle Ingredient	12.50
2.	Cocoa butter	Solidifying agent	5.00
3.	Lecithin	Emulsifier	0.30
4.	Pharmaceutical grade sugar	Sweetening agent	10.00
5.	Vanilla essence	Flavouring agent	0.20
6.	Dicalcium phosphate	Adsorbent	2.00

Table No. 2 Formulation of Chocolate base

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

9. Formulation Of Haritaki Churna Chocolates (Medicated Chocolate)

I had the oven set to 50°C. Once the chocolate foundation was melted, it became a liquid that flowed freely. Following the previous stage, the necessary amount of medication—Hariti churna—was added. The entire mass was then thoroughly mixed to guarantee even mixing with the aid of a stirrer. The aforementioned liquid was then transferred into a polycarbonate set mould and chilled for 15 minutes to solidify it. Subsequently, the chocolates are released from their mould and put through additional assessment procedures.

Fig. No. 12 Formulation of Haritaki Churna Chocolates (Medicated Chocolate)

SR. NO.	INGREDIENTS	CATEGORY	QUANTITY (gm)
1.	Chocolate Base	Vehicle	
2.	*Haritaki churna*	API	2.00

(Table No. 3 Formulation of Haritaki churna chocolates (Medicated Chocolate)

10. Evaluation of Haritaki churna Chocolates[22]

- **Colour, odour, taste, texture and mouth feel characteristics**

This was evaluated by observing the chocolates and further administering them for taste and mouth feel characterisation.

- **Blooming Test**

1. Fat Bloom Test

The chocolate will become less glossy and develop a soft, white coating on the surface when a thin layer of fat crystals formed on the formulation, giving the end product an unappealing appearance. The migration of a filling fat to the chocolate layer or the recrystallization of lipids are the two main causes of fat bloom. The onset of fat bloom will be postponed by storage at a steady temperature.

2. Sugar Bloom Test

Every Sample underwent treatment cycles that included,

a. 30°C for 11hrs,
b. Temperature shifting for 1 hr,
c. 18°C for 11hrs, and

changing the temperature for an hour. Whether or not blooming had taken place was determined by monitoring a test chocolate formulation for 11 hours at 18°C.

- **Dimensions**

The Dimensions of five formulations was determined using Scale for length and width, And Vernier calliper for Thickness. The variation limit allowed is +5%.

- **Weight variation**

Five formulations were chosen at random and weighed separately as part of a weight variation investigation conducted in accordance with USP. It was computed what the average weight and standard deviation were.

RESULTS AND DISCUSSION

1. Evaluation of Haritaki Churna

a. Physical Parameters

SR. NO.	PHYSICAL PARAMETERS	VALUES
1.	pH	5.357
2.	Ash values	
	a. Total ash value b. Acid insoluble ash	10% w/w 5% w/w
3.	Extractive values	
	a. Water soluble extractive value b. Alcohol soluble extractive value	0.12% w/w 2%w/w

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

4.	Crude fibre content	9.75% w/w

(Table No. 4 Physical Parameters of Haritaki Churna)

b. Detection of Heavy Metals

SR. NO.	HEAVY METALS	VALUES
1.	Arsenic (Spectrophotometry)	0.205 ppm
2.	Iron (Limit test)	Within the limit
3.	Lead (Limit test)	Within the limit
4.	Mercury (Qualitative analysis)	Absent

(Table No. 5 Heavy Metals of Haritaki Churna)

c. Detection of Microbes

SR. NO.	MICROORGANISM	PRESENT/ABSENT
1.	*Escherichia coli*	Absent

(Table No. 6 Detection of Microbes of Haritaki Churna)

d. Antimicrobial Test

Zone of inhibition of Gentamicin (44 mm) was found to be slightly more than the Zone of inhibition due to *Haritaki churna* (40 mm).

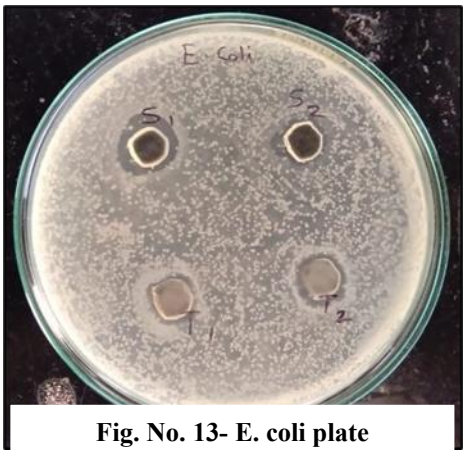


Fig. No. 13- E. coli plate

Fig. No. 14- Bacillus subtilis plate

2. EVALUATION OF *HARITAKI CHURNA* CHOCOLATE

a. Physical Parameters

Stability Study was carried out by keeping samples at room temperature for 1 month and results obtained are as followed,

SR. NO.	TEST	OBSERVATION	RESULT
1.	Colour	Dark Brown	No change
2.	Odour	Pleasant	No change
3.	Taste	Sweet	No change
4.	Texture	Smooth and Glossy	No change
5.	Mouth feel characterisation	Pleasant	No change
6.	Blooming tests:		
	Fat bloom test Sugar bloom test	No bloom No bloom	No change No change

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

(Table No. 7 Physical Parameters of Haritaki Churna Chocolate)

b. Dimensions

SR. NO.	LENGTH	WIDTH	THICKNESS
1.	2.4 cm	2.4 cm	1 cm
2.	2.4 cm	2.4 cm	1 cm
3.	2.4 cm	2.4 cm	1 cm
4.	2.4 cm	2.4 cm	1 cm
5.	2.4 cm	2.4 cm	1 cm
Average	**2.4 cm**	**2.4 cm**	**1 cm**

(Table No. 8 Dimensions of Haritaki Churna Chocolate)

c. Weight Variation

SR. NO.	WEIGHT OF CHOCOLATE
1.	8.85
2.	8.70
3.	8.65
4.	8.81
5.	8.78
Average	**8.75**

(Table No. 9 Weight Variation of Haritaki Churna Chocolate)

d. Antimicrobial Test

Zone of inhibition due to *Haritaki churna* chocolate was found to be 40mm slightly less than that of standard Gentamicin antibiotic 46mm.

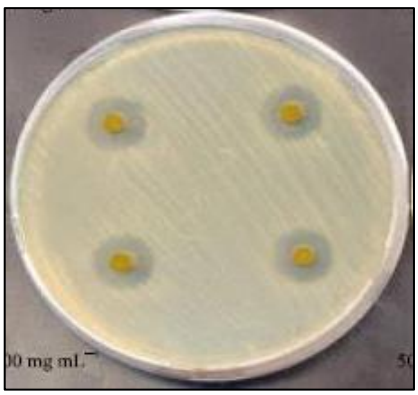


Fig. No. 15- E. coli plate

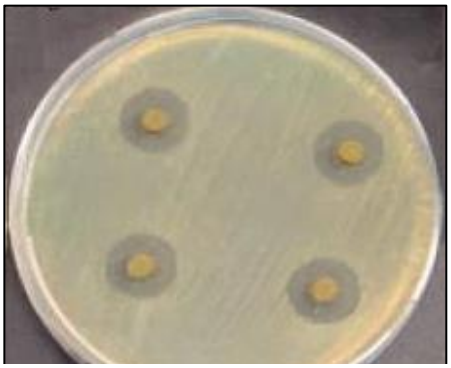


Fig. No. 16- *Bacillus subtilis* plate

CONCLUSION

The ancient science of life known as Ayurveda has a lengthy history, and its fundamental ideas could still hold true today. There has long been a recognition of the need for Ayurvedic medicine to be collaborated with modern technology. But the fundamental component of all sciences is the ongoing pursuit of new information through investigation, advancement, and innovative applications. When designing dose forms, patient compliance and ease of administration are becoming increasingly crucial considerations. The creation of an attractive and patient-friendly medication administration system for pediatric and elderly patients has received more attention recently. Haritaki churna has proven to be similar in its antibacterial activity as compared to that of Gentamicin antibiotic. Different parameters were considered for the evaluation of the churna including pH, ash value, extractive value, crude fiber content, heavy metal contamination, results of which navigated towards an acceptable formulation. After which the churna was incorporated in chocolate base and final formulation was then evaluated for physical parameters, dimensions, weight variation and antimicrobial activity. Final results indicated a formulation having antibiotic effect with few adverse actions and higher patient compliance.

REFERENCES

(1) Posfay-Barbe, K. M. Infections in Paediatrics: Old and New Diseases. *Swiss Med. Wkly.* **2012**, *142* (JULY), 1–10. https://doi.org/10.4414/smw.2012.13654.

(2) Frieri, M.; Kumar, K.; Boutin, A. Antibiotic Resistance. *J. Infect. Public Health* **2017**, *10* (4), 369–378.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(1), 2788-2800 | ISSN:2251-6727

https://doi.org/10.1016/j.jiph.2016.08.007.

(3) Hutchings, M.; Truman, A.; Wilkinson, B. Antibiotics: Past, Present and Future. *Curr. Opin. Microbiol.* **2019**, *51* (Figure 1), 72–80. https://doi.org/10.1016/j.mib.2019.10.008.

(4) Zhang, J.; Waite, L. M. TX Antibacteriano En NEUMONIA POR ASPIRACION. **2018**, 2201–2213.

(5) Elbers, P.; Girbes, A.; Malbrain, M. L. N. G.; Bosman, R. Right Dose, Right Now: Using Big Data to Optimize Antibiotic Dosing in the Critically Ill. *Anaesthesiol. Intensive Ther.* **2015**, *47* (5), 457–463. https://doi.org/10.5603/AIT.a2015.0061.

(6) Leibovici, L.; Shraga, I.; Andreassen, S.; Pauker, S. G.; Rothberg, M.; Weinberg, J. R.; Duerden, B. I.; Drickamer, M. A. How Do You Choose Antibiotic Treatment? *Bmj* **1999**, *318* (7198), 1614. https://doi.org/10.1136/bmj.318.7198.1614.

(7) SARAH EVERTS. Antibiotic Side Effects Explained. *Chem. Eng. News Arch.* **2013**, *91* (21), 9. https://doi.org/10.1021/cen-09121-notw4.

(8) Bayarski, Y. Antibiotics and Their Types , Uses and Side Effects. **1928**, 6.

(9) Osmanoglu, O. O. Comparing to Techniques Used in Customer Churn Analysis. *J. Multidiscip. Dev.* **2019**, *4* (1), 30–38.

(10) Aneja, K. R.; Joshi, R. Evaluation of Antimicrobial Properties of Fruit Extracts of Terminalia Chebula against Dental Caries Pathogens. *Jundishapur J. Microbiol.* **2009**, *2* (3), 105–111.

(11) Eltayeb, S. A. I.; Ibrahim, D. A. A. M. World Journal of Pharmaceutical Research FREEZE DRYING. *World J. Pharm. Res.* **2015**, *4* (6), 96–111. https://doi.org/10.20959/wjpr20227-24265.

(12) Verna, R. The History and Science of Chocolate. *Malays. J. Pathol.* **2013**, *35* (2), 111–121.

(13) Rathinamoorthy, R.; Thilagavathi, G. Terminalia Chebula - Review on Pharmacological and Biochemical Studies. *Int. J. PharmTech Res.* **2014**, *6* (1), 97–116.

(14) Klika, K. D.; Saleem, A.; Sinkkonen, J.; Kähkönen, M.; Loponen, J.; Tähtinen, P.; Pihlaja, K. The Structural and Conformational Analyses and Antioxidant Activities of Chebulinic Acid and Its Thrice-Hydrolyzed Derivative, 2,4-Chebuloyl-β -D-Glucopyranoside, Isolated from the Fruit of Terminalia Chebula. *Arkivoc* **2004**, *2004* (7), 83–105. https://doi.org/10.3998/ark.5550190.0005.708.

(15) Mahesh, R.; Ramesh, T.; Nagulendran, K.; Velavan, S.; Begum, H. Effect of Terminalia Chebula on Monoamine Oxidase and Antioxidant Enzyme Activities in Aged Rat Brain. *Pharmacogn. Mag.* **2007**, *3* (12), 240–244.

(16) Gupta, P. C. Biological and Pharmacological Properties of Terminalia Chebula Retz. (Haritaki)-an Overview. *Int. J. Pharm. Pharm. Sci.* **2012**, *4* (SUPPL.3), 62–68.

(17) Khan, M. R. U. Z.; Yanase, E.; Trivedi, V. Extraction, Phytochemical Characterization and Anti-Cancer Mechanism of Haritaki Churna: An Ayurvedic Formulation. *PLoS One* **2023**, *18* (5 May), 1–28. https://doi.org/10.1371/journal.pone.0286274.

(18) Kopparam, M.; Kumar, T. V.; Anantha Narayana, D. B.; Nandeesh, R. Development of Hingwastak Churna Granules and Tablets by Dry Granulation Technique for Improving Patient Compliance. *Indian Drugs* **2014**, *51* (10), 23–28. https://doi.org/10.53879/id.51.10.10165.

(19) Chamundeeswari, D.; Kanimozhi, P.; Reddy, C. U. Formulation and Evaluation of Churna for Digestive Property. *J. Med.* **2007**, 1–5.

(20) Gonelimali, F. D.; Lin, J.; Miao, W.; Xuan, J.; Charles, F.; Chen, M.; Hatab, S. R. Antimicrobial Properties and Mechanism of Action of Some Plant Extracts against Food Pathogens and Spoilage Microorganisms. *Front. Microbiol.* **2018**, *9* (JUL), 1–9. https://doi.org/10.3389/fmicb.2018.01639.

(21) . R. S.; . K. M.; . S. S.; . A. V. Design and Fabrication of Medicated Chocolate Formulation by Chocolate Drug Delivery System. *J. Curr. Pharma Res.* **2017**, *8* (1), 2255–2265. https://doi.org/10.33786/jcpr.2017.v08i01.002.

(22) M's, P. S. G. V. P. Research: Chocolate Formulation As Drug Delivery System for Pediatrics. *Indian J. Drugs* **2019**, *7* (4), 133–139.