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THE AYURVEDIC REMEDY: FORMULATION AND ASSISTMENT OF BETEL, BAEL AND NEEM BASED MULTI-HERBAL ANTHELMINTIC VATI PREPARATION FOR PARACIDAL ERADICATION

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ABSTRACT

Ayurvedic remedy refers to as traditional healing practice originating in india that utilizes natural ingredients, such as herbs, spices and minerals, to promote balance and well-bing in the body.In a contemporary study, efforts have been made to formulate multi-herbal formulation and estimate its anthelmintic activity against earthworm. Anthelmintic resistance presents a substantial obstacle in the battle against parasitic infections on a global scale. In which ethnopharmacological multi-herbal formulation that is "Vati Kalpana" preparation is formulated by the various herbs. Vati preapration is typically associated with the "Ayurveda", a system of medicine that originated in india. In ayurveda, vati referes to herbal pills or tablets prepared by using various herbs and other natural ingredients. For this formulation different herbs that are *Piper Betle*, *Aegle marmelos Correa* and *Azadirachta Indica* are employed and all have anthelmintic activity.The pharmacognostic analysis of this multi-herbal formulation is involves organoleptic evaluation, disintegration, friability, weight variation, hardness, and thickness tests are performed. This evaluation indicates the quality and purity of a preparation. Subsequently after formulation, evaluation of anthelmintic activity is done by comparison with standard anthelmintic formulation. The anthelmintic activity was assessed using standard procedures involving indian earthworms (Pheretima posthuma) as the model organism.In which estimation is done on the basis of paralysis and death time of the earthworms upon exposure to different concentrations of the vati.

KEYWORDS Vermicidal, Estimation, Ethnopharmacological, Paralysis.

INTRODUCTION

The herbal formulation are the combination of various herbs, often in specific proportions and are designed to achieve desied therapeutic efficacy. Hebal formulation are commonly used in traditional medicinal system such as ayurveda. The preparation of **Ayurvedicvati** follows a systematic approach, where various herbs and adjuncts are methodically combined to create a unified mixture, subsequently shaped into small pills or tablets. The formulation harnesses the potent anthelmintic properties of *Piper betle*, *Aegle marmelos Correa*, and *Azadirachta Indica* harmoniously blending their diverse bioactive compounds to combat parasitic infestations effectively. The polyherbal formulations emerge as promising candidates due to their multifaceted composition and holistic approach towards treatment. Polyherbal vati, a traditional Ayurvedic formulation, holds significant potential in this regard, combining various medicinal herbs to address anthelmintic activity effectively.The worms found in the stomach are often parasites that can infect the gastrointestinal tract, leading to a range of health issues. For its management anthelmintic formulation are utilizes. Anthelmintic activity refers to the ability of a substance to kill or expel parasitic worms known as helminths, form the body. The anthelmintic activity is evaluated by the method that are **Adult Motility Assay, Egg Hatch Inhibition Assay, Larval Paralysis Time Assay**and **Larval Development Assay.**In that we use Larval Paralysis Time Assay method. ***Piper Betle,*** commonly referred to as betel leaves, are heart-shaped foliage extensively utilized across Southeast Asia for chewing, frequently alongside areca nut and slaked lime. Its Scientific name is ***piperbetlelinn*** and belongs to family **Piperaceae**. It is one of the evergreen plant which grown in Malaysia, Sri lanka, India and other places [1]. Leaves measure 10-20 cm in length, are broadly ovate, slightly cordate, and often uneven at the base. They are shortly acuminate, glabrous, and glaucous on the sides, appearing bright green or yellowish. The chemical constituents found in the piper betle leaves That are piperol-A, piperol-B, methyl piper betlol, terpinen-4-ol, safrole, eugenol, eugenyl acetate, hydroxyl chavicol, eugenol, piper betol, allylpyrocatecholmonoacetate, cadinenecarvacrol, allyl catechol, chavicol, pcymene, caryophyllene, chavibetol, cineole and estragolas. From that **beta-phenol, chavicol and other phenlic compounds** shows the **anthelmintic activity**. The other medicinal activity of piper betle leaves are antibiotic, antifertility, antihyperglycemic, antinociptive, analgesic and antidermatophytic activity [2].

Aeglemarmeloscorrea, also known as bael or bael fruit, is a tree indigenous to the indian subcontinent and Southeast Asia, belonging to the **Rutaceae** family. *Aegle marmelos*, a member of a monotypic genus, stands at a height of 25-30 feet, embodying the stature of a medium-sized herb. Its distinct characteristics include spreading, soft and thick bark that naturally peels. The fruits of *Aegle marmelos* exhibit a distinctive range in size, spanning from 2 to 4 inches in diameter, with the possibility of spherical or oval shapes[3]. The chemical constituents present in bael fruit are carotenoids, Phenolics, alkaloids, Pectins, tannins, coumarins, flavonoids, marmelosin, marmelide, marmin and terpenoids. For **anthelminticactivityalkaloids, terpenoids, flavonoids, marmelosin** and **luvangetin** are responsible. Its therapeutical activities are antipyretic, anti-inflammatory, antidysenteric, antidiarrheal, and anti-scorbutic. The ripe fruit, known for its aromatic, astringent, cooling, and laxative qualities. The unripe fruit is recognized for its stomachic, anti-scorbutic, and digestive properties [4]. ***Azadirachta indica***, commonly known as neem, is a tree native to the Indian subcontinent and widely distributed in tropical and subtropical regions. It belongs to the mahogany family **Meliaceae**. Neem finds extensive use in Ayurvedic and homeopathic medicine, gaining prominence in modern medical practices. *Azadirachta indica* A. Juss. typically reaches heights of around 18 meters, making it a small to medium-sized tree. Its crown can span up to 10-20 meters in diameter, showcasing its expansive presence in the environment[5]. The light green leaves of the neem tree are elegantly pinnate, measuring between 20 to 40 centimeters in length. The Chemical constituents present in neem leaves are nimbin, salannin, salannol, quercetin, triterpenoids, gedunin, azadirachtin, beta-sitosterol, nimbolide, azadiradione, azadirone, steroids, flavonoids and rutin. For **anthelmintic activity Quercetin, beta-sitosterol, polyphenolic** and **flavonoids** this chemical constituents are reponsible [6]. The neem tree is rich in phytochemicals with proven antimicrobial, antiviral, antifungal, anti-inflammatory, antiplasmodial, antiseptic, antipyretic, anti-diabetic, and anti-ulcer properties across its various parts, including leaves, fruit, seeds, oil, roots, bark, and twigs [7].

MATERIALS AND METHODS

Requirements

- **Apparatus**

The basic requirements for the formulation of vati or tablet are mixing bowl, wooden spatula or spoon, beaker, stirring rod, digital weighing balance, hot air oven and tablet punching machine etc.

- **Chemicals**

Neem leaves powder, Bael fruit powder, *Piper betle* leaves powder, Starch, Magnesium Stearate and Purified water etc.

Table. I Formulation of Multi-Herbal Vati/ Tablet

Sr. No.	Ingredients	Quantity Given (mg)	Quantity Taken (gm)
1	*Piper Betle* (Leaves Powder)	110 mg	11 gm
2	*Aegle Marmelos Correa* (Fruit Powder)	110 mg	11 gm
3	*Azadirachta Indica* (Leaves Powder)	110 mg	11 gm
4	Strach	24 mg	2.4 gm
5	Magnesium Stearate	6 mg	0.6 gm
6	Purified Water	q.s	q.s

Procedure

1)Weighing of Drugs

- Weigh accurately Neem leaves powder, Piper betle leaves powder and Bael Fruit powder respectively.
- Then place this weighed powder seperately into the hot air oven for few minutes for the removal of moisture form it.
- After that, put this dried powder into bowl and mix it properly.

2) Prepare the Slurry of Starch [8]

- Take the starch and purified water into the beaker.
- Then heat that solution for few minutes until the solution becomes viscous or slurry like.

3) Preparation of Granules by using Starch slurry (Wet granulation Method)

- Slowly transfer the starch slurry into bowl contains mixture of herbal drugs and prepare a damp mass.
- Then prepare granules with the help of Sieve no.30.
- later place this wet granules into the hot air oven for 15-20 minutes at 150°C.

4) Compression

- Then add small quantity of magnesium stearate into dried graules.
- Transfer this granules into hopper of tablet punching machine.
- Multi-Herbal vati or Tablets of uniform weight are prepared by using tablet punching machine.

Fig. I Formulated Multi-Herbal Vati/Tablet

Evaluation Parameters for Multi-Herbal Vati

Physical Evaluation:

- **Organoleptic Evalution**

Preliminary assistment determine the organoleptic characterstics of polyherbal vati that are colour, odour, taste and general appearance is examined with the help of sensory organs[9].

Physico-chemical Evaluation:

- **Weight Variation**

Twenty tablets were selected randomly from the formulation. Each tablet was individually weighed with the help of calibrated electronic weighing balance and average weight was determined. The deviation of each tablet from the average weight was then calculated, followed by computing percentage deviation[10].

- **Determination of Disintegration Time**

The 4 tablets or Polyherbal vati are taken for the estimation of disintegration time. The tablets were placed into disintegration apparatus (LABINDIA Tablet Disintegration Tester). Then set the program for run disintegration test apparatus. The 0.1N HCL is used as solvent for testing and temperature was maintained at 37°C. Then the time was observed untill the tablet or Vati were totally Disintegrated[11].

- **Determination of Friability:**

The Roche Friabilator is an instrument which is used for friability testing. For friability test 20 tablets were loaded in this instrument and before loading its individual as well as average weight of this 20 tablets were taken. This test was run at speed 100 rpm for 10 min. After an interval tablets are taken out from this apparatus and once again they are weighed. Friability is expressed as the % weight loss. The acceptance threshold for weight loss should not exceed than 8%. The formula for the friability was given as follows [12] :

Friability= {Initial weight (W_1) - Final weight (W_2) / Initial weight (W_1)} x 100

- **Hardness Test**

The hardness was assessed using Monsanto Hardness Tester[13].

- **Thickness**

The Thickness of tablets/vati was examined with the help of Vernier Calliper[14].

Analysis of Vermicidal Activity (Anthelmintic Activity)

Larval Paralysis Time Assay

1. Collection of Worm

The earthworms (Pheretima posthuma) of a 5-7 cm in length and 0.1-0.2 cm in width were sourced and underwent cleansing with normal saline to eliminate any fecal residues, making them suitable for anthelmintic research [15] [16].

2. Procedure of In-Vitro Anthelmintic Activity

- The experiment utilized mature Indian earthworms, Pheretima posthuma, chosen for their similarity to human intestinal roundworm parasites in anatomy and physiology.
- Total three groups are prepared that are; control, Standard and test.
- In the standard and test group add three worms in each plate.
- Then prepare standard albendazole 25% concentration dilution and herbal vati dilution in 25%, 50% and 100% concentration.
- Then to this test group introduced 10 ml of herbal tablet solution at concentrations of 25%, 50% and 100%.
- These treatments were compared against standard Albendazole at corresponding concentrations.
- Assessments were founded on the duration necessary for paralysis or demise of the earthworms.
- Death was identified when the worms displayed no movement despite vigorous agitation or when submerged in warm water (50°C).
- To minimize potential errors, three repetitions of each treatment were performed.
- Paralysis was recognized when the worms failed to recover in saline solution, whereas death was confirmed by the absence of movement and fading body color [17] [18].

3. Data Evaluation

The findings are presented as Mean ± Standard Error of Mean (SEM) for three earthworms in each group concerning paralysis and death duration, assessed via one-way ANOVA analysis using GraphPad Prism 2.01 software. The asterisk (*) symbol denotes statistical significance, with *$p < 0.01$ and **$p < 0.001$, indicating comparisons with the standard group treated with albendazole[19].

Analysis of Vermicidal Activity

Fig. II Normal Saline (0.9%)

Fig. III Albendazole (25%)

Fig. IV Herbal Tablet (25%)

Fig. V Herbal Tablet (50%)

Fig. VI Herbal Tablet (100%)

RESULTS

Organoleptic Evaluation of Multi-Herbal Vati

Sr No.	Parameter	Observations
1	Colour	Sage green
2	Odour	Characteristics
3	Taste	Slightly Bitter
4	Shape	Disc Shaped
5	Texture/Appearance	Smooth

Physico-chemical Evaluation of Multi-Herbal Vati

Sr. No.	Parameter	Observations
1	Weight Variation	361.3±0.74 mg
2	Disintegration Time	7.2±0.34 min
3	Friability	0.88±0.29%
4	Hardness	4.9±0.20 kg/cm^2
5	Thickness	3.7±0.04 mm

Anthelmintic Activity Result

Sr. No.	Treatment	Group	Concentration (%)	Paralysis Time (Min)	Death Time (Min)
1.	Normal Saline	I	0	-	-
2.	Albendazole	II	25	53.5±0.70	68.7±0.81
3.	Polyherbal Vati	IIIa	25	46.1±1.15	59.4±0.83

		IIIb	50	36.5±0.79	49.3±0.73
		IIIc	100	25.8±1.20	38.6±1.08

CONCLUSION

The formulation of a multi-herbal vati for anthelmintic activity offers a promising natural solution for combating parasitic worm infections. This polyherbal approach capitalizes on the traditional knowledge of Ayurveda. In that pharmacognostic analysis of this multi-herbal formulation is involves organoleptic evaluation, disintegration, friability, weight variation, Hardness and thickness tests were performed with the help of modern standardization techniques to ensure safety, efficacy and consistent therapeutic outcomes. The multi-herbal vati formulation demonstrates significant anthelmintic activity, indicating its potential as an alternative treatment for parasitic worm infections. The study likely showed effectiveness against common helminths through in vitro assays. Also validates the traditional use of herbal combinations in treating parasitic infections, supporting the integration of such formulations into modern healthcare practices, particularly in regions where access to synthetic drugs is limited. Further research is recommended to isolate and characterize the specific active compounds within the formulation. Additionally, clinical trials are necessary to establish efficacy and safety in human populations.

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