FORMULATION EVALUATION AND DEVELOPMENT OF ROOT EXTRACT OF BORASSUS FLABELLIFER

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ABSTRACT

Background: Herbal medicine has recorded roots dating back over 6,000 years in India. World Health Organization has described traditional medicine as one of the surest mean to achieve health care provision.

OBJECTIVE: To formulate and evaluate the properties of herbal topical formulation contains Borassus flabellifer root extract, analyses the antibacterial activity of those herbal topical formulation. **METHODOLOGY**: 50 g of the coarsely powdered plant root was packed in thimble and extracted with 250 ml ethanol in soxhlet apparatus. Phytochemical analysis of ethanol extract of B. Flabellifer was carried out by the standard methods. Two different topical formulation (ointment and cream) were formulated, we analysed the formulation for physical and chemical properties. Antibacterial activity of both the formulation was done by disc diffusion method. RESULTS: The ethanoic extract produced significant antibacterial activity. The ethanoic extract shows 00 mm zone of inhibition for *S.aureus* and 00mm for E.coli. The herbal formulations showed zone of inhibition of 00 mm for *S.aureus* and 00 mm for E.coli.

CONCLUSION: The formulation got antibacterial activity but comparing the physical properties of both the topical formulation cream was found to have much more antibacterial activity.

KEYWORDS: Borassus flabellifer, antibacterial activity, herbal formulation.

INTRODUCTION

Herbal medicine has recorded roots dating back over 6,000 years in India, China, and the Middle East, just to mention a few places. Still today, the vast majority of the people on this planet still use herbal medicine as their first choice of medicine. Latest trends have shown increasing demand of herbal medicinal products in the treatment of diseases. Herbal medicine is milder than pharmaceutical drugs, so it has fewer side effects, usually negligible. The scientific integration of herbal medicine in to modern medical practices must take in to account the interrelated issue of quality, safety and efficacy.

In general, medicinal plants may be associated with various kinds of contaminants, in which bacterial and fungal infections are regarded as the two dominating groups. To cope up with the increasing demand for quality herbal medicines in the domestics as well as export markets, the successful development of the herbal medicines will impact for the development of national health care systems, improvement of people welfare, creation of competitive pharmaceutical products and encouragement of new drug discovery in the pharmaceutical industry which ultimately contribute to economy of the people. Therapy with herbal drugs is an old tradition but those plants have been used over the years for the treatment of numerous health problem including infectious and non- infectious skin disorders.

About 25% of the prescription drugs dispensed in the world containing at least one active ingredient derived from the plant material some are made from plant extract; others are synthesized to mimic a natural plant compound. The World Health Organization (WHO) survey indicates that about 80% of the world formulations particularly in the developing countries rely on non-conventional medicines mainly of herbal sources in their primary health care. World Health Organization has described traditional medicine as one of the surest mean to achieve health care provision. Although WHO has developed guidelines for the quality control of herbal drugs which provide a detailed description of the techniques and measures required for the appropriate cultivation and collection of medicinal plants. Worldwide need of alternative medicine has resulted into growth of natural product markets and interest in traditional system of medicine. Though use of plants for health or medicinal purposes has been part of every culture or region when such therapeutic use is based on a ‘system’ it has benefit of systematic understanding for its usage. It is interesting to look to these approaches and principles for possible solutions.

It is well known that plants with medicinal properties are rich source of these antimicrobial compounds. The properties of many such plants still remain unrevealed. One such is *Borassus flabellifer* which belongs to family Arecaceae. This family has gained lot of importance in both its commercial and nutritive value. In nutritive aspects, fruits and root tubers are well rich in many types of nutrients such as sugars, calcium and iron and also phytochemicals

Borassusflabellifer

Species: *Borassus flabellifer (L.)*
Family: Arecaceae

The plant known by various names in different languages as follows:

Sanskrit **:** Tal
English **:** Palmyra palm
Hindi **:** Tal, Tar
Kanada **:** Tale mera
Marathi **:** Tad
Malayalam **:** Pana
Tamil **:** Panai
Telugu **:** Tadichettu

It is a medicinal plant commonly known as doubt palm, Palmyra palm, tale palm, toddy palm or wine palm, is native of Indian subcontinent and Southeast Asia. It is a robust tree and can reach a height of 30 meters (98 ft). It is the official tree in Tamil nadu known as **"karpahaverukshам"** and called as **'panai'.**

Wood is considered to be termite resistant and hence it is used in construction works. The stem has horny edges and hence it can be used as fencing. The coconut flour is rich in carbohydrates and it also has antimicrobial properties due to the presence of high amount of lauric acid in it. The juice obtained from the flowering stalks of B. flabellifer is used for the treatment of diabetes.*B. flabellifer* is a good source of carbohydrate, calcium, magnesium, iron, and fiber but, limited in fat and protein.

It possesses anti- inflammatory activity, stimulant, anti leprotic, diuretic, antiphlogistic, stomachic, sedative, laxative and aphrodisiac in nature used in hyper dipsia, dyspepsia, flatulence, skin diseases, hemorrhages, fever and general debility. Ash obtained by burning the inflorescence is a good antacid, antiperiodic and heart burn, splenomegaly and in bilious fever**.** The roots of this plant are cooling, restorative, diuretic, stimulant and

antiphlogistic. They are useful in hyperdipsia, burning sensation, strangury and inflammation. The juice of the young root is good for gastric catarrh and hiccup.

EXPERIMENTAL PROTOCOL

Preparation of plant extract

50 g of the coarsely powdered plant root was packed in thimble and extracted with 250 ml ethanol in sox let apparatus (> 75 degree Celsius but not more than 100 was maintained), after defatting with petroleum ether. The solvent extract was concentrated under vacuum using rotary vacuum evaporator and stored in air tight bottle until further use.

PREPARATION OF TOPICAL FORMULATION

OINTMENT

S.no	Ingredients	Official Formula 1000 g	Working Formula 10 g
1	Wool fat	50 g	0.5 g
2	Hard paraffin	50 g	0.5 g
3	Cetostearyl alcohol	50 g	0.5 g
4	White soft paraffin	825 g	8.25 g
5	Extract	25 g	0.25 g

Table 1 showing the ingredients of ointment

Hard paraffin, wool fat, ceto-stearyl alcohol and white soft paraffin were melted in a decreasing order of the melting point in a china dish. The molten liquid was poured in to the porcelain slab and mix with the help of the ointment spatula until semi solid consistency was achieved. And then 0.25 g of extract was added to the portion of prepared simple ointment on a porcelain slab and mixed, then it was stored in a well closed container in a cool place.

PREPARATION OF THE CREAM

S.no	Ingredients	Official Formula 100 g	Working Formula 10 g
1	Extract	10 g	1 g
2	White soft paraffin	50 g	5 g
3	Bees wax	10.67 g	1.067 g
4	Borax	0.83 g	0.083 g

5	**Water**	**29.5 ml**	**2.95 ml**

Table 2 showing the ingredients of cream

The ingredients such as bees wax, white soft paraffin was heated in a china dish and the temperature was raised to 70° C. Borax was dissolved with purified water in a beaker and heated to 70° C. Then the aqueous solution was added to the oily mixture slowly with continuous stirring until a thick stable emulsion is formed. In this the borax reacts with the free fatty acid present in bees wax and produce monovalent soap which acts as an emulsifying agent and produce the w/o type of emulsion. Then this cream was cooled in room temperature and stored in a well closed container.

EVALUATION OF THE OINTMENT AND CREAM

Screening of antibacterial activity

Microorganism

Staphylococcus aureus **NCIM-** 5021 equivalent to ATCC 25923

Escherichia coli **NCIM**

Preparation of Culture medium

The nutrient agar was prepared by dissolving 1.0 g peptone, 0.3 g beef extract, 0.5 g of sodium chloride in 100 ml distilled water and boiling the solution. The pH was adjusted to 6.4 - 6.8 and sterilized by autoclaving at 15 psi pressure (121°C) for 20 min. Sterilized petri plates were prepared with an equal thickness of nutrient agar. The test bacteria were grown overnight at 30° C nutrient broth is used for seeding the agar plate.

Inoculum preparation

The inoculums were prepared using nutrient broth and the 24 hours old cultures were used for the antimicrobial studies using agar well diffusion method.

Screening of antibacterial activity by Agar Well Diffusion Method

Antibacterial activity was evaluated by the cup plate method. The overnight culture was standardised with 0.5 Mac Farland standard. The standardised culture was added into 25 ml culture medium and poured into the sterile petridish having an internal diameter of 8.5 cm. Care was taken for the uniform thickness of the layer of medium in different plates. After complete solidification of liquefied inoculated medium, wells were made aseptically with cork borer having 6 mm diameter. In each of these plates, standard, extract, ointment, and cream were placed carefully. Plates were kept for pre diffusion for 60 minutes. The plates

were incubated at 37˚C for 24 hours. After the incubation period, the zone of inhibition was measured.

RESULTS AND DISCUSSION

Evaluation of Ointment and Cream Formulation

Figure 1- showing the formulation of ointment and cream

The ointment and cream formulations were subjected to the various evaluation tests and the formulations were stable.

CHARACTERS	OINTMENT	CREAM
COLOUR	Greyish white	Brown
ODOUR	Characteristic	Characteristic
pH	5.8	6.3
CENTRIFUGATION	Stable	Stable
SPREADABILITY	18.27g.cm/ml	19.13g.cm/ml

Table 3 showing the ingredients of ointment

The homogenecity of the both ointment and cream were good because it does not contain any lumps or clumps in it. Grittiness were tested with the thumb and index finger and the results are ointment is too gritty compared with the cream. Odour is a characteristic odour. Ointment was too sticky than the cream. And both are stable on room temperature.

Screening for antibacterial activity of plant extract, ointment and cream against Staphylococcus aureus and Escherchia coli by disc diffusion method.

Antibacterial activity of ethanol extract of Borassusflabellifer was evaluated against Staphylococcus aureus and Escherichia coli by measuring zone of inhibition. This results showed that the Borassusflabellifer has significant antibacterial activity against the S.aureus and E.coli.

S.NO	Test microorganism	Zone of inhibition (in mm)			
		Std	Plant extract	Herbal ointment	Herbal cream
1.	Staphylococcus aureus	**28**	**24**	**11**	**18**
		30	**23**	**10**	**16**
		26	**20**	**12**	**17**
		28	**22.3**	**11**	**17**
] 2.	E.coli	**27**	**25**	**10**	**24**
		30	**21**	**10**	**23**
		31	**25**	**10**	**25**
		29.3	**23.6**	**10**	**24**

Table 4 zone of inhibition of all the formulations

Antibacterial activity of herbal ointment and cream contains Borassusflabellifer root extract was screened against gram positive and gram negative bacteria such as E.coli and S.aureus. The ethanolic extract produced significant antibacterial activity. The ethanolicextract shows 00 mm zone of inhibition for S.aureus and 00mm for E.coli. The herbal ointment shows zone of inhibition of 00 mm for S.aureus and 00 mm for E.coliand the herbal cream shows zone of inhibition of 00 mm for S.aureus and 00 mm for E.coli.

S. aureus positive control

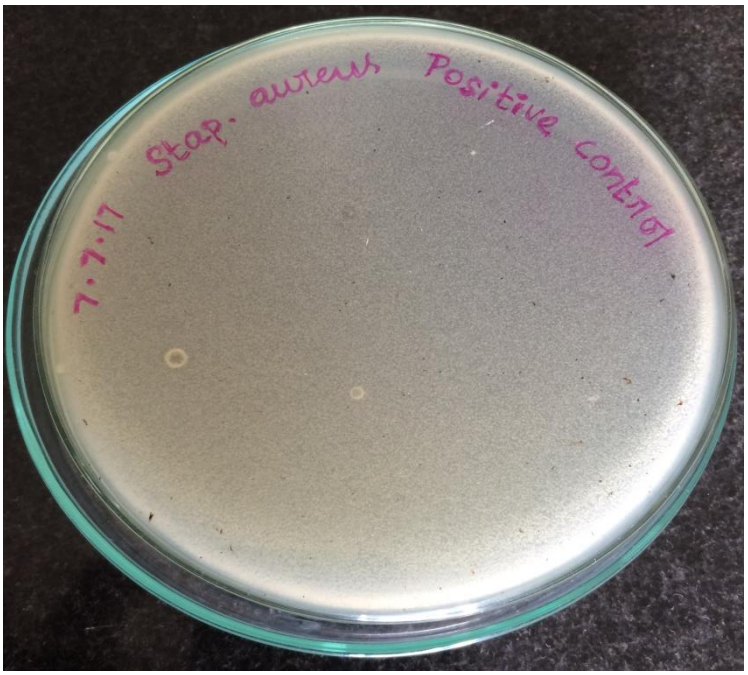

Figure 2 positive control of gram positive bacteria

Zone of inhibition for S.aureus

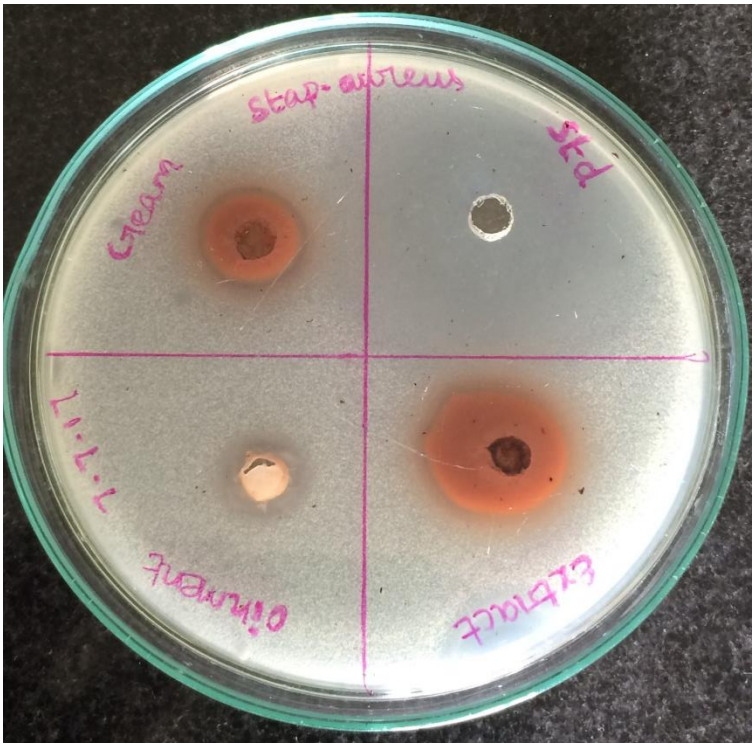

Figure 3 zone of inhibition of gram positive bacteri

E. coli positive control

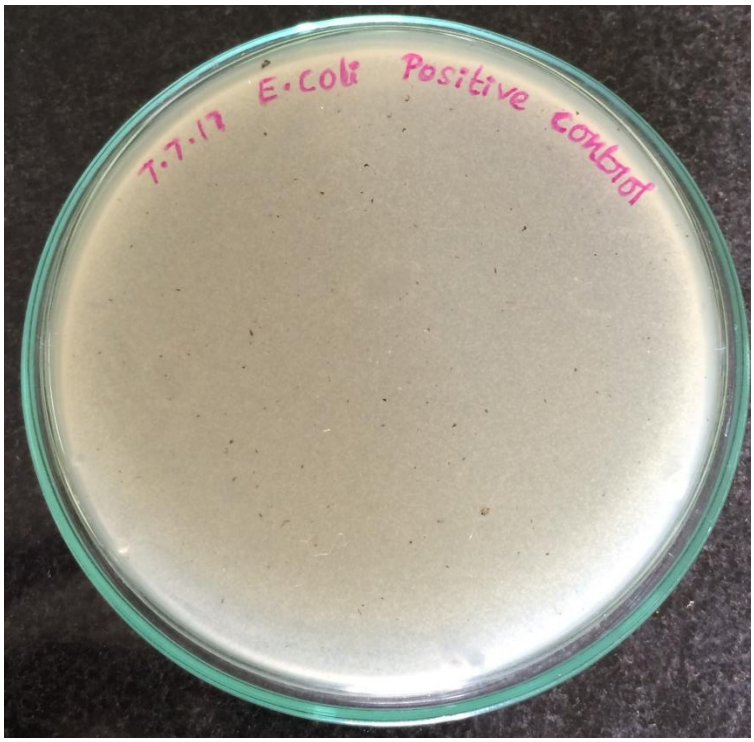

Figure 4 positive control of gram negative bacteria

Zone of inhibition for E. coli

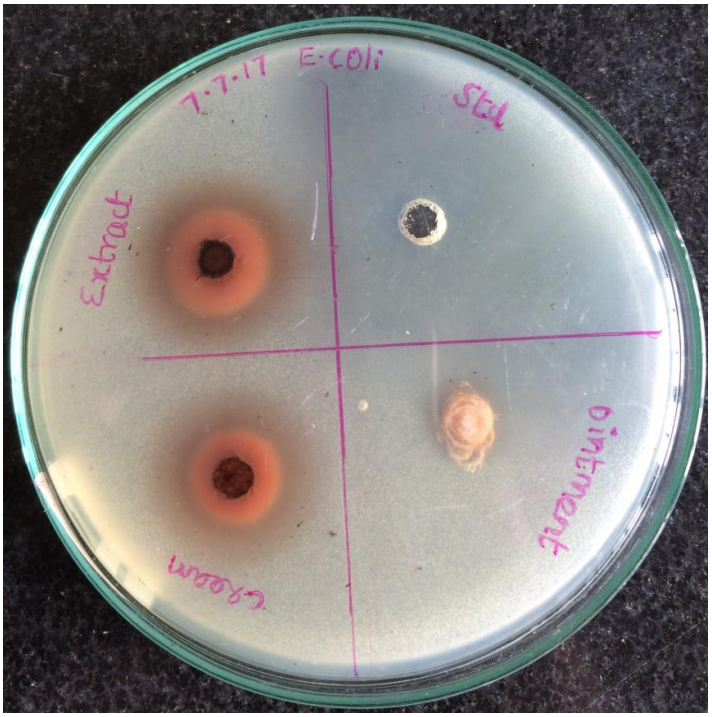

Figure 5 zone of inhibition of gram negative bacteria

CONCLUSION

This study proved both the formulation got antibacterial activity but comparing the physical properities of both the topical formulation cream was found to have much more antibacterial activity.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest for this work.

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