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FORMULATION AND EVALUATION OF SACHET BAGS FROM VITEX NEGUNDO FOR PAIN RELIEVE

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ABSTRACT

The present study is based upon the herbal sachet bag formulations. The herbal ingredients include neem, orange peel, vitex negundo, lavender, lemongrass oil were studied by based upon the literature review. Hence, based upon the sachet formulations are prepared and various evaluation test we have concluded that above ingredients having following therapeutic and prophylactic activities like anti-inflammatory, anti-oxidant, anti-viral, anti-microbial, anti-fungal effects and further investigation on different activities have to be done.

KEYWORDS: sachet bag, vitex negundo, anti-oxidant.

INTRODUCTION

Medicinal plants have been a major source of therapeutic agents since ancient times to cure human disease. The revival of interest in natural drugs started in last decade mainly because of the wide spread belief that green medicine is healthier than synthetic products. Now-a-days, there is manifold increase in medicinal plant-based industries due to the increase in the interest of use of medicinal plants throughout the world which are growing at a rate of 7-15% annually. Despite the major advances in the modern medicine, the development of new drugs from natural products is still considered important. Traditional therapeutics based on herbal medicinal principles is time tested and widely accepted across various cultural and

socioeconomic strata. However, there is lack of precise guidelines to study the herbal compounds and till date a very meagre portion of this tremendous potential drug-repertoire has been scientifically screened. Hence, there is a real need for scientific evidence-based validation of these agents. The evaluation of plant products on the basis of medicinal and therapeutic properties forms a platform for the discovery of newer drug molecules from different plant sources. From the innumerable plants being researched since time immemorial, Vitex negundo is important one. This plant of Verbenaceae family is commonly known as Nir gundi (Hindi) and five leaved chaste trees (English). Vitex negundo L(Shambhalu) is an aromatic large shrub or small slender tree of about 3 meter in height with quadrangular branches. It is found in moist area, often on banks of rivers, throughout India, up to an altitude of 1500 meter, also grown in Mediterranean countries and Central Asia. Various medicinal properties are attributed to it particularly in the treatment of anti-inflammatory, fungal diseases, antioxidant and hepatoprotective disorders. Vitex negundo, commonly known as the five-leaved chaste tree. Herbal remedies are a type of alternative medicine that originates from plants and plant extracts. Used to heal illnesses and disease and to address psychological concerns, herbal remedies have been around for centuries and were the precursor to modern medicine.

Herbal remedies are obtained from a wide variety of natural resources including plant leaves, bark, berries, flowers and roots. Herbal medicine remains a popular alternative throughout China and the Far East and is growing in popularity throughout the United States. Botanicals have been used traditionally by herbalists and indigenous healers worldwide for the prevention and treatment of liver disease. Clinical research in this century has confirmed the efficacy of several plants in the treatment of liver disease. Basic scientific research has uncovered the mechanisms by which some plants afford their therapeutic effects. In recent years many researchers have examined the effects of plants used traditionally by indigenous healers and herbalists to support liver function and treat diseases of the liver. In most cases, research has confirmed traditional experience and wisdom by discovering the mechanisms and modes of action of these plants as well as reaffirming the therapeutic effectiveness of certain plants or plant extracts in clinical studies.

VITEX NEGUNDO

vitex negundo is a traditional herb known for its medicinal properties in Unani, Ayurveda, Siddha, Chinese, Roman, and other traditional systems of medicine. Traditionally, it is used

as anthelminthic, antitoxin, aphrodisiac, contraceptive, antimalarial, analgesic, anti-inflammatory, anti-asthmatic, vermifuge, etc. All parts of V. negundo contain a number of phytoconstituents like Alkaloids, fatty acids, flavonoids, glycosidic iridoids, lignans, phenols, steroids, tannins and di- and sesquiterpenes. Due to the presence of a variety of secondary metabolites, V. negundo is used in different types of diseases or disorders by traditional practitioners for the treatment of spermatorrhoea, stomach ache, asthma, cold, diarrhoea, indigestion, gallstone, hernia, eye disorders, rheumatism, irritable bladder and dysmenorrhea, headache, migraine, kwashiorkor, neck gland sores, tubercular neck swelling, reddened, arthritis, jaundice, urticaria, eczema and liver disorders. It is most widely used for curing disorders of the reproductive system like vital power, depression, frail erection without libido, self-contempt for sexual abuse, stool containing prostatic fluid, and testicle pain. It has recently been reported to have cytotoxic properties against various types of cancer cells.

The plant is an aromatic, deciduous shrub grows all over India, in wastelands, mixed open forest, up to 1500 meters elevation. It is also found in Afghanistan, Pakistan, Sri Lanka, Thailand, Malaysia, Eastern Africa, China, and Madagascar. In India, it is cultivated as a hedge plant. The tree grows 2-4 meters in height, with quadrangular branches and thin grey bark, Assam Agricultural. The leaf stalk is long and 3-5 leaves grow at its tip. The leaves are petiolate, smooth, exstipulate, 4-10 cm long, hairy beneath, have a typical pungent odour. The flowers are small, bluish purple in colour, lanceolate, in panicles up to 30 cm long. The fruits are small, ovoid or obovoid, four seeded drupes, black when ripe.

Plant Anatomy

- **Kingdom** - Plantae – Plants
- **Sub Kingdom** - Tracheobionta - Vascular plants
- **Super division** - Spermatophyta - Seed plant
- **Division** - Magnoliophyte – Flowering plant
- **Class** - Magnoliopsida - Dicotyledons
- **Subclass** - Asteridae
- **Order** - Lamiales
- **Family** - Verbenaceae
- **Genus** - Vitex Linn.
- **Species** - Vitex negundo Linn. (Chaste tree).

Fig. 1: vitex negundo.

Fig. 2 : Leaves of vitex negundo.

PHYTOCHEMICAL CONSTITUENTS

TABLE 1

Plant part	Class of secondary Metabolites	Compound Name	Refer.
NISH Leaves	Alkaloids	Nishi dines	[25]
	Aliphatic alcohol	Linalool; n-hentraiaconatol; Para hydroxybenzoic acid	[19]
	Terpenes	a – pine binene	[5]
	Diterpenes	Vitex lactone	[27]
	Sesquiterpenes	Viridiflorol; B-caryophyllene	[18,26]
	Glycoside	Luteolin-7-glucoside;5,7-dihydroxy-2-(3,4-dihydroxyphenyl)-4H-chromen-4-one;5-hydroxy-3,6,7-trimethoxy-2-(3, n-5,6,7,8,3,4,5` heptamethyl	[25,26]
	Flavonoids	Flavone; corymbosin; vitexicarpin;5-hydroxy3,6,7,3` 4-pentamethoxycflavone;5-O-desmethoxynobieletin flavone;57dihydroxy-6,4`dimethoxyflavonoid;5hydroxy-7,4`dimethoxflavone;7,8dimethyl herbacetin-3-rhamnoside; casticin;	[18,28,29]

		artemtin;4-4 dimethoXytransstilbene; gardeninA; gardenin B;4,5-diethyl-3`-ethoxy-pyro-flavone	
	Iridoid glycoside	Nishandaside;2-p-hydroxybenzoyl mussaenosidicacid; negundo side; lagundinin; aucubin; agnuside	[27]
	Steroids	b-sitosterone; b-sitosterone acetate; stigmasterone	[30]
	Furanoeremo -philane	a-cedrene	[27]

THERAPEUTIC USES

- The root, fruit, flowers, leaves, and bark of Nir gundi have medicinal value and are used for medicinal purpose externally as well as internally.
- All compounds extracted from all the parts of the plant exhibited various bioactivities including anti-nociceptive, anti-inflammatory, anti-tumour, anti-oxidant, anti-androgenic, anti-osteoporotic, anti-cataract, hepatoprotective, anti-hyperglycaemic, insecticidal, anti-microbial activity.
- It has been used for the treatment of chronic bronchitis.
- Nir gundi decoction is used for steam bath for arthritis, joint pains and sciatica. The dried leaves when smoked are said to relieve headache.
- Decoction of Nir gundi leaves is an effective gargle in Tstomatitis and sore throat. The tub-bath of the decoction of its leaves is rewarding in epididymis-orchitis and uterine inflammations. Casticin has been isolated from leaves which have antiproliferative and apoptotic activities.
- Fresh leaves of V. negundo have anti-inflammatory and pain suppressing activities possibly mediated via PG synthesis inhibition, antihistamine (anti-itching), membrane stabilising and antioxidant activities.
- Leaf extract of V. negundo exerts a protective effect on human liver cell i.e. CYP2E1-dependent CCl4 toxicity via inhibition of lipid peroxidation, followed by an improved intracellular calcium homeostasis and inhibition of Ca (2+)- dependent proteases.

- Roots are used for joint ache, inflammations, flatulence, breathing problems, malaria and leprosy Roots are tonic, anodyne, febrifuge, Becchi, expectorant and diuretic. Flowers are used for diarrhoea, cholera, fever, haemorrhages, and cardiac disorder.

- Flowers are astringent and used in fever, diarrhoea and liver complaints. The dried fruits contain lignans, including a phenyl indene-type lignan, vitexdoin F (1), and three phenyl naphthalene-type lignans, vitexdoins G, H and I (2-4) having anti-inflammatory and anti-osteoporotic activities and the bark is used in toothache.

- Vitex Negundo has shown promise as an effective bio-control agent against diseases and pests of cultivated plants. The extracts of leaves possess inhibitory, deterrent or lethal activity that cause disease and damage to other organisms.

- The leaves are reported to possess pesticidal, antifungal and antibacterial properties. The leaf extract is used as grain preservation material to protect the pulses against.

- Volatile oil possesses the antimicrobial properties due to presence of monoterpene constituents which exerts membrane damaging effects. Ursolic acid and botulinic acid are triterpenoids having pesticidal effect.

OTHER INGREDIENTS

- **LEMONGRASS**

Lemon grass is a tall plant having enormous striped leaves with an uneven edge. It is known for its smoky, sweet, herbaceous and lemony fragrance. It grows in numerous parts of the tropical and sub-tropical South East Asia and Africa.

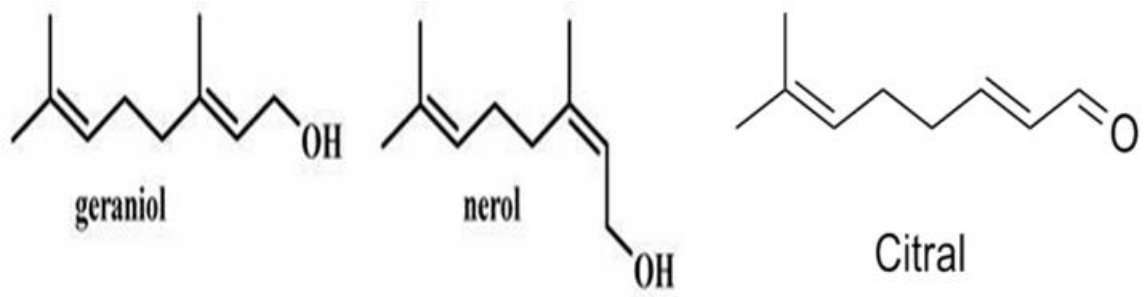
Fig. 3: lemon grass powder.

BOTANICAL DESCRIPTION

- **Scientific name:** Cymbopogon citratus
- **Kingdom:** plantae: phylum tracheophyte
- **Subkingdom:** commelinidae
- **Division:** magnoliophyte
- **Class:** liliopsida
- **Order:** poales
- **Family:** poaceae
- **Genus:** Cymbopogon
- **Species:** citratus

Chemical constituents: citral (mixture of geranial and nerol), isonerol, isogeranial, geraniol, geranyl acetate, citronellal, citronellol, germacrene-D, and elemol.

Structures of chemical constituents of lemon grass



THERAPEUTIC PROPERTIES

- Pain relief
- Anti-inflammatory
- Anti-bacterial
- Digestive issues
- Skin treatment

LAVENDER

Fig. 4: lavender powder.

BOTANICAL DESCRIPTION

- **Kingdom:** plantae
- **Division:** magnoliophyte
- **Class:** Magnoliopsida
- **Order:** lamiales
- **Family:** lamiaceae
- **Genus:** Lavandula
- **Sub family**: nepetoideae

PHYTOCONSTITUENTS

- Linalool
- Linalyl acetate
- Limonene
- Camphor
- Terpene
- Lavandulol
- Menthone

THERAPEUTIC PROPERTIES

- Anxiety and depression
- Pain
- Skin condition
- Sleep

- Menstrual cramps
- Nervous disorder
- Migraines

NEEM

Fig. 5: neem powder.

BOTANICAL DESCRIPTION

- **Botanical name:** Azadirachta indica
- **Kingdom:** Plantae
- **Order:** Rutales
- **Species:** Indica
- **Genus:** Azadirachta
- **Class:** Dicotyledonae
- **Division:** Magnoliophyta

PHYTOCONSTITUENTS

- Azadirachtin
- Nimbin and Nimbindin
- Salanin
- Quercertin
- Nimbolinin and Nimbidol
- Ascorbic acid

THERAPEUTIC PROPERTIES

- Skin treatment: psoriasis
- Infection
- Repels insects and mosquitoes
- Reduces joint pains
- Reduces dandruff
- Treats wounds

ORANGE PEEL

Fig. 6: orange peel powder.

BOTANICAL DESCRIPTION

- **Botanical name**: citrus sinensis
- **Kingdom:** plantae
- **Order:** Sapindales
- **Species:** citrus sinensis
- **Family:** rutaceae
- **Class:** Magnoliopsida
- **Division:** magnoliophyte

PHYTO CONSTITUENTS

- Hesperidin and naringin (flavanone glycosides)
- Tannins
- Terpenoids
- Saponins
- Pectin
- Essential oils

- Ascorbic acid

THERAPEUTIC PROPERTIES

- Anti-inflammatory
- Anti-oxidant
- Anti-microbial
- Treats hyperpigmentation
- Digestion
- Weight loss.

AIM AND OBJECTIVES

The primary aim of formulating Vitex negundo powder in sachet form is to provide a convenient and easily usable dosage for various ailments traditionally treated with this herb. This formulation allows for easy consumption and targeted delivery of the herb's bioactive compounds, potentially benefiting those seeking relief from conditions like pain, inflammation, and other ailments.

OBJECTIVES

- provide a convenient and effective method for pain relief
- Anti-inflammatory, Analgesic, and antioxidant
- Effects to address conditions like joint pain, inflammation, and oxidative stress.
- The collection of herb parts used for formulation (leaves and fruits)
- To reduce side effects of chemical formulations.
- Easily portable and easy to use

MATERIALS AND METHODOLOGY

- **Collection of plants:** The various Herbal sources of materials were collected from the medicinal garden & Surroundings of Dhanvanthari institute of pharmaceutical sciences.

PREPARATION PROCEDURE

- The various Herbal sources of materials were collected from the medicinal garden & Surroundings of Dhanvanthari institute of pharmaceutical sciences.
- Herbs were dried by cool air process.
- Dried herbs were blended into fine powders.

- Prepare the formulations (F1,F2,F3) as shown in below table 2.
- Formulations are filled in the sachet bags.
- Dip the sachet bag into the hot water and use.

Table 2: formulation of herbal powder.

S.NO	INGREDIENTS	F1	F2	F3
1	Vitex negundo	5g	5g	5g
2	Lemon grass	2g	1.5g	1.5g
3	Orange peel	0.5g	1g	0.5g
4	Neem extract	2g	1.5g	2g
5	Lavender	0.5g	1g	1g

From the above, Different formulations were prepared by using various herbal extracts like Neem, lavender, lemon grass oil, vitex negundo, orange peel by performing different individual evaluation parameter.

EVALUATION PARAMETERS

ORGANOLEPTIC PROPERTIES

The study of colour, odour, appearance, taste &texture were studied.

PHYSICO CHEMICAL TEST

PARTICLE SIZE

Particle size distribution was determined using mechanical sieve analysis. A series of standard sieves (BSS 20,40,60,80 and 100) were arranged in descending order of mesh size. A 100g of powder placed on the uppermost sieve and mechanically shaken for 15minutes using a sieve shaker. The weight of powder retained on each sieve was determined and the percentage of powder passing through each sieve was calculated.

ANGLE OF REPOSE

1. Choose the material you want to test.
2. Create a flat surface or use a specialized device with a gradual incline.
3. Slowly pour the material onto the surface, allowing it to form a pile.
4. Measure the angle between the surface and the slope of the pile using a protractor or angle measurer.
5. Repeat the process several times to ensure accurate results.

- The angle of repose (θ) can be calculated using the formula:

$\tan(\theta) = h / r$

Where:

- h = height of the pile
- r = radius or base radius of the pile

Bulk Density

1. Measure the weight of a container.
2. Fill the container with the material (e.g., powder or granules).
3. Measure the weight of the container with the material.
4. Calculate the volume of the container.
5. Calculate bulk density = (weight of material) / (volume of container).

True Density

1. Use a pycnometer or gas displacement method.
2. Measure the weight of the material.
3. Measure the volume of the material using the pycnometer or gas displacement method.
4. Calculate true density = (weight of material) / (true volume of material).

TO DETERMINE ASH VALUE

1. Weighing a sample of the material (e.g., food, fuel, or pharmaceutical).
2. Incinerating the sample in a furnace at high temperatures (usually around 500-600°C).
3. Allowing the sample to cool.
4. Weighing the remaining ash residue.

The ash value is calculated as:

Ash value (%) = (weight of ash residue / weight of original sample) x 100

TO DETERMINE MOISTURE CONTENT

1. Weigh a sample.
2. Dry the sample in an oven at a specified temperature (usually 105°C) until constant weight is achieved.
3. Weigh the dried sample.

Moisture content (%) = [(initial weight - dried weight) / initial weight] x 100.

PHYTOCHEMICAL TEST

Mayer's test

1. Sample preparation: Extract the substance with a suitable solvent.
2. Mayer's reagent: Add Mayer's reagent (potassium mercuric iodide) to the extract.
3. Observation: A white or creamy precipitate indicates the presence of alkaloids.

Ferric Chloride test

1. Add a few drops of ferric chloride solution to the test substance.
2. A colour change (often purple, green, or blue) indicates the presence of phenols.

Lead Acetate test

1. Add lead acetate solution to the test substance.
2. A yellow precipitate indicates the presence of tannins.

Salkowski test

1. Mix the test substance with chloroform.
2. Add concentrated sulfuric acid.
3. A reddish-brown colour at the interface indicates the presence of steroids or terpenoids.

RESULTS AND DISCUSSION

PHYTOCHEMICAL CONSTITUENTS

From the above tests that we have performed shows the presence of alkaloids, tannins, steroids, terpenoids and phenolic compounds in vitex negundo.

Table 3:

S.NO.	EVALUATION TESTS	OBSERVATION	INDICATION
1.	**Mayer's test**	white precipitate was observed	Indicates the presence of **alkaloids**
2.	**Ferric chloride test**	Change of colour(i.e. blue) was observed	Indicates the presence of **phenolic compounds**
3.	**Lead acetate test**	Yellow precipitate was observed	Indicates the presence of **tannins**
4.	**Salkowski test**	Reddish-brown colour interface was observed	Indicates the presence of **steroids or terpenoids**

ORGANOLEPTIC PROPERTIES

From the above organoleptic evaluation, the following are the observations table 3.

Table 4:

S.NO	EVALUATION PARAMETERS	OBSERVATION		
ORGANOLEPTIC		**F1**	**F2**	**F3**
1.	Appearance	Powder	Powder	Powder
2.	Colour	Dark green	Light green	Green
3.	Odour	Astringent	Astringent	Astringent
4.	Taste	Characteristic	Characteristic	Characteristic
5.	Texture	Fine	Fine	Fine

PHYSICOCHEMICAL EVALUATION

From the above evaluation procedure, the following are the observations in the table 4.

Table 5:

s.no.	EVALUATION PARAMETERS	F1	F2	F3
1	Total ash	3grms	3.34grms	4.1grm
2	Acid insoluble ash	2.79grms	2.9grms	3.8grms
3	pH	5.6	6.0	6.9
4	Moisture content	4%	4.25%	4.9%
5	Particle size	23u	26u	28u
6	Angle of repose	28.12	29.91	30.21
7	Bulk density	0.9502gm/cm2	0.6123gm/cm2	0.7231gms/cm2
8	Tapped density	0.9219gm/cm2	0.9931gm/cm2	1.319gm/cm2
9	Irritability	No irritation was observed	No irritation was observed	No irritation was observed

Herbal based extracts from various plant sources were selected & authentication was done from a botanist then the plants air dried, Grinded into fine powder then kept for cool drying, then the various herbal extracts was selected & made into different formulations up to 10grms each.

From the above discussion & performing various evaluation parameters hence we came to conclusion that formulation is effective and safe.

CONCLUSION

We are concluded from the above Evaluation parameters on making different herbal formulations and performing various evaluation tests by using various herbal extracts we came to a conclusion that among the herbal formulations above mentioned in the table 2, the formulation (F1) is concluded as good formulation because the formulation is having angle of repose (28.12) which is having good flowability, particle size of (23u),pH(5.6) which is

suitable for skin pH. We also came to a conclusion that herbal formulations are more effective and safer with less side effects when compared to synthetic, further investigation have to be done.

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