



FORMULATION AND EVALUATION OF POLYHERBAL GEL CONTAINING TURMERIC, GINGER, TEA TREE OIL, MARULA OIL FOR THE TREATMENT OF HIDRADENITIS SUPPURATIVA

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ABSTRACT

*Polyherbal formulations are one of the most preferred forms due to their synergistic effects considering various health problems. This abstract mainly emphasizes the polyherbal gel containing *Curcuma Longa* (Turmeric), *Zingiber Officinale* (Ginger), *Melaleuca Alternifolia* (Tea Tree) oil, *Sclerocarya Birrea* (Marula) oil for the treatment of Hidradenitis Suppurativa. Turmeric and Ginger are well known for their anti-inflammatory as well as anti-oxidant properties which, provide soothing skin irritations, treating inflammations and promoting overall skin health inflammation, as well as that Marul oil prevents the formation of scar Tissue, provides intense hydration, nourishment and protection against environmental stresses. Gels are preferred over ointments because they avoid first pass metabolism, and gel absorbs quickly through the skin so it leaves no stain and is preferred over ointment because it results in the formation of film over the applied skin surface and causes staining of the clothes.*

KEY WORDS: *Hidradenitis Suppurativa, Curcuma Longa (Turmeric), Zingiber Officinale (Ginger), Melaleuca Alternifolia (Tea Tree) oil, Sclerocarya Birrea (Marula) oil.*

INTRODUCTION

“A constant, provocative, repetitive, weakening skin sickness (of the terminal hair follicle), hidradenitis suppurativa normally shows itself after pubescence as firmly established, difficult, fiery sores in the body apocrine organ bearing locales, generally ordinarily the axillary, inguinal and anogenital regions”.

Agonizing knots and abscesses, repeating sores, sinus parcels, scarring, and skin changes are indications of Hidradenitis suppurative [1].

Albeit the exact etiology of HS is obscure, various elements, including insusceptible framework glitch, hair follicle impediment, and hereditary qualities, are accepted to play a part. Normally starting after pubescence, HS influences ladies more frequently than guys. Another gamble factor for HS is heftiness. The gamble and seriousness of HS are expanded by smoking. The

An effective readiness comprised of a few different concentrates or parts is alluded to as polyherbal gel. The synergistic advantages of joining numerous herbs in a gel structure might improve the restorative characteristics of each plant alone.

condition's gamble of creating is expanded by family ancestry [1].

The progressions appearing in HS are coordinated to the pilosebaceous unit of apocrine rich regions. Shrinkage or potentially loss of sebaceous organs contributes altogether to the pathogenesis, disturbs the neighborhood endocrine homeostasis as well as influences nearby bacterial colonization. Infundibulofolliculitis is the resulting element of HS pathogenesis. Contracting of sebaceous organs and infundibulofolliculitis go before follicular stopping and ensuing dilatation of hair follicle. The epithelium coating of the enlarged follicle is penetrated, delivering keratin strands, hair parts and microbes to the encompassing tissue. Prompting solid unfamiliar body type-like irritation, with the inundation of histocytes and development of multinucleated monster cells, at last followed by canker arrangement with recuperating and scarring [2].

They have various applications including relief from discomfort, aggravation decrease, wound recuperating, quieting skin disturbances and saturating. One method for lessening probability of adverse consequences from



unreasonable dosages of single plant is to utilize a combination of herbs. Moreover, every herb might be utilized at lower fixation because of their synergistic properties, which further brings down the chance of negative responses [3].

Contrasted with customary measurement structures like table or cases, gel plan offers a reasonable for the conveyance of home grown removes and take into consideration more prominent ingestion through skin and increment the bioavailability of restorative substances [3].

The rhizomes or underground stem, of the plant *Curcuma Longa*, an individual from the Zingiberaceae family, is the natural wellspring of turmeric. Curcumin, a bioactive substance tracked down in turmeric, makes solid calming difference. Curcumin restrains body's incendiary arbiters and pathways including TNF-alpha, COX-2, and NF-kappa. Turmeric can possibly lessen irritation which might help with side effects like agony, enlarging and redness to HS sores [4].

The rhizome, of the *Zingiber officinale* plant, an individual from the Zingiberaceae family, is the natural wellspring of ginger. Bioactive substances viewed as in ginger, for example, paradol, shogaol and gingerol have mitigating characteristics. By obstructing the combination of supportive of fiery cytokines and compounds including lipoxygenase and cyclooxygenase, reduce expanding and aggravation connected to HS injuries [5].

The *Melaleuca alternifolia* tree, additionally alluded as the tea tree, is the organic wellspring of tea tree oil. *Melaleuca alternifolia* is an individual from the Myrtaceae family and is local to Australia. Steam Refining is the technique used to get tea tree oil from the leaves of this tree. Tea tree oil's dynamic part terpinene-4-ol answerable for is expansive range against bacterial characteristics. It has been exhibited that this substance represses development of numerous microorganisms, including *Staphylococcus Aureus*, a microbe that is much of the time connected to HS [6].

The bits or seeds of the marula natural product, officially known as *Sclerocarya birrea*, are the natural wellspring of marula oil. A few countries including South Africa, Namibia, Zimbabwe are home to marula tree. Cold squeezing is the technique used to remove marula oil from the organic product's portion. Marula oil's ability to energize tissues recovery and fix makes it valuable for wound mending. By advancing collagen creation,

angiogenesis and epithelialization in impacted regions, marula oil might help with mending cycle of HS [7].

MATERIAL AND METHODOLOGY

Preparation of aqueous extract of Turmeric and Ginger: Wash the fresh rhizomes of turmeric and ginger under running water to facilitate the removal of dust. Peel the outer skin of turmeric and ginger rhizomes. Chop the peeled rhizomes of ginger and turmeric into small pieces to enhance the extraction process. Transfer the chopped turmeric, ginger pieces into blender. Add small amount of distilled water to make the grinding process faster. Blend until smooth paste formed. Transfer the blended mixture into China dish add the remaining required amount of distilled water for efficient extraction of the active components and then the solvent evaporated till the dry powder is obtained.

Weighing and Measuring: The required amount of xanthum gum (1.7 gm), tea tree oil (5 drops), marula oil (3 drops), ginger powder (0.1gm), turmeric powder (0.4 gm) and aloe vera juice (68 ml).

Preparation of aloe vera gel: Take fresh aloe vera leaves and wash them under running water. Peel of the Aloe vera leaves and then isolate the gel by scrapping into a container.

Preparation of Slurry: Put the required amount of powdered xanthum gum (1.7 gm) in a measuring beaker. Pour in as much aloe juice which is required to dissolve the xanthum gum, cover and put away for thirty minutes.

Combining Aloe vera gel and Xanthum gum slurry: Add q.s. sodium benzoate to the gel of aloe vera. Add the prepared xanthum gum slurry, cover and put away for three to four hours.

Incorporation of the Drugs into the gel: Isolate the determined measure of glycerin (2 ml), peppermint oil (2 drops), marula, and tea tree oil in an alternate beaker. The previously measured ginger powder and turmeric powder then added progressively to ensure that the combination is uniformly conveyed all through the gel add the blend and mix completely.

Packaging: The formulated gel is then filled into the glass container which is previously washed and sterilized to avoid any microbial growth throughout the storage. Keep the glass container in cool place and away from direct sunlight to prevent oxidation of the active compounds.



Phytochemical Screening

Result

Tests for Phytochemical	Chemical test	Turmeric	Ginger	Tea Tree Oil	Marula Oil
Carbohydrate	Molish Test	+ve	+ve	+ve	-ve
	Benedict Test	+ve	+ve	+ve	-ve
Protein	Biuret Test	+ve	-ve	-ve	-ve
Tannin	Ferric Test	+ve	-ve	-ve	-ve
Glycoside	Killer-Killani Test	+ve	-ve	-ve	-ve
Steroid	Lieberman-Burchard Test	+ve	+ve	+ve	+ve
Alkaloid	Dragendroff Test	+ve	+ve	-ve	+ve
	Mayer Test	+ve	+ve	-ve	+ve
	Wagner Test	+ve	+ve	-ve	+ve
Flavonoid	Shinoda Test	+ve	+ve	-ve	+ve
Terpenoids	Salkowski Test	+ve	-ve	+ve	+ve
Saponin	Frothing Test	+ve	+ve	+ve	+ve
Phenolic	Liebermann's Test	-ve	+ve	+ve	+ve
Quinone	Sulphuric Acid Test	-ve	-ve	+ve	-ve

Spreadability: For spreadability testing of a gel definition, the technique normally includes estimating the measurement of the gel spread on a reasonable surface.

Result:

Sr.no	Parameter	Observation
1.	Spreadability	6.4 cm

Solubility: To determine the solubility of a gel, you need to assess how well it dissolves or disperses in a particular solvent or medium.

Result:

Sr.no	Solvents	Solubility
1.	Water	Completely soluble
2.	Ethanol	Partially soluble
3.	Chloroform	Insoluble
4.	Acetone	Insoluble

Swelling Index: The enlarging list study is directed to decide the level of expanding or hydration displayed by a gel plan when presented to a particular dissolvable or medium.

SI = Swelling Index
 V_2 = Final Volume after Swelling
 V_1 = Initial Volume before Swelling

Result:

$$SI = (V_2 - V_1) / V_1 \times 100$$

$$= (11 - 7) / 7 \times 100$$

$$= 57.14 \%$$

were,

Zone of inhibition: The zone of inhibition test for tea tree oil includes putting of tea tree oil through plug drill onto an agar plate with microorganisms (*S. Aureus*) then, at that point, estimating the inhibited region around where microbes' development is repressed.

Result:

Concentration of Tea Tree Oil	Zone of Inhibition(mm)
3 drops	11
5 drops	14
Control (No tea tree oil)	0



Fig: Zone of Inhibition

pH: Estimating the pH of a gel plan is fundamental to guarantee its dependability, viability, and similarity with the skin or mucous films.

Result:

Sr.no	Parameter	Observation
1.	pH	5.55

Anti-Microbial activity: The sterile Petri dishes were filled up with Agar medium which was then immunized with the test living organisms (*Staphylococcus aureus* (ATCC-6538P)). Four chamber or cups were made in the medium with the sterile cork borer in each plate. The formed polyherbal gel, standard circle and dissolvable control were ready. A uniform measure of 0.2 ml arrangement was added to the cup and incubated at 37C for 24 hrs. The well dispersion test was acted in sets of three and antimicrobial action was communicated as the mean of inhibition diameter in width (mm). The outcomes

were then correlated with the standard like Doxycycline, Minocycline and Antibiotic medication. From the outcome it was seen that there was no microbial growth noticed and it showed great zone of restraint however lesser when contrasted with standard.

Result:

The Mean Inhibition Zone Diameter after 24 hours of incubation of gram-positive *S. Aureus* is found to be 15 mm.



Fig: Diameter of Zone of Inhibition (mm²)

Anti-Inflammatory Activity

Egg albumin denaturation was used as a protein to measure the in vitro anti-inflammatory activity. Using the following formula, the percentage inhibition of protein

denaturation was determined from the control:
 Percentage of inhibition = $100 \times \frac{(\text{Abs}_{\text{control}} - \text{Abs}_{\text{test}})}{\text{Abs}_{\text{control}}}$
 where, Abs = Absorbance



1. Anti – Inflammatory Activity by Protein Denaturation:

Concentrations µg/ml	% Inhibition of Diclofenac Sodium	%Inhibition of Gel Formulation
10	53.29%	52.99%
50	55.61%	53.77%
100	58.89%	54.46%

Result and Discussion

Sr.No.	Parameter	Observation
1.	Physical Appearance	
	a) Color	warm yellow
	b) Odor	Invigorating smell with herbal freshness
	c) Texture	Smooth and light-weight
2.	Spreadability	6.4 cm
3.	Irritancy	Non-irritant
4.	Solubility	Soluble in water and partially soluble in ethanol.
5.	Homogeneity	Uniformly homogenized
6.	Grittiness	No grittiness
7.	Swelling Index	57.14%
8.	Viscosity	0.384 Poise
9.	Ph	5.55
10.	Anti- microbial activity	15 mm (Mean inhibition zone diameter)
11.	Zone of Inhibition	5 drops of tea tree oil were found to be effective
12.	Anti – Inflammatory activity	53.74% protein denaturation

CONCLUSIONS

Our current task involves creating an anti-inflammatory gel that uses tea tree oil, marula oil, ginger, turmeric and other ingredients to treat hidradenitis suppurativa. Thus, it contains an herbal substance without any adverse effects.

Thus, it can be concluded that a herbal gel with minimal side effects can provide the necessary amount to treat Hidradenitis Suppurativa.

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