



Polyherbal: Antipyretic Transdermal Patches

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ABSTRACT

Two traditional, side-effect-prone therapies for pyrexia are offered by the allopathic healthcare system. Therefore, it would be wiser to choose a safe, tested, and effective Ayurvedic herbal treatment composition. A fever is defined as a rise in body temperature that surpasses the typical daily fluctuations and is accompanied by an increase in the hypothalamic set point. In this work, transdermal films were created to treat pyrexia using herbal medicinal herbs such *Azadirachta indica*, *Tinospora cordifolia*, *Acacia Arabica*, *Embolia Officinalis*, and *Mangifera indica*. Transdermal patches were created using plant extracts and the solvent casting technique. Thickness, folding endurance, physical appearance, weight uniformity, moisture content, drug content, flatness, moisture uptake, pH, and in vitro drug release and stability studies were among the physicochemical criteria used to evaluate the patches. The average absorbance release vs. time using transdermal film graphs demonstrate that the rate of drug release was constant. The formulation does not irritate human volunteers' skin, according to the results of the skin irritation research. All things considered, the current study offers a fresh method for incorporating transdermal drug delivery methods into the creation of herbal remedies.

Keywords: Polyherbal transdermal patch, Antipyretic patches, pyrexia, Painless drug delivery.

INTRODUCTION

One of the most common and extensively used drug delivery techniques is transdermal. Because of its convenience and palatability, the transdermal route has garnered more attention in the delivery of medications than other distribution methods [1]. One of the most suitable, established, simple, secure, and economical ways to administer medication is through the transdermal route. Targeting a particular region of action and controlling the rate of distribution are the primary goals of a transdermal drug delivery system. When applied to healthy skin, transdermal drug delivery devices—separate, self-contained dosage forms—release drugs into the bloodstream at a regulated pace [2].

Transdermal patches, sometimes referred to as skin patches, are medicated adhesive patches that are put to the skin to administer a specific dosage of medication via the skin and into the bloodstream. When applied to undamaged skin, transdermal drug delivery systems (TDDS patches), which are self-contained discrete dose forms, administer the medication via the skin at a regulated rate of systemic circulation. Dosage design for transdermal drugs aims to minimize drug metabolism and retention in the skin while increasing drug flux through the skin into systemic circulation. One promising technique for both local and systemic drug delivery is the transdermal route of administration.

The TDDS offers a number of benefits, including a non-invasive, painless way to deliver medications straight into the body; a more efficient way to administer medications that are broken down by stomach acids; a controlled, consistent distribution of medications over an extended period of time; fewer side effects than oral medications or supplements; ease of use and memory; a substitute for those who cannot or do not want to take medications or vitamins orally; and cost-effectiveness [3]. In medicine, a fever, also known as pyrexia, is a condition when a patient's body temperature has risen over normal. Pyrexia may be a sign of a number of illnesses.

However, it is often the body's first line of defence in battling infections. The nature of the Pyrexia can often provide the doctor a clue regarding the etiology. If you are receiving in-home care, it is crucial to document any increases in body temperature. hectic fever, relapsing fever, intermittent fever, recurrent fever, and intermittent fever [4].



MATERIAL

1. NEEM

In recent years, neem, also known as *Azadirachta indica*, has gained popularity all over the world due to its many health benefits. Neem leaves, flowers, seeds, fruits, roots, and bark have all been used historically to treat fever, infections, inflammation, skin disorders, dental issues, and other ailments. Neem leaf in particular has been shown to have therapeutic properties. Neem leaf and its constituents have been demonstrated to possess immunomodulatory, antipyretic, anti-inflammatory, antihyperglycemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant[5], antimutagenic, and anticarcinogenic properties.

2. MANGO

Terpenoids are essential for healthy immunological function and vision. Additionally, they are antioxidants, which shield your cells from dangerous substances known as free radicals. *Mangifera*'s anti-inflammatory and antipyretic qualities account for many of the possible health benefits of mango leaves [6]. Although inflammation is a natural immune response, persistent inflammation can raise your chance of developing a number of illnesses. By disrupting fat metabolism, mango leaf extract may aid in the management of metabolic syndrome, diabetes, and obesity. Because of its effects on fat metabolism, mango leaf may help manage diabetes. Mango leaves may protect your hair follicles from damage because they are rich in antioxidants.

3. BABUL

Babool bark has expectorant, aphrodisiac, and cooling properties. In addition, babool gum has strong emollient, expectorant, detoxifying, aphrodisiac, and antipyretic properties [7]. The gum calms vata and pitta and heals urinary issues like UTIs, uterine pain, and bleeding. The babool tree is useful in treating kapha and pitta. Its applications, advantages, dosage, and possible adverse effects are examined in this article. Babul is an ayurvedic herb used mostly to treat intestinal worms, diabetes, bleeding issues, and skin illnesses. Another name for it is the Arabic gum tree in India.

4. GULVEL

Leaves are diuretic and expectorant. Anemia, cancer, diabetes, diarrhea, rheumatism, liver, eye, urinary, laxative, and heart conditions are all treated with plant decoctions. utilized in Tibetan, Siddha, Ayurvedic, Unani, and homeopathic remedies. It has strong antipyretic properties [8].

5. AMLA

It aids in the battle against colds. Amla helps with vision. It burns fat. Amla increases immunity. The astringent and antibacterial qualities of amla strengthen the immune system. Oxidative damage is the root cause of many health issues, including cancer. When body cells use oxygen, they produce dangerous byproducts known as free radicals. Since amla is a strong antioxidant, it can stop this oxidation and protect the cell. Amla also makes hair seem beautiful. Antioxidant, antidiarrheal, antidiabetic, antipyretic, anticancer, and antibacterial properties are among its many attributes [9].

METHODS

INGREDIENTS	FORMULA TABLE			
	F1	F2	F3	F4
CRUDE DRUG	500	400	300	200
HPMC	0.5	0.5	0.5	0.5
CHOLOROFORM	6.25	6.25	6.25	6.25
ETHANOL	6.25	6.25	6.25	6.25
ACASIA	1.5	1.5	1.5	1.5
ISOPROPYL MYRIASTRATE	As required	As required	As required	As required
GLYCERINE	0.3	0.3	0.3	0.3



METHODOLOGY

To get rid of dirt, the plant leaves were rinsed three times with tap water and then once with deionized water. The cleaned leaves were allowed to air dry at room temperature in the shade. The dried leaves were ground into a coarse powder using a blending machine in preparation for solvent extraction.

Using the cold maceration extraction method, 500 milliliters of methanol were used to macerate *Azadirachta indica*, *Tinospora cordifolia*, *Acacia Arabica*, *Emblica Officinalis*, and *Mangifera indica* for three days. The extracts were concentrated by evaporation and kept for later use at a cool temperature in an airtight container.

PROCEDURE FOR PREPARATION OF TRANSDERMAL PATCHES

Methanolic extracts of *Azadirachta Indica*, *Tinospora Cordifolia*, *Acacia Arabica*, *Emblica Officinalis*, and *Mangifera Indica* leaves in different ratios (500, 400, 300, and 200) and polymer were used to create transdermal patches. A measured amount of ethanol and chloroform were combined with a weighed amount of polymer, and the mixture was then heated. Glycerin and permeation enhancer were then added in the appropriate amounts. The resultant solution was placed on a hot plate in a Petridish and allowed to air dry at room temperature for a whole day. After adding the determined quantity of extract to the polymer solution, the mixture was well combined until it was homogeneous.

EVALUATION TESTS

1. EXTRACTION OF PLANT MATERIALS

Sr.no.	Extracts	Colour and consistency	% yield (w/w)
1.	<i>Azadirachta Indica</i>	Green and semisolid	66.67
2.	<i>Tinospora</i>	Brown and viscous	60
3.	<i>Acacia Aribica</i>	Green and semisolid	65.56
4.	<i>Emblica</i>	Greenish – Yellow and semisolid	66.67
5.	<i>Mangifera Indica</i>	Green and semisolid	66.26

2. PHYTOCHEMICAL SCREENING^[10-11]

Sr.no	Test	<i>Azadirachta Indica</i>	<i>Tinospora Cordifolia</i>	<i>Acacia Aribica</i>	<i>Emblica Officinalis</i>	<i>Mangifera Indica</i>
1.	Alkaloids	+	+	+	+	+
2.	Glycosides	+	+	+	+	+
3.	Tannins	+	+	+	+	+
4.	Carbohydrates	+	+	+	+	+
5.	Flavonoids	+	+	+	+	+
6.	Amino Acids	+	+	+	+	+
7.	Proteins	+	+	+	+	+

3. EVALUATION OF HERBAL TRANSDERMAL PATCHES

Sr.no.	Physical Appearance	F1	F2	F3	F4
1.	Appearance	Jellified Preparation	Jellified Preparation	Jellified Preparation	Jellified Preparation
2.	Colour	Dark green	Dark green	Light green	Light green
3.	Clarity	Opaque	Opaque	Opaque	Opaque
4.	Flexibility	Yes	Yes	Yes	Yes
5.	Smoothness	Good	Good	Good	Good



4. PHYSIOCHEMICAL EVALUATION

Sr.no.	Physicochemical Evaluation	F1	F2	F3	F4
1.	Thickness of Patch	0.2 ± 0.089 m	0.3 ± 0.089 mm	0.8 ± 0.040 mm	0.6 ± 0.075 mm
2.	Determination of Surface pH	4.5 ± 0.264	4.44 ± 0.095	4.55 ± 0.229	4.61 ± 0.090
3.	% drug content	81 ± 1.414 %	83.6 ± 2.494 %	85.6 ± 1.247 %	89 ± 1.414 %
4.	Water vapour permeability test	0.096 ± 1.699 g/m ²	0.142 ± 0.0005 g/m ²	0.133 ± 0.001 g/m ²	0.088 ± 0.0005 g/m ²
5.	Flatness test	105.8 ± 0.776%	107.5 ± 2.663%	110 ± 5.211%	107.8 ± 3.419%

RESULT

PHYSICAL APPEARANCE –

- Colour: Dark green
- Texture: Jellified Preparation
- Clarity: Opaque

Formulation code	Uniformity of weight (gm)	Thickness (mm)	Drug Content (%)	Moisture Content (%)	Surface pH	Percent Elongation (%mm)	Tensile strength (Kg/mm ²)
Transdermal patch	1.25 ± 0.0152g	0.6 ± 0.075 mm	89 ± 1.414 %	1.06 ± 0.497 %	4.61 ± 0.090	101.4 ± 0.529%	26.7 ± 1.247

CONCLUSION

In this study, five medicinal plants—*Azadirachta indica*, *Tinospora cordifolia*, *Acacia Arabica*, *Emblica Officinalis*, and *Mangifera indica*—were used to create transdermal patches for the treatment of pyrexia. Phytochemical analysis of the plants revealed the presence of tannins, alkaloids, flavonoids, and glycosides. For formulation development, a methanolic extract of this plant was used, and assessment tests revealed that formulation F4 was the best. Maximum moisture uptake, moisture content, drug content, thickness, folding durability, and elongation were all displayed by the created formulation. The proposed compound did not irritate human skin, according to the safety evaluation. Compared to traditional dosing forms, the herbal transdermal patch may be a better choice for treating pyrexia. The further clinical study is needed for antipyretic activity.

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