



REVIEW ARTICLE

Wound Healing and Pharmacological Properties of the Siddha Formulation *Mathan Thailam*: A Narrative Review

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Abstract

Wound healing remains a significant concern in clinical practice, especially in chronic and infected wounds, where delayed healing can lead to serious complications and increased healthcare costs. The rising problem of antimicrobial resistance has encouraged a renewed interest in traditional systems of medicine as alternative options for wound care, even though conventional treatments are often effective. The Siddha system of medicine offers several medicated oils for external application, one of which is *Mathan Thailam*, a formulation that has been used for a long time in the treatment of burns, infected wounds, and ulcers. In this review, a comprehensive literature search was conducted using PubMed and Google Scholar with keywords including “*Mathan Thailam*,” “wound healing,” and “Siddha medicine.” Studies published in English up to 2025 were considered, including preclinical experiments, traditional Siddha texts, and selected case reports; studies lacking relevant data were excluded. Evidence was synthesized narratively to evaluate pharmacological properties, mechanisms of action, and clinical outcomes. *Mathan Thailam* formulation is prepared using *Datura* leaf extract, purified copper sulfate, and coconut oil. Earlier reports indicate that this preparation shows antimicrobial, anti-inflammatory, antioxidant, and wound-healing effects. Preclinical data suggest that topical application of *Mathan Thailam* accelerates wound healing through increased collagen deposition, greater tensile strength, and improved epithelialization. It is thought that these effects are linked to changes in inflammatory mediators (TNF- α , IL-10) as well as better antioxidant defense systems and angiogenesis. Clinical evidence however remains limited and is largely confined to observational case reports documenting symptomatic improvement and reduction in wound size in chronic ulcers. In the absence of controlled clinical trials, such observations should be interpreted with caution. Overall, the existing literature indicates that *Mathan Thailam* possesses wound-healing potential that is supported mainly by preclinical data. Further well-designed clinical studies are required to establish its safety, efficacy, and therapeutic relevance within evidence-based wound-care practice.

Keywords: *Mathan Thailam*; Siddha medicine; wound healing; pharmacological attributes.

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Introduction

Hemostasis, inflammation, proliferation and remodeling are the four overlapping stages of wound healing a complicated and tightly controlled biological process that restores the structural and functional integrity of damaged tissue¹. After an injury clot formation stops blood loss and makes it easier for growth factors to be released which attracts immune cells to the wound site. Neutrophils and macrophages infiltrate during the inflammatory phase eliminating necrotic tissue and microbial pollutants to prepare the wound environment for healing. Fibroblast migration, collagen synthesis, angiogenesis and granulation tissue formation take place during the proliferative phase.

During the remodeling phase collagen reorganization and tissue strengthening take place¹. Acute wounds often heal in a predictable amount of time, while chronic and infected wounds frequently show delayed healing and necessitate further therapeutic procedures. A significant clinical and financial burden is associated with chronic wounds, especially in individuals with diabetes mellitus, vascular insufficiency, advanced age, and weakened immune systems². Conventional wound management strategies including antibiotics, antiseptics, and synthetic dressings, are effective in many cases, however rising antimicrobial resistance, side effects from treatment, longer healing times and high healthcare costs have sparked a resurgence of interest in complementary and alternative therapies^{2,3}.

In these regards, traditional medical systems have their topical preparations that have been long employed to treat wounds and are currently receiving a new scientific focus based on their ability to exhibit a multi-target phenotype in wound-healing mechanisms. For wound care, traditional medical systems like Ayurveda, Siddha, and Traditional Chinese Medicine have traditionally used natural products, medicinal oils, and preparations based on plants and minerals⁴. Numerous of these formulations show several biological activities related to wound healing such as pro-regenerative, antibacterial, anti-inflammatory and antioxidant properties. In preclinical models, experiments using herbal remedies like *Centella asiatica*, *Curcuma longa*, *Calendula officinalis* and honey-based dressings have shown improved wound contraction, collagen deposition, angiogenesis, and epithelialization⁵⁻⁷. Similarly, preclinical trials using polyherbal formulations derived from traditional systems have Suggested potential for better granulation tissue development and quicker wound healing suggesting their potential use as adjuncts in wound management^{7,8}. The Siddha system of medicine rooted in classical Tamil traditions emphasizes holistic wound care using herbal, mineral, and animal-derived formulations based on tridosha principles. A number of medicated oils (thailams) that are recommended for burns, ulcers, infected wounds and persistent non-healing skin lesions are described in classical Siddha scriptures⁹. Among them, Siddha practice frequently uses formulations like *Mathan Thailam*, Mahamegarajanga Thailam, and associated medicinal oils for external wound care⁹⁻¹¹. Many Siddha wound-healing compositions are still understudied from a contemporary pharmacological and mechanistic standpoint despite their continued traditional and clinical use. *Datura metel* leaf juice, refined copper sulfate, and coconut oil are the basic ingredients of *Mathan Thailam*, a traditional Siddha herbomineral preparation¹⁰. Traditionally, it has been utilized topically to treat burns, diabetic ulcers, infected wounds, and cuts¹⁰. Preliminary experimental studies in animal models have suggested that *Mathan Thailam* may improve wound contraction, epithelialization, collagen deposition and tensile strength in animal wound models possibly by modifying inflammatory cytokines, antioxidant defense mechanisms, angiogenic signaling and antimicrobial activity, according to preliminary experimental studies¹¹. However the available evidence remains predominantly preclinical, and clinical data are largely limited to observational case reports rather than controlled clinical trials. Although several Siddha medicated oils are indicated for wound management, *Mathan Thailam* merits focused scientific evaluation due to its distinctive herbomineral composition, incorporation of copper ions with established roles in angiogenesis and tissue remodeling, and preliminary experimental observations suggesting potential multi-targeted effects relevant to wound-healing activity. At the same time, significant gaps remain regarding its exact mechanism of action, safety in the long-term, especially its standardization in terms of *Datura*-derived alkaloids, consistency between batches, and the strength of the overall clinical evidence on its therapeutic use. Thus, the purpose of this narrative review

is to critically summarize and review the existing classical Siddha literature, experimental studies and documented clinical results regarding *Mathan Thailam*. This review combines available information on the phytochemical and mineral makeup, pharmacological properties, and proposed mechanisms of action of *Mathan Thailam* to relate traditional Siddha knowledge to contemporary science, while also highlighting gaps in evidence, safety concerns, and directions for future research. To have a better perspective on the therapeutic merit of *Mathan Thailam*, it can be first useful to explore the history and traditional context of its usage in the Siddha medicine or system. The traditional background gives this conceptual framework with which its composition, method of preparation and clinical application are informed. Thus, the next section is the summary of classical descriptions and conventional use of *Mathan Thailam* and then pharmacological properties and chemical composition are presented.

Traditional Background of *Mathan Thailam*

Wound care was a well-known part of the Siddha system of medicine, in which internal and external methods of treatment are used to recover the integrity of the tissue and the humoral balance. Classical Siddha texts describes several medicated oils preparations (*thailams*) that are traditionally indicated for infected wounds, ulcers, burns, and inflammatory skin disorders. These are mainly topical preparations and are aimed at cleaning wounds, decreasing inflammation, preventing infection and promoting tissue regeneration⁹. *Mathan Thailam* (also known as Mattan Thailam or Pachai Ennai) is a well-recognized Siddha medicated oil used traditionally for infected wounds, chronic ulcers, diabetic wounds, and inflammatory skin conditions, as described in classical texts and the *Siddha Formulary of India*^{9,10}. Traditional Siddha wound care involves a step-by-step approach that engages wound cleansing, hemostasis, application of medicated oils traditionally signs and signs that symbolize treating the inflammatory and infectious issues, and subsequent application of supportive interventions that are supposed to assist the granulation and epithelialization. These are practices of *Aruvai Maruthuvam*, the surgical and para-surgical branch of Siddha medicine which focuses on repairing the health of tissues whilst balancing *Vatham*, *Pitham*, and *Kabam*⁹.

Mathan Thailam is a classical herbomineral formulation prepared using fresh leaf juice of *Datura metel* L., purified copper sulphate (*thurusu*), and coconut oil. The formulation procedure and the compositional information are explained in Siddha pharmacopeial texts and have been standardized in contemporary research in line with the procedures as stipulated in the *Siddha Formulary of India*¹⁰. Contemporary standardization research has shown that the formulation can be reproduced and has given physicochemical, phytochemical and analytical validation to the quality and consistency of the formulation¹⁰. It is still found in classical Siddha texts and in contemporary Siddha medical practice, which points to the fact that it

still belongs to the historical wound care methods. Even though its conventional use has been informed mainly by the practical observations and written traditions, some new studies have initiated preliminary systematic evaluation of its composition, short-term safety, and its probable pharmacological properties. Such initiatives offer a basis of establishing the relationship between the traditional knowledge of Siddha and modern scientific testing and go to the next level of researching *Mathan Thailam* as a possible topical agent in wound care^{9,10}. Although the usual literature explains how *Mathan Thailam* is prepared and when it is used, a scientific review of the matter needs to have a clear look at the chemical and mineral content used. This is necessary to conduct such correlations whenever no purely biological mechanism is involved and to maintain the standard and safety of formulations by use of such compositional analysis. In this line, the following part will cover the phytochemical and mineral profile of *Mathan Thailam* with reference to the modern analytical researches.

Phytochemical and Mineral Composition of *Mathan Thailam*

Mathan Thailam is a classical Siddha herbomineral preparation made by processing fresh leaf juice of *Datura metel* L. with purified copper sulphate ($CuSO_4 \cdot 5H_2O$) in coconut oil, based on procedures in the *Siddha Formulary of India* and tested in modern standardization studies¹⁰. It is important to know the chemical composition of this formulation as it helps in determining the therapeutic actions of use reported and defining a scientific basis of its use in the traditional wounds treatment. Traditional indicators of formulation completion, such as disappearance of froth and characteristic changes in colour and odour, are used to ensure effective extraction of lipophilic phytoconstituents into the oil medium. The chemical characterization of the standardized formulation indicates that several classes of bioactive phytochemicals, primarily derived from *Datura metel* leaves, are retained in the final oil. The major constituents have been identified to be alkaloids, saponins, coumarins, steroids/phytosterols, triterpenoids, phenolics and flavonoids, through qualitative phytochemical screening and chromatographic analyses¹⁰. GC-MS profiling further indicates that coconut oil forms a fatty-acid-rich lipid base, dominated by lauric, capric, palmitic, oleic, and stearic acids, which may facilitate skin penetration and offer potential antimicrobial and barrier-protective benefits¹⁰. Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES) elemental analysis shows that the finished formulation contains low, measurable amounts of copper (around 33 ppm), reflecting careful control of mineral incorporation during processing¹⁰. Notably, the heavy metals like lead, arsenic and mercury were not found, which means that purification and standardization measures are effective in reducing heavy metal contamination. This observation reflects Siddha pharmacopeial principles, which focus on the safe and controlled use of mineral components through proper detoxification¹⁰.

The phytochemical profile identified in *Mathan Thailam* consistent with literature on *Datura metel*, which is known to contain tropane alkaloids (e.g., atropine, scopolamine, hyoscyamine), flavonoids, saponins, and other secondary metabolites that have been reported to have biological activities^{12,13}. It should also be noted though that most mechanistic understanding is based on the extrapolation of studies on individual plant constituents as opposed to the entire formulation. Thus, the combination of plant compounds, a lipid carrier, and copper ions presents a profile that may be relevant to wound healing, although we still lack clear evidence of how it works at the overall formulation level. Comprehensively, physicochemical testing, chromatographic fingerprinting (HPTLC, GC-MS), and elemental analysis (ICP-OES) provide a reliable control system of quality control and safety assessment of *Mathan Thailam*¹⁰. These analytical results confirm the formulation's consistency, but they do not demonstrate its clinical effectiveness, highlighting the need for further controlled pharmacological and clinical studies. These phytochemical classes and mineral elements have been identified, which allows postulating the potential biochemical explanations of the processes whereby *Mathan Thailam* can have an effect on various stages of wound healing. Compositional determination of these findings is therefore used as a basis to study the pharmacological properties of the formulation which are discussed in the next section.

Pharmacological Basis of Wound Healing Activity

Due to its complicated phytochemical and mineral structure, *Mathan Thailam* has been recommended to have various biological activities in wound healing. The subsequent subsections present in short, the experimental and non-experimental evidence that exists on its anti-inflammatory, antimicrobial and tissue-regenerative effects as it pertains to the various phases of wound healing.

Anti-inflammatory and Antioxidant Mechanisms

The wound healing process commences with an inflammatory phase, where immune cells such as neutrophils and macrophages work to remove dead tissue and fight off invading pathogens. In this phase, reactive oxygen species (ROS) are produced to counteract infections and initiate repair mechanisms. Nevertheless, chronic inflammation and high reactive oxygen species production can harm healthy tissue and hinder epithelial regeneration and collagen synthesis. Components of *Mathan Thailam* have been reported in related studies to potentially mitigate these effects and help restore balance¹⁴. The activity of *Datura metel* leaves is attributed to its phytochemical constituents. Supercritical CO₂ extracts of *D. metel* have been reported the ability to diminish nitric oxide production, inhibit MMP-2 activity, and support fibroblast migration crucial activities that may modulate inflammation and facilitate prompt wound healing¹⁴. Copper, a mineral component of *Mathan Thailam* is included in the formulation as described in classical

Siddha texts and confirmed by modern standardization studies¹⁰. The particular effects of *Mathan Thailam* on oxidative stress, inflammatory cytokines, epithelialization, and collagen maturation have not been experimentally verified in these investigations despite the fact that copper is known in general biology to boost antioxidant enzymes like superoxide dismutase^{15,16}. Along with the regulation of inflammation and oxidative stress, the control of the microbial colonization is also crucial in the process of the organized wound healing. This factor is specifically significant in chronic and diabetic wounds whereby infection can drastically retard healing. The possible antimicrobial effects of *Mathan Thailam* are thus addressed under the following subsection.

Antimicrobial and Antiseptic Properties

Microbial colonization and wound infection are established factors that impede healing, mostly due to prolonged inflammation, heightened oxidative stress, and advancing tissue damage. The antibacterial and antiseptic efficacy of *Mathan Thailam* is proposed to stem from the synergistic effects of its phytoconstituents and mineral ingredients, rather than from a singular active principle^{10,17}. In vitro investigations have reported that methanolic extracts of *Datura metel* exhibit extensive antibacterial activity against both Gram-positive and Gram-negative bacteria, thus aligning with its traditional application in infected wounds^{18,19}. Limited preclinical investigations have further suggested antibacterial activity of *Mathan Thailam* against *Escherichia coli*, including resistance-modifying effects²⁰. Nevertheless, the antibacterial activity of the entire formulation has not been thoroughly verified using standardized assays or comparison controls and these conclusions are based on laboratory-level research. The majority of the clinical data pertaining to *Mathan Thailam*'s antibacterial activity is found in observational studies and individual case reports. In addition to reported granulation tissue production and epithelialization, observational investigations detailing its topical treatment in diabetic foot ulcers have described decreased clinical indicators of infection²¹. However, the interpretability of these results is limited due to the lack of comparator therapies, standardized outcome measures, and controlled clinical trials. Therefore, strong clinical confirmation is still needed even though preliminary experimental and anecdotal clinical observations point to possible antibacterial advantages. In addition to the potential part in infection control, successful wound healing involves cellular interactions between fibroblast-proliferation, extracellular-matrix-deposition, and angiogenesis. The evidences that are available concerning these tissue-repair processes in the case of *Mathan Thailam* have been summarised in the subsection that follows.

Cellular and Molecular Mechanisms of Tissue Repair: Collagen Synthesis and Angiogenesis

Preliminary experimental observations suggest that *Mathan Thailam* may contribute to tissue repair by creating a wound microenvironment conducive to collagen

synthesis and angiogenesis, primarily through modulation of inflammation and oxidative stress. Extracellular matrix (ECM) production and fibroblast activation may be facilitated by reducing prolonged inflammatory responses. This may support the synthesis and deposition of collagen, especially types I and III, which are critical for early wound matrix formation and the development of tensile strength^{10,22}. Additionally, preclinical research suggests that bioactive phytochemical-containing wound healing formulations may affect angiogenic processes, including the control of pro-angiogenic growth factors like vascular endothelial growth factor (VEGF). Increased VEGF signaling supports the neovascularization of the wound bed by encouraging endothelial cell migration, proliferation, and capillary sprout creation within the temporary extracellular matrix^{23,24}. Nevertheless there is still little direct molecular data supporting these routes for the full *Mathan Thailam* formulation. Granulation tissue production depends on the coordinated interaction of endothelial cells, macrophages, and fibroblasts. Together, fibroblast-derived collagen deposition, macrophage-mediated debris removal, and endothelial reactions to integrin- and growth factor-mediated signaling enhance the regenerating tissue's vascularization and structural structure^{25,26}. These procedures give the healing wound mechanical stability and improve the supply of nutrients and oxygen. In order to restore tissue integrity and functional strength during the later stages of wound healing, collagen remodeling and maturation as well as the stability of newly generated microvasculature are crucial. The proliferative and remodeling phases may be supported by *Mathan Thailam*, according to available experimental observations; however these conclusions are mainly based on indirect evidence and extrapolation from related wound-healing studies, highlighting the need for focused mechanistic investigations.

Safety Considerations and Potential Risks of Datura Alkaloids

Mathan Thailam is enriched with fresh leaf juice of *Datura metel* L. which is a medicinal herb known to have biologically active tropane alkaloids including atropine, hyoscyamine, and scopolamine. These substances are commonly known anticholinergic drugs which act through their pharmacological actions by competitive antagonism of muscarinic acetylcholine receptors, both in the peripheral and central nervous systems. The behaviors of this kind lead to a number of the therapeutic properties, but are also thought to explain the toxicological profile of *Datura* species when oral intake or systemic intake happens at more significant doses^{26,27}. Accidental or even defaulted ingestion of Tropane alkaloid may cause anticholinergic syndrome, the clinical scenario associated with having peripheral symptoms such as tachycardia, mydriasis, dry mucous membranes, urinary retention and hyperthermia as well as central nervous system symptoms such as agitation, delirium, hallucinations, confusion and in the worst case situation, seizure or coma²⁸⁻³⁰. The formulation to be adopted in the case of *Mathan Thailam* is directed solely to topical use and is conventionally made by means of processing of *Datura metel* leaf juice in coconut oil and

Table 1. Major Phytochemical Classes Identified in *Mathan Thailam* and Reported Biological Relevance

S. No.	Phytochemical class	Source component	Reported biological relevance*	Supporting literature
1	Alkaloids	<i>Datura metel</i> leaves	Antimicrobial, analgesic; modulation of inflammatory mediators	^{10,12}
2	Saponins	<i>Datura metel</i> leaves	Surface-active properties; reported role in tissue repair	¹³
3	Coumarins	<i>Datura metel</i> leaves	Antioxidant, anti-inflammatory activity	¹²
4	Steroids / phytosterols	<i>Datura metel</i> , coconut oil	Membrane stabilization; anti-inflammatory effects	¹⁰
5	Triterpenoids	<i>Datura metel</i> leaves	Reported association with collagen modulation	¹³
6	Phenolics / flavonoids	<i>Datura metel</i> leaves	Free radical scavenging; vascular protection	^{12,13}

Table 2. Fatty Acid Components Detected in *Mathan Thailam* by GC–MS

S. No.	Compound identified	Chemical class	Probable source	Reference
1	Lauric acid	Saturated fatty acid	Coconut oil	¹⁰
2	Capric acid	Saturated fatty acid	Coconut oil	¹⁰
3	Palmitic acid	Saturated fatty acid	Coconut oil	¹⁰
4	Oleic acid	Monounsaturated fatty acid	Coconut oil	¹⁰
5	Stearic acid	Saturated fatty acid	Coconut oil	¹⁰

Table 3. Mineral Profile of *Mathan Thailam* (ICP–OES Analysis)

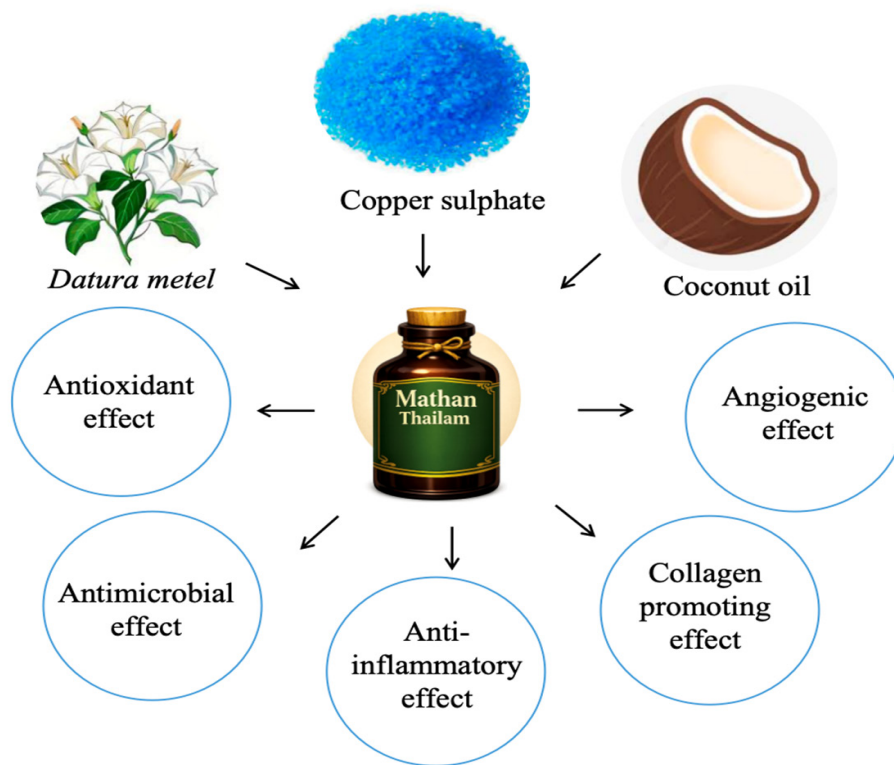
Element	Detection status	Approx. concentration (ppm)	Reference
Copper (Cu)	Detected	~33.2 ppm	¹⁰
Lead (Pb), Arsenic (As), Mercury (Hg)	Not detected	Below detection limit	¹⁰

purified copper sulphate of the Siddha pharmacopeial. It is assumed that the processes help to extract the lipophilic constituents and may reduce the toxicity of the crude plant material but it is not possible to rule out the chances of systemic exposure¹⁰. Percutaneous absorption of lipophilic tropane alkaloids may occur with application over open wounds or damaged skin barriers and over extended use or when applied over make widely accessible surfaces, alkaloids may be highly varied based on environmental conditions, maturity of the plant, geographic origin and changes in processing, which can influence the consistency and safety profile of the formulations derived using this plant^{27,31}. Physical and chemical standards of *Mathan Thailam* have been presented that have given acceptable values and non-toxic heavy metals like lead, arsenic and mercury and contain controllable amounts of copper ions at approximately 33 ppm¹⁰. Also, existing preclinical experiments and few isolated clinical observations did not report obvious symptoms of anticholinergic toxicity during topical application. Yet, these results are initial and detailed toxicological analyses such as dermal absorption research, pharmacokinetic research studies, and long-term safety persons checkups are not yet accessible. Considering all these, *Mathan Thailam* should be used cautiously in clinical practice especially in patients with extensive wounds, impaired skin breaks or those using drugs with an anticholinergic effect. Watching against

possible indicators of systemic absorption e.g. tachycardia, dry mouth, or neurological symptoms may be indicated in long time use. Quantitative profiling of tropane alkaloids in standardized batches, dermal permeability studies, systematic pharmacovigilance studies should be a priority in future research to determine evidence-based ranges of safety of clinical use of this traditional Siddha formulation.

Limitations of Preclinical Evidence

Although preclinical studies and experimental observations give preliminary evidence on the possible wound-healing functions of *Mathan Thailam* (e.g. anti-inflammatory, antioxidant, antimicrobial and tissue healing) available data are overwhelmed by various methodological limitations that diminish the reliability and generalizability of the available data (i.e. small sample sizes often n=6-10 animals per group) lack of appropriate controls (e.g. vehicle-only group, control with standard treatment e.g. povidone-iodine or silver sulfadiazine). Moreover, there has been no systematic study of variations in the oil preparation used in the different studies (e.g. variations in heating time, ratio of ingredients, batch-to-batch reproducibility of *Datura metel* leaf or method of extract preparation) which may cause inconsistent findings^{10,33}. There is no systematized study of the variability in the oil preparation between different studies (e.g. variations in heating time, ratios of ingredients



Mechanisms of Mathan Thailam

Figure 1: Synergistic mechanisms of *Mathan Thailam*. Integration of *Datura metel*, Copper sulphate and Coconut oil results in a multi-targeted pharmacological effect including antioxidant, antimicrobial and anti-inflammatory activities that accelerate wound healing.

used, consistency between batches of *Datura metel* leaf, or different methods of extract preparation), which can contribute to incons. Such limitations are typical of early-stage herbal and traditional formulation research, and suggest that the evidence is encouraging and consistent with traditional use, but cannot be called definitive evidence of efficacy and mechanisms until advanced rigorous and standardized protocols with larger cohorts, adequate controls, and replication are done.

Case Studies

There is only limited clinical evidence on *Mathan Thailam* mostly as individual case reports and small case series of observations. These give its topical applications, such as in conjunction with other Siddha preparations (e.g., Triphala Chooranam wash, Palagarai Parpam, or Muthuchippi Parpam) to a range of chronic non-healing ulcers, such as varicose, venous, diabetic foot, and arterial ischemic ulcers ^{21 33}.

The reports have given examples such as: In one case, a 60-year-old diabetic man reported having a diabetic foot ulcer, which was managed using *Mathan Thailam* dressing and Triphala Chooranam wash, and the ulcer was completely treated in four months ³⁵. In another case, a 52-year-old diabetic, hypertensive male patient who exhibited a seven-month-old deep leg ulcer; *Mathan Thailam* and Palagarai Parpam therapy had a seven-month reduction in Leg Ulcer Measurement Tool (LUMT) of

18/68 to 12/68 in six weeks ²¹. Similarly, a 49-year-old man with painful arterial ischemic ulcer on the right fourth toe; *Mathan Thailam* and Palagarai Parpam produced improvement in the LUMT score of 21/68 to 06/68 in six weeks ²¹. In another case, a 55-year-old male, having a venous ulcer on the left leg; every alternate-day *Mathan Thailam* usage six-week intervention led to the reduction of the LUMT score of 28/68 to 14/68 ²¹. Similarly, a 58-year-old female who experienced a varicose ulcer (Naala Vibatha Pun) around the right ankle; *Mathan Thailam* application on alternate days, six weeks was accompanied by an improvement of LUMT score between 17/68 to 12/68, coupled with actual pain reduction, oozing and swelling ²¹. In another case, a 48-year-old male patient with a chronic venous ulcer on the left ankle; *Mathan Thailam* 10mg a day, Muthuchippi Parpam 10mg a day on November 1-3 every week the LUMT score decreased to 21/68 by 05/68 ²¹.

Such observations also create some initial ideas about what may happen in chronic wound management when working with the traditional Siddha protocols. Nonetheless, the evidence is anecdotal, limited by significant limitations, such as extremely small sample sizes (in most cases, isolated instances or small series), failure to control or match, lack of randomization, blinding, or standardized protocols other than of LUMT scoring, and can also be confounded (e.g. by co-administration of systemic treatment, natural variability of wounds, or adjunctive wound care measures). There is further limited interpretability by retrospective reporting and potential publication bias of the desirable

Table 5: Reported Case studies on *Mathan Thailam*

S. No.	Case Description	Observation / Outcome	Reference
1	Diabetic foot ulcer in a 60-year-old male treated with <i>Mathan Thailam</i> dressing and cleansing with Triphala Chooranam	Complete recovery of the ulcerative foot after 4 months of treatment	²⁷
2	A 52-year-old male with diabetes and hypertension presenting with a 7-month-old deep ulcer on the left leg, treated with <i>Mathan Thailam</i> and Palagarai Parpam	Reduction in Leg Ulcer Measurement Tool (LUMT) score from 18/68 to 12/68 after 6 weeks of treatment	²¹
3	A 49-year-old male farmer diagnosed with a severely painful blackish arterial ischemic ulcer on the right fourth toe, treated with <i>Mathan Thailam</i> and Palagarai Parpam for 6 weeks	LUMT score reduced from 21/68 to 06/68, indicating marked healing and improved quality of life	²¹
4	A 55-year-old male with a venous ulcer on the left leg for 3½ months, treated with topical application of <i>Mathan Thailam</i> on alternate days for 6 weeks	LUMT score reduced from 28/68 to 14/68, suggesting significant ulcer healing and improved quality of life	²¹
5	A 58-year-old female diagnosed with Naala Vibatha Pun (varicose ulcer) around the medial malleolus of the right ankle for 5 months, treated with <i>Mathan Thailam</i> on alternate days for 6 weeks	LUMT score reduced from 17/68 to 12/68, with reduced pain, oozing, and swelling, and improved mobility	²¹
6	A 48-year-old male with a 12-month-old venous ulcer on the left ankle joint, treated with <i>Mathan Thailam</i> and Muthuchippi Parpam on alternate days for 6 weeks	LUMT score reduced from 21/68 to 05/68, showing marked wound contraction and significant improvement in quality of life	²¹

Footnote*: The information is obtained by uncontrolled case reports of observation and small series. Results are tentative, prone to numerous biases and are not universal. Validation must be done via randomized controlled trials.

Table 6: Marketed Products of *Mathan Thailam*

S. No.	Brand / Manufacturer	Reported Uses*
1	Moolihai Ayurveda	External wounds, skin infections, minor burns, itching, and ulcerated lesions
2	Medisiddh Thaila (Oil)	Skin disorders, wounds, ulcers, and inflammatory skin conditions
3	IMPCOPS (Govt. of Tamil Nadu)	Diabetic ulcers, carbuncles, fissures, eczema, and chronic non-healing wounds
4	Vadalur Arutjothi Vaidyasalai	Diabetic ulcers, chronic wounds, non-healing ulcers, and ear infections
5	AEON Wellness – <i>Mathan Thailam</i>	Weeping eczema, itching, chronic ulcers, bedsores, and wound healing
6	SKM Siddha & Ayurveda – <i>Mathan Thailam</i>	Eczema, inflammatory skin conditions, redness, and minor wounds

outcomes. By definition, it means that these reports must be taken as hypothesis generating and not evidence of efficacy. They are neither strong clinical evidence nor can be used to make general therapeutic arguments relating to *Mathan Thailam*. The safety, efficacy and generality in clinical practice can only be assessed appropriately by use of rigorous randomized controlled trials (RCTs)- with sufficient sample sizes, objective primary endpoints (e.g., complete healing rates, time to healing, infection rates), comparators and long term follow-up.

Marketed product

With increasing public interest in traditional systems of medicine, several Siddha and Ayurveda-based pharmaceutical manufacturers have developed and commercialized formulations derived from classical texts. Many manufacturers have embraced *Mathan Thailam*, a traditional Siddha medicinal oil that is today sold under many brand names. These formulations are mainly meant to be used topically to wounds, ulcers, and certain dermatological diseases. Table 6 shows a typical list of *Mathan Thailam* items that are sold commercially. It should be mentioned that the stated indications are not

supported by data from controlled clinical trials, but rather by conventional usage claims and product information from manufacturers.

Conclusion

Traditionally, burns, infected wounds, and chronic non-healing ulcers have been treated topically using *Mathan Thailam*, a traditional Siddha herbomineral preparation. In order to assess its potential for wound healing within a modern scientific framework, the current narrative review critically integrates information from experimental pharmacology, recent standardization research, traditional Siddha literature, and accessible clinical case reports. Purified copper sulphate, coconut oil, and *Datura metel* leaf juice make up the formulation, which is a multi-component therapeutic system that can have complimentary biological effects related to wound healing. According to preclinical research, *Mathan Thailam* has antibacterial, anti-inflammatory, antioxidant, and collagen-promoting qualities that may help with wound contraction,

angiogenesis, epithelialization, and tensile strength restoration. Although there is still no direct molecular evidence at the formulation level, mechanistic studies suggest that *Mathan Thailam* may influence pro-angiogenic signaling, oxidative stress pathways, and inflammatory cytokines. Importantly, when prepared according to pharmacopeial guidelines, modern analytical tests have demonstrated consistent quality, physicochemical stability, and controlled incorporation of mineral components, without detectable harmful heavy metals, supporting both safety and formulation reliability. On the clinical side, the current evidence comes mainly from observational case reports and small case series, which report symptomatic improvement and reduced ulcer severity—particularly in chronic, diabetic, venous, and arterial ulcers. While these findings are encouraging, they should be interpreted cautiously due to the absence of randomized controlled trials, standardized comparators, and long-term safety data. Therefore, in the context of evidence-based wound care, the therapeutic claims related to *Mathan Thailam* cannot yet be deemed definitive. The idea that *Mathan Thailam* has true wound-healing capacity is generally supported by the literature, which is mostly based on preclinical research and conventional use. In order to address safety concerns about alkaloid variability and batch-to-batch consistency, future research should focus on well-designed clinical trials, mechanistic investigations at the molecular and cellular levels, and strong pharmacovigilance. Such initiatives are necessary to confirm its therapeutic effectiveness and to make it easier to logically include *Mathan Thailam* into contemporary wound-management techniques.

Credit authorship contribution statement

The authors confirm sole responsibility for the following: review conception and design (BK, MP,N), data collection (BK, N, MP), first draft of manuscript (BK, N, MP, TK), analysis and interpretation of collected data (BK,MP), editing and review (BG, MP, N, TK).

Declaration of competing interest

The authors declare that they have no known competing financial interest or personal relationship that could have appeared to influence the work reported in this.

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