



Chinese Petai Leaves (*Leucaena leucocephala*) as a Natural Therapy for Burn Wound Healing: A Literature Review

Author:

Sugiyarto¹, Akhmad Rifai², Sumardino³

Department of Nursing, Health Polytechnics of Surakarta

*Corresponding Email: *sugiy1077@gmail.com*

About the Author

1. 1st Author : (Sugiyarto, SST., Ners., M.Kes)
Affiliation : (Department of Nursing, Health Polytechnics of Surakarta).
Mailing address : (Jaten RT 1/ RW 5 Beku Karangnom klaten)
Email of author : (sugiy1077@gmail.com)
Orcid ID : <https://orcid.org/0000-0002-2639-7793>
Google Scholar URL : <https://scholar.google.com/citations?hl=en&user=KHKvV9EAAAAJ>
Phone number : 08562519004

- 2nd Author : (Akhmad Rifa'I, S.Kep., Ns., M.Kes)
Affiliation : (Department of Nursing, Health Polytechnics of Surakarta).
Mailing address : (Gang Palem2 RT 06 RW 06 Gagaksipat Ngemplak Boyolali)
Email of author : (rifaiaahmad2020@gmail.com)
Orcid ID : -
Google Scholar URL : <https://scholar.google.com/citations?hl=id&user=DCffaJUAAAAJ>
Phone number : 081575750108

- 3rd author : (Sumardino, SST., M.Kes)
Affiliation : (Department of Nursing, Health Polytechnics of Surakarta).
Mailing address : (Tegalrejo, Ceper, Klaten)
Email of author : (dinolahaku@gmail.com)
Orcid ID : -
Google Scholar URL : <https://scholar.google.com/citations?user=ATqQH3gAAAAJ&hl=en&oi=ao>
Phone number : 085867326070

ABSTRACT

Burns can cause disruption of skin integrity which makes patients susceptible to infection. It has been reported that morbidity and mortality in this population are almost 61% caused by infection. One of the best and optimal treatments in this problem is to use complementary therapy that accelerates the healing of burns, namely by administering petai cina leaves topically. The source of the article used was obtained from a search through PubMed, ScienceDirect, and Google Scholar from 2015 to 2018. After being obtained, an article assessment was carried out until the stage of making a literature review. Based on the literature review that has been carried out, it was found that the use of petai cina leaves topically can accelerate the healing time of burns. The average healing time for the group receiving 30% Chinese petai extract was approximately 11.14 days. This is also supported by the results of statistical tests from several studies which show that petai cina leaves are effective in accelerating the healing of burns with p value 0,001 ($p < 0.05$). Petai cina leaves have the potential as a complementary nursing intervention for healing burns that supports the performance of the main pharmacological therapy for burns, although clinical trials have not been carried out on humans. Currently, clinical research conducted on humans still does not exist, so clinical research on humans needs to be carried out in the future.

Keywords: Burn, Skin, Chinese Petai Leaves

ABSTRAK

Luka bakar dapat menyebabkan gangguan integritas kulit yang membuat pasien rentan terhadap infeksi. Telah dilaporkan bahwa morbiditas dan mortalitas pada populasi ini hampir 61% disebabkan oleh infeksi. Salah satu pengobatan terbaik dan optimal dalam masalah ini adalah dengan menggunakan terapi komplementer yang mempercepat penyembuhan luka bakar, yaitu dengan pemberian daun petai cina secara topikal. Sumber artikel yang digunakan diperoleh dari pencarian melalui PubMed, ScienceDirect, dan Google Scholar dari tahun 2015 hingga 2018. Setelah diperoleh, dilakukan penilaian artikel hingga tahap pembuatan tinjauan pustaka. Berdasarkan tinjauan literatur yang telah dilakukan, ditemukan bahwa penggunaan daun petai cina secara topikal dapat mempercepat waktu penyembuhan luka bakar. Waktu penyembuhan rata-rata untuk kelompok yang menerima 30% ekstrak petai Cina adalah sekitar 11,14 hari. Hal ini juga didukung oleh hasil uji statistik dari beberapa penelitian yang menunjukkan bahwa daun petai cina efektif dalam mempercepat penyembuhan luka bakar dengan nilai p 0,001 ($p < 0,05$). Daun petai cina memiliki potensi sebagai intervensi keperawatan komplementer untuk penyembuhan luka bakar yang mendukung kinerja terapi farmakologis utama untuk luka bakar. Saat ini penelitian klinis yang dilakukan pada manusia masih belum ada, sehingga penelitian klinis pada manusia perlu dilakukan dimasa mendatang.

Kata Kunci: Luka Bakar, Kulit, Daun Petai Cina

INTRODUCTION

In terms of surface area, the human skin is the largest organ. It is the vital component that protects internal tissues against temperature extremes, microbiological infections, mechanical damage, and UV radiation (Rodrigues et al., 2019). Burn injuries are caused by contact with hot liquids, chemicals, fire, electricity, or radiation. The degree of injury varies from first-degree, which is superficial, to fourth-degree, which is more visible and reveals muscles, tendons, and bone (hydrogel). A natural physiological response known as wound healing involves intricate interactions between many types of cells, mediators, cytokines, and the vascular system in the event of a skin injury (Zulkefli et al., 2023).

Utilizing the wealth of nature is one of the fields of search. Many plants found in nature have the ability to heal wounds. Some pharmacological effects of *Leucaena* leaf include antibacterial and anti-inflammatory properties that are related to the healing of wounds (Zayed & Samling, 2016). *Leucaena leucocephala*, sometimes referred to as Petai Cina in Indonesia, is one such plant. Traditionally, *leucaena* leaves are chewed or chopped and applied to the affected skin

area until healed (Sartinah et al., 2010; Veronica & Dwiastuti, 2022). Many studies have demonstrated this plant's efficiency in the process of repairing wounds. Leucaena leaf ethanol extract has demonstrated the capacity to accelerate wound healing (Chatchanayuenyong & Sujayanont, 2020).

The traditional use of medicinal plants in wound management is well-documented, with various species demonstrating promising therapeutic effects (Shedoeva et al., 2019). Recent scientific investigations have helped elucidate the mechanisms of action and validate the efficacy of many of these traditional remedies (Maver et al., 2018).

Burn wounds pose a significant challenge in healthcare, often leading to chronic complications and impaired healing. Traditional medicinal plants have garnered increasing attention as potential natural therapies to enhance burn wound healing. One such plant is the Chinese Petai leaves, a widely used herbal remedy in various cultures. This literature review aims to evaluate the existing evidence on the efficacy of Chinese Petai leaves as a natural therapy for burn wound healing.

MATERIALS AND METHODS

This study uses a systematic literature review approach to evaluate the potential of Chinese petai leaves (*Leucaena leucocephala*) in accelerating burn healing. Data was obtained from academic databases such as PubMed, ScienceDirect, and Google Scholar using keywords such as *Leucaena leucocephala*, burn and wound healing. The initial search yielded 88 articles. After removing duplicates, 46 articles remained. These were screened based on titles and abstracts, resulting in 17 articles for full-text review. Following a detailed evaluation, 5 studies were included in the final analysis. Inclusion criteria include English or Indonesian articles published in the last 10 years, focusing on the effects of Chinese petai leaf or its active compounds on burn healing, and are based on experimental research. Articles that are irrelevant, discuss compounds without burn focus, or are other reviews, are removed.

The data collected included research methods, key outcomes, and relevance to burn healing. The analysis was carried out descriptively to summarize the main findings and identify the effectiveness and mechanism of action of Chinese petai leaves in various research models.

RESULTS

Tabel.1 Article search results

Authors, Year	Article Title	Outcomes	Key Finding
(Kurnianto et al., 2017)	Penyembuhan luka bakar pada tikus putih dengan menggunakan ekstrak daun pegagan (<i>Centella asiatica</i>) 25% dan ekstrak daun petai Cina (<i>Leucaena leucocephala</i>) 30%	The study found that the group treated with 30% Chinese petai extract exhibited a significantly faster healing time for burn wounds compared to the other groups, with a p-value of less than 0.05, indicating a meaningful difference in effectiveness.	Faster wound closure
		The average healing time for the group receiving 30% Chinese petai extract was	

		<p>approximately 11.14 days, which was notably quicker than the control group, which had an average healing time of 14.71 days, demonstrating the superior efficacy of the petai extract in promoting burn wound healing</p> <p>Chinese Petai Leaves (<i>Leucaena leucocephala</i>) contain bioactive compounds such as flavonoids, tannins, and saponins.</p> <p>Flavonoids exhibit antibacterial and antioxidant properties that enhance wound healing. Tannins promote fibroplasia, aiding in dermal tissue regeneration. These compounds collectively contribute to the accelerated healing of burn wounds, making Chinese Petai Leaves a promising natural therapy for burn treatment, as evidenced by their significant effectiveness compared to other treatments in the study.</p>	
(Rohmah et al., 2016)	Efektivitas Daun Petai Cina (<i>Leucaena Leucocephala</i>) Dan Daun Jarak Pagar (<i>Jatropha Curcas</i>) Terhadap proses Penyembuhan Luka Bakar Grade I pada Tikus Putih (<i>Rattus Norvegicus</i>)	The results showed that the healing process (maturation phase) of grade II burns using 10 grams of Chinese petai leaves, the average healing was 12.78 with the highest healing time on the 13th day.	Faster wound closure
(Dewantari & Sugiharti, 2015)	Formulasi Dan Uji Aktivitas Gel Ekstrak Daun Petai Cina (<i>Leucaena Glauca, Benth</i>) Sebagai Sediaan Obat Luka Bakar	In this study, the extract was obtained by maceration method with 70% ethanol solvent. Furthermore, the extract is made into a gel preparation using a hydrophilic base with an extract concentration of 10%, 15%, and 30%. The gel preparation was then evaluated for physical properties including homogeneity test, pH test, adhesion test and dispersion test as well as its burn ability. The test results showed that the higher the concentration of Chinese petai leaf extract gel, the wider the dispersion ($p < 0.05$), wound healing	The higher the concentration of petai leaf extract Chinese in gel preparations will further improve the dispersion ($P < 0.05$), adhesion ($P < 0.05$) and burn healing activity ($P < 0.05$) but have no effect on the homogeneity and pH of the preparation.

		power ($p < 0.05$) and shorten the adhesion ($p < 0.05$). All gels with concentration variations remain homogeneous and provide the same pH value of 5	
(Widyantoro & Sugihartini, 2015)	Uji Sifat Fisik Dan Aktivitas Ekstrak Daun Petai Cina (<i>Leucaena Glauca</i> , <i>Benth</i>) Dalam Berbagai Tipe Basis Salep Sebagai Obat Luka Bakar	The test results showed that the order of the ointment bases that provided good homogeneity were hydrocarbons, absorption and water solubility. The order of the widest dispersion power is hydrocarbons, water soluble, absorption and water washed. From the results of the adhesion test, the adhesion sequence of the longest is hydrocarbon, absorption, water soluble and water washed, the order of burn healing speed from the fastest is hydrocarbon, absorption, water soluble and water washed. Based on these results, the ointment bases of the best order are hydrocarbons, absorption, water soluble and water washed.	The ointment base of the best order is hydrocarbon, absorbent, water-soluble and water-washed
(Elbanoby et al., 2024)	Phytochemicals derived from <i>Leucaena leucocephala</i> (Lam.) de Wit (Fabaceae) biomass and their antimicrobial and antioxidant activities: HPLC analysis of extracts	The results indicate that the botanical parts of <i>L. leucocephala</i> contain several bioactive compounds that have the potential to act as promising antimicrobial and antioxidant agents.	Antimicrobial and antioxidant agents.

DISCUSSION

Chinese petai leaf (*Leucaena leucocephala*) shows promising potential as a natural therapy for burn healing based on various studies. Research by Kurnianto et al. (2017) revealed that 30% Chinese petai leaf extract significantly accelerated the healing time of burns in rats, with an average time of 11.14 days compared to 14.71 days in the control group. This effect is attributed to the bioactive content such as flavonoids, tannins, and saponins that have antibacterial, antioxidant, and tissue regeneration properties. Similar findings were supported by Rohmah et al. (2016), who recorded healing of second-degree burns within an average of 12.78 days in the group that used Chinese petai leaves.

Another study by Dewantari & Sugiharti, (2015) and Widyantoro & Sugihartini, (2015) assessed the effectiveness of gel formulations and ointments based on Chinese petai leaf extract. Higher concentrations of extracts indicate increased wound healing power, physical stability, and pH. The hydrocarbon ointment base provides the best results for the speed of wound healing. Maden et al. (2018) emphasized the importance of considering the potential toxic and allergic effects of the plant, although most herbal therapies, including Chinese petai

leaves, show safety and effectiveness. Overall, Chinese petai leaf has great potential to be a natural alternative in the treatment of burns, with its significant bioactive benefits and customizable formulations for clinical applications.

The results of Phytochemical compounds in Leaves *L. leucocephala* methanolic extracts by HPLC were rosmarinic acid, resveratrol, quercetin, myricetin, and naringenin (Elbanoby et al., 2024). Quercetin exhibits many kinds of health benefits, including as potent antioxidant and anti-infective qualities that lower oxidative stress and inflammation, all of which may promote wound healing. Additionally, quercetin has been shown to improve four components of wound healing: the distribution of inflammatory cells, blood vessel density, fibroblast distribution, and collagen fraction. It has also been shown to improve biochemical markers associated with these aspects of the healing process (Huang et al., 2024).

Quercetin has shown promising effects in accelerating wound healing. Topical application of quercetin significantly improved wound closure and modulated key cytokines and growth factors involved in the healing process. Quercetin treatment increased the expression of pro-healing factors such as VEGF, TGF- β 1, and inhibiting TNF- α and IL-6 secretions in macrophages (Gopalakrishnan et al., 2016; Kant et al., 2020; Luo et al., 2018). A natural substance called resveratrol (RSV) has been the subject of much research due to its significant anti-inflammatory and antioxidant, which are closely related to a range of harmful (Jia et al., 2022).

A common flavonoid ingested by people, naringenin has low toxicity and anti-inflammatory properties. Naringenin works by inhibiting oxidative stress caused by carrageenan, producing hyperalgesic cytokines (IL-33, TNF- α , and IL-1 β), and activating NF- κ B in the skin of the paw. By upregulating the expression of transforming growth factor β 1 (TGF- β 1) and inhibiting the pro-inflammatory factors tumor necrosis factor α (TNF- α), interleukin 1 β (IL-1 β), and interleukin 6 (IL-6), hydrogel with resveratrol therapy accelerated wound healing in a rat burn wound model (Zheng et al., 2020).

While Chinese Petai Leaves show promise in burn wound healing, it is important to consider the broader context of herbal therapies. Although plant-based treatments have been used for centuries, modern clinical studies are still needed to fully understand their efficacy and safety in human applications. Additionally, potential toxic and allergic reactions should be carefully evaluated to ensure safe use in therapeutic settings (Maden et al., 2018; Tsala et al., 2013).

The content of flavonoids, alkaloids, saponins, and phenolic compounds in these various herbs plays a role in accelerating wound closure. However, it is important to consider the potential toxic and allergic effects of the use of plants and phytochemical agents, even though most studies show antitoxic effects.

Overall, Chinese petai leaves and several other herbal plants show potential as natural therapies in healing burns. However, more clinical trials are needed to ensure its safety and effectiveness before it can be widely recommended in clinical practice.

CONCLUSION

Based on the results of a literature review, Chinese petai leaf (*Leucaena leucocephala*) is proven to have great potential as a natural agent to accelerate the healing of burns. Research shows that Chinese petai leaf extract, especially with high concentrations, can improve the tissue regeneration process, accelerate healing time, and provide significant results compared

to the control group. Bioactive content such as flavonoids, tannins, and saponins contribute to the antibacterial, antioxidant, and stimulating properties of fibroplasia that accelerate the healing process.

In addition, the formulation of Chinese petai leaves in the form of gels and ointments provides positive results in terms of physical stability, homogeneity, and healing effectiveness. These findings support the development of Chinese petai leaves as an herbal therapy that can be used in the treatment of burns. However, *in vivo* studies have shown the potential of *Leucaena leucocephala* in accelerating wound healing, clinical trials in humans are necessary to confirm its effectiveness. Long-term toxicity evaluation and the potential side effects, such as allergic reactions or skin irritation, should be assessed. Further studies are needed to understand how the active compounds in *Leucaena leucocephala* leaves (flavonoids, tannins, saponins) contribute to the wound healing process, including their anti-inflammatory, antioxidant, and tissue regeneration effects.

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