

WHAM evidence summary: Aloe vera for treating burns

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CLINICAL QUESTION

What is the best available evidence for topically applied aloe vera for promoting healing in burns?

SUMMARY

Aloe vera is a succulent plant that has traditionally been used for natural wound healing, including to promote healing of burns.¹⁻³ Because it has a high water content, aloe vera promotes moist wound healing and is described as soothing on application. The research identified in the literature search provided some evidence supporting the efficacy of aloe vera for promoting healing in partial thickness burns.⁴⁻¹³ *Level 1* evidence suggested that aloe vera applied topically to partial thickness burns is associated with statistically significantly high rates of healing^{4-6, 8, 13} that is achieved faster^{4, 7-9, 12} than with comparator treatments. *Level 1* evidence^{9, 10} also indicated that aloe vera can help relieve the pain of partial thickness wounds. Allergic reactions to the aloe vera products have been reported.⁶

CLINICAL PRACTICE RECOMMENDATIONS

All recommendations should be applied with consideration to the wound, the person, the health professional and the clinical context.

There is some evidence that topically applied aloe vera could be used to improve healing in partial thickness burns, especially when there is limited access to contemporary dressings for moist wound healing (Grade B).

SOURCES OF EVIDENCE: SEARCH AND APPRAISAL

This summary was conducted using methods published by the Joanna Briggs Institute.¹⁴⁻¹⁶ The summary is based on a systematic literature search combining search terms related to aloe vera/acemannan and burns. This search was conducted in Medline, EMBASE, the Cochrane Library, AMED and the World

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Health Organisation's Afro library, for evidence conducted in humans with burns published up to February 2017 in English. Retrieved studies were appraised for relevance and rigour using Joanna Briggs Institute critical appraisal tools. Levels of evidence for intervention studies are reported in Table 1.

BACKGROUND

Aloe vera (*Liliaceae* family) is a tropical succulent that has been used in Asian and African countries as a traditional medicine for centuries.¹⁻³ The active component of aloe vera is a gel substance that is cultivated from the inside of the leaves. The aloe gel contains vitamins, enzymes, amino acids, sugars, minerals, anthraquinones and polysaccharides (including acemannan).^{1, 3, 17} It has water content of approximately 99%,^{1, 18} which contributes to its attributed effect in preventing wound desiccation and its soothing characteristics.^{19, 20}

Bench research suggests that aloe vera stimulates fibroblast proliferation, promotes collagen synthesis and stimulates angiogenesis.^{17, 20} Aloe vera is also claimed to have antimicrobial qualities,^{17, 20, 21} and ability to improve microcirculation, which in turn increases wound bed oxygenation.^{9, 20}

Aloe vera gel is produced from the leaves of the aloe vera plant. The outer layer of the washed leaf is peeled and the inner gel is pulverised. In commercial production, this gel is filtered, sterilised and pasteurised, reducing it to a slimy, gel consistency.^{17, 21} When prepared traditionally, aloe vera leaves are washed, the outer leaf rind is removed with a sterilised knife, the inner flesh is ground to a pulp with a mill and the gel substance stored in an air tight container in a dry, cool place.²² This method produces a non-sterile product that is not recommended for use in contemporary wound care due to the risk of infection.

CLINICAL EVIDENCE

The body of evidence identified in the search included eight studies,⁶⁻¹³ most of which were summarised in two systematic reviews,^{4, 5} and all of which were at moderate or high risk of bias. All the research was conducted in people with partial thickness (second- or third-degree burns). The evidence identified in this search on aloe vera products applied topically to human burns is summarised in Table 2.

A systematic review⁴ at moderate risk of bias reported four studies^{6, 7, 12, 13} all of which were at a high risk of bias and two of which were randomised.^{6, 7} Participants had deep partial thickness (second- or third-degree) burns to up to 40% of total body surface area.⁴ The pooled results for two studies^{7, 12} reporting time to complete healing showed that aloe vera products were associated with superior outcomes compared to control treatments. Time to complete healing was statistically significantly shorter for topical aloe vera compared to the comparator treatments (weighted mean difference [WMD] 8.79 days, 95% confidence interval [CI] 2.51 to 15.07, $p = 0.006$). The third trial⁶ in the review⁴ reported higher rates of complete healing with fresh aloe vera pulp compared to 1% silver sulfadiazine cream (95% versus 83%). The last trial¹³ reported that an aloe vera powder was associated with an improved rate of epithelisation in burns following skin grafting compared to no aloe vera treatment (5.84 ± 0.27 mm versus 3.95 ± 0.33 mm) (Level 1).⁴

A Cochrane review⁵ included three studies⁶⁻⁸ reporting aloe vera treatments for people with burns, two of which are reported above.^{6, 7} In the third study (also at high risk of bias),⁸ 0.5% aloe vera powder was associated with a higher rate of achieving complete healing for partial thickness burns compared to 1% silver sulfadiazine cream (100% versus 80%, risk ratio [RR] 1.41, 95% CI 0.70 to 2.85, $p > 0.05$). In this study 100% of the aloe vera treated burns healed by 15.9 ± 2 days, compared with 18.73 ± 2.65 days for the burns treated with silver sulfadiazine cream^{5, 8} (Level 1).

Efficacy of aloe vera gel for deep partial thickness burns was demonstrated in an RCT conducted in individuals with second degree burns covering less than 25% total body surface area. Patients were randomised to receive either gauze soaked in aloe vera gel ($n = 25$) or 1% silver sulfadiazine cream ($n = 25$). The mean healing time was significantly faster in the aloe vera group (mean 11 ± 4.18 days versus mean 24.24 ± 11.16 days, $p < 0.00001$)⁹ (Level 1).

One RCT¹⁰ ($n = 120$) that was at high risk of bias reported skin dryness as the main evaluation of aloe vera treatment for second-degree burns. At 14-day follow-up, there was no significant difference in skin dryness between a group treated with an aloe vera herbal cream and a group receiving silver sulfadiazine cream (7.1% versus 10.9%, $p > 0.05$)¹⁰ (Level 1).

Table 1: Levels of evidence for clinical studies

Level 1 Evidence	Level 2 Evidence	Level 3 Evidence	Level 4 Evidence	Level 5 Evidence
Experimental designs	Quasi-experimental designs	Observational – analytic designs	Observational –descriptive studies	Expert opinion/ bench research
1.b Systematic review of randomised controlled trials (RCTs) and other study designs ^{4, 5} 1.c Randomised controlled trials ⁶⁻¹⁰	Level 2.c Quasi-experimental prospectively controlled study ^{12, 13}	Nil	Level 4.c Case series ¹¹	Nil

A case series that was at high risk of bias reported outcomes for people with burns ($n = 4$) who were treated with aloe vera gel. After two weeks, 50% of the burns were completely healed and the other 50% were evaluated as having achieved 80 to 90% improvement in size, oedema and erythema¹¹ (Level 4).

CONSIDERATIONS FOR USE

- Aloe vera has been associated with allergic responses including urticaria and contact allergic dermatitis.^{1, 4} Its application should be avoided in people with an allergy to plants in the *Liliaceae* family (e.g., onions and garlic). In one trial, approximately 40% of participants reported irritation or itching, but this was not different from individuals treated with a silver sulfadiazine dressing.⁶ Allergic response may be greater when the aloe gel is harvested from the centre component of the leaf, because the active ingredients are more condensed in this part of the plant.⁴ Applying the aloe gel to a small area of skin as a test prior to application to a burn is recommended.²³
- Aloe vera gel appears to be an effective treatment for reducing pain in people with burns.^{9, 10} In RCTs, people with second and third degree burns who received aloe vera gel reported statistically significantly lower rating of pain measured on a on visual analogue scale than people who were treated with 1% silver sulfadiazine cream. Aloe vera gel was superior for pain management after seven days of treatment ($n=120$ people, $p = 0.014$) and after 14 days of treatment ($n = 120$ people, $p = 0.05$).¹⁰ Aloe vera was also associated with faster achievement of a pain-free status in people with second degree burns ($n = 50$ people, $p = 0.01$).⁹ The soothing characteristics of aloe vera are potentially related to its high water content.^{1, 18-20}
- In countries with limited access to contemporary moist wound dressings, aloe vera presents a cost-effective management option. A cost analysis conducted in India reported that a 5ml aloe vera gel dressing was 2.40 Indian rupee. This was about half the price of using a 2g silver sulfadiazine dressing at the cost of 4.92 Indian rupee.⁹

CONFLICTS OF INTEREST

The author declares no conflicts of interest in accordance with

Table 2: Summary of the evidence

Study	Country of study	Type of aloe vera (number participants)	Comparison treatment (number participants)	Duration of treatment	Outcome measures	Level of evidence
Akhtar, et. al. (1996) ⁷	India	Aloe vera cream applied every 3 days (n = 50)	Antibiotic cream applied every three days (n = 50)	Until complete healing achieved	Time to complete healing	Level 1
Visuthikosol, et. al. (1995) ¹²	Thailand	85% aloe vera gel-soaked gauze applied twice daily (n = 27)	Petroleum jelly gauze (n = 27)	Until complete healing achieved	Time to complete healing	Level 1
Khorasani, et.al. (2009) ⁸	Iran	0.5% aloe vera powder applied twice daily (n = 30)	1% silver sulfadiazine cream applied twice daily (n = 30)	Until complete healing achieved	<ul style="list-style-type: none"> Complete healing Time to complete healing 	Level 1
Shahzad, et. al. (2013) ⁹	Pakistan	Aloe vera gel-soaked gauze applied twice daily (n = 25)	1% silver sulfadiazine cream applied twice daily (n = 25)	Until complete healing achieved	<ul style="list-style-type: none"> Time to complete healing Pain on a visual analogue scale 	Level 1
Panahi, et. a. (2012) ¹⁰	Iran	Herbal cream containing aloe vera gel and essential oils applied once daily (n = 60)	1% silver sulfadiazine cream applied twice daily applied once daily (n = 60)	Until recovered	Frequency of skin dryness Pain on a visual analogue scale	Level 1
Thamlikitkul et. al. (1991) ⁶	Thailand	Fresh aloe pulp applied twice daily (n = 20)	Silver sulfadiazine cream applied twice daily (n = 18)	Until complete healing achieved or discharge	Complete healing	Level 2
Sun, et. al. 1994 ¹³	China	1% aloe vera powder plus petroleum jelly gauze (n = 50)	Petroleum jelly gauze (n = 50)	8 days	Rate of epithelialisation	Level 2
Nagar et. al. (2015) ¹¹	India	Aloe vera gel	None	Two weeks	<ul style="list-style-type: none"> Rate of healing Erythema Oedema Burn size 	Level 4

International Committee of Medical Journal Editors (ICMJE) standards.

ABOUT WHAM EVIDENCE SUMMARIES

WHAM evidence summaries are consistent with methodology published in Munn Z, Lockwood C, Moola S. The development and use of evidence summaries for point of care information systems: A streamlined rapid review approach, *Worldviews Evid Based Nurs.* 2015;12(3):131-8.

Methods are outlined in resources published by the Joanna Briggs Institute¹⁴⁻¹⁶ and on the WHAM Collaborative website: <http://WHAMwounds.com>. WHAM evidence summaries undergo peer-review by an international, multidisciplinary Expert Reference Group. WHAM evidence summaries provide a summary of the best available evidence on specific topics and

make suggestions that can be used to inform clinical practice. Evidence contained within this summary should be evaluated by appropriately trained professionals with expertise in wound prevention and management, and the evidence should be considered in the context of the individual, the professional, the clinical setting and other relevant clinical information.

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