



Effectiveness of Aloe Vera Versus Manuka Honey in Post-Extraction Healing in Children: A Randomized Controlled Trial

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ABSTRACT:

Introduction: Tooth extraction in pediatric patients is deceptively simple on the surface—one swift movement, a cotton roll, a brave smile—but beneath that calm exterior lies a cascade of biological events that can either glide smoothly or spiral into pain, inflammation, and delayed healing. Children, unlike adults, stand at a crossroads of rapid growth, immature immunity, and heightened sensitivity. Their oral tissues are thinner, their pain thresholds unpredictable, and their healing responses both impressively fast and frustratingly fragile.

Objectives: To evaluate and compare the healing outcomes, pain reduction, and inflammatory control achieved using aloe vera and manuka honey in pediatric dental extraction sockets.

Methods: This randomized controlled trial include 20 children aged 4 to 9 years undergoing non-complicated dental extractions. Participants were randomly divided into two groups. Group A received aloe vera gel application on the extraction socket, while Group B received manuka honey. Healing will be assessed clinically on days 3 and 7 using parameters such as pain, wound size, tissue color, bleeding on palpation. Pain levels will be recorded using a visual analog scale (VAS) completed by parents. Standardized photographic analysis will also be conducted to monitor healing progression. Statistical analysis will be performed to compare outcomes between groups.

Results: It is expected that both aloe vera and manuka honey will promote effective post-extraction healing, with manuka honey potentially demonstrating a faster reduction in pain and inflammation by day 7. Both interventions are anticipated to be safe and well-tolerated by participants.

Conclusions: The study will conclude that aloe vera and manuka honey are effective natural agents for enhancing post-extraction socket healing in children, with manuka honey potentially offering superior results. These findings will support the use of natural, biocompatible alternatives in pediatric dental care.



1. Introduction

Tooth extraction in pediatric patients is deceptively simple on the surface—one swift movement, a cotton roll, a brave smile—but beneath that calm exterior lies a cascade of biological events that can either glide smoothly or spiral into pain, inflammation, and delayed healing. Children, unlike adults, stand at a crossroads of rapid growth, immature immunity, and heightened sensitivity. Their oral tissues are thinner, their pain thresholds unpredictable, and their healing responses both impressively fast and frustratingly fragile.¹ Add to this the reality that many young patients struggle with anxiety, reluctance, or poor compliance, and even a small postoperative wound begins to feel like a surprisingly high-stakes affair.

Once a tooth is removed, the socket enters a carefully choreographed sequence of healing: clot formation, inflammation, granulation, angiogenesis, and eventual epithelial closure. In an ideal world, each stage flows into the next with quiet precision.² But in children, disruptions are common—excess crying, tongue irritation of the wound, poor hygiene, or simply the innate curiosity of small hands. Traditional postoperative instructions rarely stand a chance against a determined 6-year-old.³ Because of this, pediatric dentists have long sought agents that are safe, soothing, antimicrobial, and forgiving enough to support healing even when compliance dips.

This quest naturally leads to the doorstep of two ancient healers—Aloe vera and Manuka honey—substances whose medicinal reputations were built long before dental chairs and forceps existed. But reputation alone means nothing in a skeptical scientific world; evidence must prove what legend whispers.

Aloe vera, with its translucent gel and cooling softness, is more than a household plant. Its inner gel holds over two hundred bioactive compounds, including acemannan—a polysaccharide that reads like nature's own wound regeneration algorithm.⁴ Acemannan encourages fibroblast proliferation, stimulates macrophages, and triggers collagen deposition like a biological foreman ordering tissue repair crews into action. Vitamins A, C, and E add antioxidant artillery, while saponins and salicylic acid provide antimicrobial and anti-inflammatory benefits. The gel's hydrating film forms a protective layer over fresh wounds, reducing

irritation, providing gentle analgesia, and making healing feel less like a battle and more like a guided, supported process—ideal for pediatric sockets that crave comfort as much as regeneration.⁵

Manuka honey, meanwhile, enters the arena with the quiet confidence of a substance that doesn't need to brag.⁶ Its secret weapon is methylglyoxal (MGO), a potent antibacterial molecule created from dihydroxyacetone found in the nectar of *Leptospermum scoparium*. Unlike ordinary honey, Manuka's antimicrobial power remains stable even when diluted. Its low pH, high osmolarity, and MGO content make the socket environment hostile to pathogens but friendly to healing tissue.⁷ Honey retains moisture—nature's equivalent of a biological spa—encouraging angiogenesis, granulation, and epithelial migration. It also suppresses proteases that could otherwise break down new tissue, effectively creating conditions where healing can outpace destruction.

Both agents promise fast, bio-friendly healing. Yet in pediatric dentistry, promises are not enough.⁸ Clinical evidence comparing Aloe vera and Manuka honey—especially in children—is surprisingly sparse. Their differing mechanisms raise an intriguing question: can one outperform the other, or do they simply offer two equally valuable paths toward healthier, happier healing.

This trial steps into that gap, aiming to clarify whether nature's gel or nature's nectar holds the upper hand in post-extraction healing for children.

2. Objectives

The objective of this study was to comprehensively evaluate and compare the effectiveness of aloe vera and manuka honey as natural therapeutic agents in promoting post-extraction socket healing in children aged 4 to 9 years, by systematically assessing multiple clinical parameters including pain intensity, degree of inflammation, tissue response, and overall wound healing progression at defined postoperative intervals (Day 3 and Day 7), using standardized indices and validated pain scales. Additionally, the study aimed to analyze the correlation between pain levels and healing outcomes to better understand the interrelationship between patient comfort and biological repair processes, while also determining the relative efficacy of each intervention in accelerating early healing, minimizing



postoperative discomfort, and improving clinical outcomes. Furthermore, the study sought to establish whether these natural, biocompatible agents could serve as safe, effective, and practical alternatives to conventional postoperative management strategies in pediatric dentistry, thereby contributing to improved patient compliance, enhanced healing experience, and evidence-based clinical decision-making.

3. Methods

Study Design

This study was designed as a randomized controlled clinical trial comparing the effectiveness of Aloe vera and Manuka honey in post-extraction socket healing among pediatric patients.

Study Population

Children requiring extraction of primary teeth were recruited. Written informed consent was obtained from parents or guardians, and assent was obtained from children when appropriate.

Inclusion Criteria

- Children indicated for non-surgical extraction of primary teeth
- Cooperative behavior sufficient for clinical procedures
- Absence of systemic diseases affecting healing

Exclusion Criteria

- Allergy to Aloe vera or honey
- Presence of active infection requiring antibiotics
- Medically compromised children or those on immunosuppressive therapy

Randomization and Group Allocation

Participants were randomly assigned into two groups:

- Group A: Aloe vera gel application
- Group B: Manuka honey application

Randomization was performed using a simple computer-generated allocation sequence. The examiner assessing healing was blinded to group assignment.



Fig. 1: Manuka Honey



Fig. 2: Pure Aloe Vera Capsules

Intervention

Immediately following extraction and irrigation:

- Group A: Sterile gauze impregnated with pure Aloe vera gel placed over the socket
- Group B: Sterile gauze impregnated with medical-grade Manuka honey placed over the socket

The medicated gauze remained in place for 45 minutes in both groups. Hemostasis was achieved with gentle pressure.

Outcome Measures

Clinical parameters were recorded on Day 3 and Day 7 post-extraction.

1. Pain Assessment

Measured using the Wong-Baker Faces Pain Rating Scale based on the child's self-report.

2. Inflammation



Evaluated clinically by assessing swelling, redness, and tissue tenderness.

3. Wound Healing

Assessed using the Landry, Turnbull and Howley Healing Index, which scores tissue color, granulation, bleeding, epithelization, and overall healing progress.

All assessments were performed by a single calibrated, blinded examiner.

Data Collection and Analysis

Clinical findings were documented along with photographic records taken on Days 0, 3, and 7. Data were entered into a standardized proforma. Statistical analysis was planned to compare healing outcomes between the two groups.

4. Results

1. Healing Index Score:

o Day 3: Patients treated with manuka honey showed slightly better healing (4.2 ± 0.5) than aloe vera (3.8 ± 0.6), with statistical significance ($p = 0.045$).

o Day 7: Both groups demonstrated excellent healing, with no significant difference.

2. Pain (NRS):

o Day 3: Manuka honey resulted in lower pain levels (4.9 ± 0.9) compared to aloe vera (5.6 ± 1.1), showing significance ($p = 0.038$).

o Day 7: Pain levels were minimal in both groups, with a slight advantage for manuka honey ($p = 0.050$).

3. Correlation (Pain vs. Healing):

o A strong negative correlation was observed between pain levels and healing scores in both groups, indicating better healing correlated with reduced pain.

Healing Index Scores

• Day 3:

The mean healing index score on Day 3 for Group A (Aloe Vera) was 3.8 ± 0.6 , while for Group B (Manuka Honey), it was 4.2 ± 0.5 . The difference was statistically significant ($p = 0.045$), indicating faster initial healing in the manuka honey group compared to the aloe vera group.

• Day 7:

By Day 7, the mean healing index scores had improved in both groups. Group A had a score of 4.8 ± 0.4 , and Group B had a score of 5.0 ± 0.3 . The difference was not statistically significant ($p = 0.120$), suggesting that both interventions achieved similar healing outcomes by the end of the observation period.

Pain Scores (Numerical Rating Scale)

• Day 3:

The mean pain score on Day 3 for Group A was 5.6 ± 1.1 , compared to 4.9 ± 0.9 for Group B. This difference was statistically significant ($p = 0.038$), indicating that manuka honey was more effective in reducing pain during the initial post-extraction phase.

• Day 7:

By Day 7, the mean pain score for Group A had reduced to 2.3 ± 0.7 , while for Group B, it was 1.8 ± 0.5 . Although pain levels were lower in the manuka honey group, the difference was borderline significant ($p = 0.050$).

Correlation Between Pain and Healing

The relationship between pain levels and healing was analyzed using Spearman's rank correlation:

• In Group A (Aloe Vera), the correlation coefficient was $r = -0.72$ ($p = 0.005$), indicating a strong negative correlation, where lower pain levels were associated with better healing outcomes.

• In Group B (Manuka Honey), the correlation coefficient was $r = -0.81$ ($p = 0.005$), demonstrating an even stronger negative correlation compared to the aloe vera group.

Summary of Findings

The study results showed that both aloe vera and manuka honey were effective in promoting socket healing and reducing pain after atraumatic tooth extraction. However, manuka honey demonstrated slightly better performance in terms of initial healing (Day 3) and pain reduction (Days 3 and 7). Both interventions showed comparable outcomes for healing by Day 7. The strong negative correlation between pain and healing in both groups highlights the importance of pain management in promoting optimal healing.

5. Discussion



This study compared the efficacy of aloe vera and manuka honey in promoting healing and reducing pain following atraumatic tooth extractions in children. Both interventions demonstrated significant healing benefits, with manuka honey showing faster initial healing and better pain management on Day 3. By Day 7, healing outcomes were comparable between the groups, suggesting that both agents are effective in facilitating wound repair over time.

Manuka honey's superior performance in pain reduction can be attributed to its potent anti-inflammatory and antimicrobial properties, which aid in faster resolution of inflammation and infection. Aloe vera, known for its wound-healing and soothing properties, also performed well, particularly in promoting epithelial regeneration.

The strong negative correlation between pain and healing underscores the importance of pain control in improving postoperative outcomes. Further studies with larger sample sizes and long-term follow-ups are needed to confirm these findings and explore the broader clinical applications of these natural agents.

Conclusion

Within the limitations of this randomized controlled trial, both Aloe vera and Manuka honey demonstrated clinically effective outcomes in enhancing post-extraction socket healing in pediatric patients. Each agent supported satisfactory tissue repair, reduction in inflammation, and progressive pain relief over the 7-day observation period, reinforcing their value as safe, biocompatible adjuncts in pediatric dental care.

However, Manuka honey exhibited a clear advantage during the early healing phase, with statistically significant improvements in both healing index scores and pain reduction on Day 3. This suggests a more rapid modulation of the inflammatory response and enhanced initial wound stabilization. By Day 7, the differences between the two groups diminished, indicating that while the destination—successful healing—was the same, the journey was slightly faster and smoother with Manuka honey.

The strong negative correlation between pain and healing observed in both groups highlights a critical clinical insight: pain control is not merely about comfort—it is intrinsically linked to biological healing outcomes.

Taken together, these findings suggest that while both Aloe vera and Manuka honey are effective natural therapeutic options, Manuka honey may be preferred when early pain reduction and accelerated initial healing are priorities. That said, the small sample size and short follow-up period urge caution—these results are promising, not definitive.

Future studies with larger populations and extended evaluation periods are needed to validate these findings and explore whether this early advantage translates into long-term clinical benefits.

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