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| **Evidence summary: Effectiveness of topical coconut products (Low resource communities)** | **October 2017** |

**AUTHORS:**

**CLINICAL QUESTION:** What is the best available evidence on the use of coconut products in wound management and treatment of skin conditions?

**SUMMARY**

Despite the wide use of coconut products for medicinal purposes by populations in tropical regions, there are only a few clinical studies of its effectiveness in treating skin conditions and no studies were identified on their use in wound management. The skin conditions that responded well to treatment with virgin coconut oil were xerosis, psoriasis and mild to moderate atopic dermatitis, with no adverse events reported. In contrast, there are numerous laboratory in-vivo studies using animal models.

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**CLINICAL PRACTICE RECOMMENDATIONS**

* **Topical virgin coconut oil may be considered for the treatment of xerosis. (Grade B)**
* **Topical virgin coconut oil may be considered for the treatment of psoriasis if for some reason it is not possible to use corticosteroids e.g. cost or side effects (Grade B)**
* **In children with mild to moderate atopic dermatitis, virgin coconut oil appears to be preferable to mineral oil both in terms of effectiveness and safety. (Grade B)**
* **Given the lack of human studies, no recommendations can be made in regard to the use of coconut products for wound care.**

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**SOURCES OF EVIDENCE**

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| **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** |
| Experimental studies | Quasi-experimental | Observational – analytic design | Observational – descriptive | Bench research  Expert consensus |
| 4 RCTs  1, 2, 3,4 | None | Observational study without control group 5 | None | 2 *in-vivo* laboratory studies 6, 7 |

**BACKGROUND:**

Various parts of the coconut tree have been used for a multitude of purposes in traditional medicine for thousands of years to the extent that it is often called the ‘tree of life’ 8. The products of *Cocos nucifera Linn: Arecaacae* that are commonly used include coconut water, oil from coconut milk or copra (dried kernel), dried coconut shell and husk fibre.9 Laboratory testing and biochemical analysis of these products have identified a number of useful properties e.g. anti-inflammatory, antimicrobial, antifungal, antioxidant, antineoplastic and analgesic.10, 9 Another quality of coconut oil is that it contains short chained and saturated fatty acids which prevent it from becoming oxidised and rancid.11

**EVIDENCE**

**Laboratory studies**

Results from two studies are provided as examples of the significant amount of laboratory work on this topic that has been reported. In the first study, undertaken in India, virgin coconut oil (VCO) was applied to open dermal wounds in rats daily for 10 days. (VCO is obtained directly from coconut milk, not copra, and treated in a manner that avoids the loss of components such as vitamins.) There were 3 groups of 6 rats each: control group, a group treated with 0.5ml VCO, and the third treated with 1ml VCO. Among a number of outcome measures were time to complete epithelisation and levels of skin components in the granulation tissue e.g. collagen and fibroblasts. In terms of both time to complete epithelisation and total collagen content, groups 2 and 3 were statistically significant compared to the control (p<0.05), 1ml being more effective than 0.5ml.7 (Level 5 evidence)

The second study was conducted in Indonesia.to evaluate the healing activity of coconut shell liquid smoke (CS-LS) on burn wounds 6 (Level 5 evidence) (CS-LS is produced by burning coconut shells at 400o C resulting in liquid smoke – a solution due to the condensation of vapour of wood smoke – pyrolysis.) Coconut shells contain the highest antioxidant properties of any parts of the coconut. Thirty six mice were randomised for treatment into 3 groups of 12: CS-LS, normal saline 0.9% (NaCl), and 10% povidone iodine. The burn wounds were left open with treatment carried out twice a day for 25 days. Wound contraction was measured on days 1,5,10 and 25 after burn induction and tissue samples were taken from a sacrificed mouse in each group on the same days to assess the number of fibroblasts. The CS-LS group showed the fastest wound contraction of the 3 groups on day 5 (p<0.001); on day 10 there was a significant difference to the povidone iodine group (p< 0.001; and on day 25 a significant difference to the NaCl group (p<0.05).

**Skin conditions in adults**

Very few clinical studies were identified by a comprehensive literature search. A randomised, double blind controlled trial (RCT) was conducted on 34 female patients with mild to moderate xerosis, 1 (Level 1 evidence) Xerosis is a condition characterised by dry, rough, scaly and itchy skin associated with a defect in the skin barrier function. The aim of the study was to determine the effectiveness and safety of VCO compared with mineral oil as a therapeutic moisturiser for this condition. The solutions were applied to the legs twice a day for two weeks. Skin hydration and skin lipids were tested to measure effectiveness while transdermal water loss and skin pH were the quantitative measures for safety. In addition grading of xerosis for dryness, scaling, roughness and pruritus was undertaken by both an investigator (Wehr’s grading) and by participants using a visual analogue scale. Data were collected at baseline, day 7 and day 14. Participants were also asked about any side effects experienced e.g. erythema, stinging, or itching. Both treatments were comparable in terms of effectiveness and safety. There were no significant statistical differences between the 2 groups on the outcome measures. By the end of the study 81% (13 of 16) of the participants in the VCO group showed improvement of at least one level in xerosis grading compared to 72% (13 of 18) of the participants in the mineral oil group.

Another blinded RCT compared VCO to virgin olive oil (VOO) in moisturising dryness and removing *Staphylococcus Aureus* (SA) from colonised skin in adult patients with atopic dermatitis (n=52). One group was treated with VCO and the other with VOO, applying the oil twice daily on two clinically non-infected sites and massaging gently into the skin. The measures used were skin cultures, photography and the objective component of the SCORAD severity index (0-SSI). Assessment occurred at baseline and at 4 weeks. Of the VCO group 20 of the 26 (77%) were positive for SA on entry into the study compared to 12 in the VOO group (46%). Following treatment only 1 (5%) of the VCO group remained positive versus 6 (50%) of the VOO group. The relative risk for VCO was 0.1 compared to 10.1 for VOO (p = 0.00; 95% ci, 0.01-0.73) with the number needed to treat (NTT) being 2.2. At baseline there was no significant difference between the groups on the O-SSI scores (p=0.15) but the VCO group improved significantly on this severity measure at 4 weeks compared to the VOO group (p=0.004).2 (Level 1 evidence)

Forty patients with scalp psoriasis were randomised into 3 groups to assess the effectiveness of the following treatments – all relatively bland emollients:

* 5% coal tar solution and coconut oil (1:1);
* 10% urea, 10% lactic acid, 10% propylene glycol and 10% liquid paraffin (in a cream base), and
* coconut oil alone.

All 3 groups showed significant improvement: 57%, 64.4% and 58.3% respectively (p<0.01). Clearance rates between groups were also comparable (no data provided). The authors noted that only topical corticosteroids had substantially higher response and clearance rates than this study had found but the treatments in this study had had no adverse effects.3 (Level 1 evidence)

An observational study of the use of VCO for patients with psoriasis involved 31 patients applying VCO twice daily to lesions for 8 weeks. Every second week erythema, scaling and plaque elevation were evaluated using photographs, assessment and scoring. The reporting of results was very limited. At the completion of the study 5 (16%) patients had complete clearance. The most improvement in scaling (0.61) occurred in the 4 to 6 week period and patients assessed the improvement in their lesions as being the best in this period. The other two measures showed the most improvement in the 6 to 8 week period: erythema 0.71, plaque elevation 0.53. No patient experienced adverse effects. 5 (Level 3 evidence)

**Use in children**

One paediatric study was found. The objective of one of these studies (RCT, n=117 aged between 1 and 13 years) was to compare the effectiveness of the use of topical VCO versus that of mineral oil in children with mild to moderate atopic dermatitis. Improved epidermal function was measured clinically using the SCORAD severity index, and physiologically by measuring transdermal water loss (TEWL) and skin capacitance (emollient effect). Five ml of the oil were applied twice daily. Assessments were conducted on entry to the study then at 2, 4 and 8 weeks. On the SCORAD measure the VCO was significantly more effective than the mineral oil (mean reduction 68.23% vs 38.13%, p˂0.001). The VCO also produced significantly effective results in terms of the TEWL over the 8 week period with a decrease of 70.7% in water loss compared to the mineral oil group with only 35.36% reduction. In terms of the emollient effect of the two oils, a significant statistical difference between the two only become apparent at 8 weeks of treatment (p=0.03). No patients suffered from adverse effects in the VCO group while 5 in the mineral oil group required ‘rescue’ treatment with topical corticosteroids.4 (Level 1 evidence)

**METHODOLOGY**

This evidence summary is based on a structured literature and database search, including ten relevant health care journals from low and middle income countries, combining search terms that describe management of wounds and skin conditions, and use of various parts of the coconut palm. Retrieved studies were appraised for relevance and rigour using Joanna Briggs Institute appraisal tools.12

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