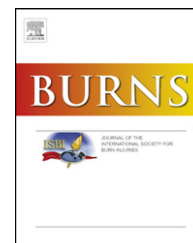


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Review

A systematic review of silver-containing dressings and topical silver agents (used with dressings) for burn wounds

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ABSTRACT

Silver preparations are commonly used for burns, but evidence of their effectiveness remains poorly defined. The aim of the study was to evaluate the effectiveness of silver-containing dressings and topical silver for preventing infection and promoting healing in burn wounds through a meta-analysis of the available evidence. The Cochrane Central Register of Controlled Trials and relevant databases were searched. Drug companies and experts in this field were also contacted. Randomised controlled trials (RCTs) of silver dressings or topical silver (used with dressings) compared with non-silver dressings were eligible for inclusion. We identified 14 RCTs involving 877 participants. One small trial of a silver-containing dressing showed significantly better healing time compared to the control [MD -3.6; 95% CI -4.94 to -2.26 for partial thickness burns and MD -3.9; 95% CI -4.54 to -3.26 for superficial burns]. Topical silver showed significantly worse healing time compared to the non-silver group [WMD 3.96; 95% CI 2.41–5.51] and showed no evidence of effectiveness in preventing wound infection [WMD 2.48; 95% CI 0.39–15.73]. Our review suggests that silver-containing dressings and topical silver were either no better or worse than control dressings in preventing wound infection and promoting healing of burn wounds.

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1. Background

The seriousness of a burn depends on how deeply the burn has affected the skin tissue and the surface area of the body affected. Burns are commonly grouped based on how deep the tissue is burned. They may be grouped into superficial (first-degree), partial (second-degree), and full (third-degree) thickness burns. The superficial thickness burn only affects the epidermal layer of the skin while partial thickness burn involves the epidermal layer as well as a varying thickness of the dermis. Thus, partial thickness burn can be further divided into superficial partial and deep partial thickness burns. In a deep partial thickness burn, there is damage in the deeper structures of the dermis involving sweat glands and hair follicles. Superficial thickness and superficial partial thickness burn wounds can heal spontaneously if they do not become infected. Burns requiring hospital admission are costly to manage. Unintentional and intentional burns vary across gender, age groups, income groups and regions in the world. Populations at high risk for burns include children, the elderly, and physically or mentally disabled people [1,2].

Several antiseptic agents such as Povidone-iodine, alcohol, chlorhexidine, and honey are used topically in burns and each claims to be effective for preventing infection in wound burns. More recently, silver has re-emerged as a treatment option for infections in burn wounds and sulfadiazine (SSD) cream in particular is commonly used to manage burns [3]. However, it has a tendency to adhere to wound surface and requires frequent dressing changes that would traumatise new epithelised surface and delayed wound healing [4]. Additionally, it has been suggested that SSD cream itself may delay healing and it has toxic effect on skin cells [5].

Silver-containing preparations are widely used in the treatment of burn wounds. These products include dressings which contain nanocrystalline silver with sustained release of silver into the wound (e.g. Acticoat[®]), hydrocolloid dressing which releases Ag⁺ ions when exudates are absorbed by the dressing (e.g. Contreet-H[®]), hydrofiber dressings (e.g. Aquacel-Ag[®]) and dressings with silver bound to activated charcoal (e.g. Actisorb Silver 220[®]). The various silver-containing dressings act by both absorbing exudates and releasing the silver onto the wound bed, killing microorganisms both in the wound and within dressings or killing bacteria within the dressings with no release of silver ions [6,7]. In the presence of bodily fluids and other exudates, silver complex present in the dressings are ionised to release the biologically active Ag⁺ ions. Ag⁺ ions readily bind to negatively charged proteins, RNA, and DNA in most gram-negative and gram-positive bacteria, fungal cells and virus [8-10].

It is also worth noting that in clinical practice opinions on the use of silver-containing preparations for burn wounds are conflicting. Some experts believe that silver products have a role in burn wounds and their use are justified to prevent wounds infection [11-15] while other experts do not endorse routine use of silver containing dressings particularly for superficial and partial thickness wounds because of limited evidence on their clinical effectiveness and their use is not cost-effective [16-19].

At least eight reviews have examined the effectiveness of dressings for both acute and chronic wounds [18-25]. However, these reviews vary in the types of interventions, wound types, types of studies included and tools used to determine the methodological quality of the included studies. Only one recent review [18] has incorporated the Cochrane risk of bias assessment tool [26] to determine the internal validity of the included RCTs. Silver containing dressings are increasingly used despite the lack of evidence for their usefulness in preventing and promoting wound healings in burns. This systematic review focuses on silver-containing dressings and topical silver agents for burn wounds. It also includes a critical examination of the quality of all included trials using risk of bias assessment tool to establish the extent of the current evidence to support the use of silver-containing dressings in preventing and promoting healing for burn wounds. Our focus is on the effectiveness of the silver products for the treatment of superficial and partial thickness burns.

2. Methods

2.1. Criteria for considering studies for this review

2.1.1. Types of studies and participants

We included trials that evaluated the effects of silver-containing dressings or topical silver agents (used with dressings) in treatment of burn wounds. Only trials that reported allocation of participants to groups as randomised were included. There was no restriction on the basis of language, date of trial or publication status. Studies involving patients of any age described as having superficial or partial thickness burn and in any care setting were eligible for inclusion. We excluded *in vitro* studies, review articles, and letters to the editor.

2.1.2. Types of interventions

Eligible comparisons were:

- Silver-containing dressings or topical silver agents used with a dressing compared with sham dressings.

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