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Review Article

Evidence based medical use of aloe vera extracts, short review of literature

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ABSTRACT

The use of aloe vera is being promoted for a large variety of conditions. The aim of this review was to summarize all available research papers on aloe vera preparations with a view to providing evidence for or against its clinical effectiveness. Independent literature searches were conducted in PubMed. All studies of controlled clinical trials, observational studies and case series were included. There were no restrictions on the language of publication. All studies were read by all authors and data were extracted in a standardized, pre-defined manner. Even though there are some promising results, clinical effectiveness of oral or topical aloe vera is not sufficiently defined at present.

Keywords: Aloe vera, Medical, Skin

INTRODUCTION

Aloe barbadensis Miller, commonly referred to as Aloe vera, is one of more than 400 species of Aloe belonging to family Liliaceae that originated in South Africa. Only a few species of Aloe have been considered for commercial importance, of which Aloe vera is considered the most potent and, thereby, the most popular plant in the research field. Aloe vera has been used in folk medicine for over 2000 years, and has remained an important component in the traditional medicine of many contemporary cultures, such as China, India, the West Indies, and Japan.[1]

Aloe vera is a succulent plant. Succulents are xerophytes, which are adapted to living in areas of low water availability and are characterized by possessing a large water storage tissue. The main feature of the Aloe vera plant is its high-water content, ranging from 99-99.5%. The remaining 0.5-1.0% solid material is reported to contain over 75 different potentially active compounds including water- and fat-soluble vitamins, minerals, enzymes, simple/complex polysaccharides, phenolic compounds, and organic acids. It is a source of 19 out of 20 essential amino acids which is required by our body and these amino acids help in smooth functioning of our complex enzyme system.[2]

Studies have proved the antiseptic, anti-inflammatory, antiviral and antifungal properties of Aloe vera and the use of this plant is proved beneficial. This plant is proved to be non-allergic and very good in building up the immune system. Aloe vera is gaining popularity in dentistry as it is completely natural and there are no side effects being reported with its use. This paper gives an overview of the uses of this miracle plant and its uses in dentistry.[3]

METHODS

Computerized literature searches were performed to identify all published articles on the subject. PubMed was

used. The bibliographies of all investigations thus located were searched for further relevant articles. There were no restrictions regarding publication language. All articles (or abstracts if only available as abstracts) were read in full. Data were extracted in a predefined fashion.

RESULTS

Diabetes mellitus

One study divided 72 diabetic women without drug therapy into two groups. They received one tablespoon of aloe vera gel or placebo for 42 days. Blood glucose levels subsequently decreased from 250 mg to 141 mg percentage in the experimental group, while controls showed no significant changes. This study was neither randomized nor was it blinded to patient or investigator.[4]

Dyslipidemia

Nasiff et al. conducted a controlled clinical trial on 60 patients with hyperlipidaemia who previously had not responded to dietary interventions. Patients received either 10 ml or 20 ml aloe vera or placebo daily over a period of 12 weeks. Blood lipid levels were measured before treatment and after four, eight, and 12 weeks. Total serum cholesterol decreased by 15.4% and 15.5%, triglycerides by 25.2% and 31.9%, low density lipoprotein (LDL) by 18.9% and 18.2% respectively in the two groups receiving aloe vera.[4]

Liver protection

Isolated phytosterols, namely lophenol and cycloartanol, have the ability to induce the downregulation of fatty acid synthesis and a tendency for upregulation of fatty acid oxidation in the liver, which favors the reduction in intra-abdominal fat and improvement of hyperlipidemia. Further, addition to sterol regulatory element-binding transcription factor 1/peroxisome proliferator-activated receptor (PPAR)-α ratio was decreased; metabolic syndrome-related disorders were improved and liver steatosis in Aloe-sterol-treated Zucker diabetic fatty rats.[1]

Anti-oxidant effects

It has been reported by several authors that different fractions of A. vera as well as unfractionated whole gel have anti-oxidant effects. Glutathione peroxidase activity, superoxide dismutase enzymes and a phenolic anti-oxidant were found to be present in A. vera gel, which may be responsible for these anti-oxidant effects. The A. vera gel in a concentration of 1 in 50 also inhibited prostaglandin E2 production from inflamed colorectal biopsies, but had no effect on thromboxane B2 release.[5]

Anti-cancer

It has been documented the remarkable potential therapeutic options of Aloe vera in cancer, wherein it showed chemo protective effects against 1,2-dimethylhydrazine-induced preneoplastic lesions in the colon of Wistar rats.

Aloe vera treatment could inhibit the secretion of VEGF in cancer cells. VEGF is one of the most important proangiogenic cytokines known and well characterized as an inducer of tumor neovascularization. Aloe vera treatment significantly inhibited in vitro VEGF-induced angiogenic response of human endothelial cells, causing an inhibition of proliferation and migration of endothelial cells.[1]

Antimicrobial

Aloe vera has been described as an antibacterial agent. The Aloe protein of 14 kDa from the Aloe vera leaf gel was isolated and the purified Aloe protein exhibited a potent antifungal activity against Candida paraprilosis, Candida krusei, and Candida albicans. Aloe vera has anthraquinones as an active compound, which is structural analogue of tetracycline. The anthraquinones acts like tetracycline that inhibits bacterial protein synthesis by blocking the ribosomal A site (where the aminoacylated tRNA enters). Therefore, the bacteria cannot grow in the media containing A. vera extract.[1]

Effect on estrogen status

Isolated emodin and aloe-emodin from Aloe vera gel specifically suppress breast cancer cell proliferation by targeting estrogen receptor-α protein stability through distinct mechanisms, which suggests a possible application of anthraquinones in preventing breast cancer cell proliferation through estrogen receptor-α inhibition. Aloe vera gel also helps to maintain ovarian steroid status in polycystic ovary-like condition wherein steroidogenesis altered and disturbed estrogen:testosterone ratio.[6]

Radiation-induced injuries

Williams et al, reported two RCTs in one publication. In the first study, they randomized 194 women receiving radiation therapy to be treated with Aloe vera gel, self-administered to the radiation- exposed skin twice per day or with placebo gel. The severity of the dermatitis was judged weekly during the 10 weeks treatment period both by the patients and by their healthcare providers. There was no difference between the treatment group and the placebo group. Some clinicians participating in this trial felt that there were fewer skin problems than normally expected.

Thus, it was speculated that the inert carrier gel might have had some beneficial effects. A second RCT was therefore performed with 108 women. The only difference compared with the first study was that the control group now received no topical therapy at all. The trial was therefore not blinded. Again, the results did not

suggest any benefit of the Aloe vera gel in terms of prevention of radiation- induced dermatitis.[7]

Genital herpes

Syed et al. conducted two trials on the efficacy of Aloe vera for first episodes of genital herpes in men. In the first study, they randomized 120 men into three parallel groups. Each patient applied either aloe vera cream (aloe vera extract 0.5% in hydrophilic cream), aloe vera gel, or placebo three times daily for two weeks. Aloe vera cream showed shorter mean duration of healing than aloe vera gel and placebo (4.8 days versus 7.0 and 14.0 days, respectively). The numbers of cured patients were 70%, 45%, and 7.5%, respectively (P<0.02). Of the 49 patients healed at the end of this trial period, six had a relapse after 21 months of follow-up.[8]

Psoriasis

A study by Syed et al. randomized 60 patients with mild to moderate chronic psoriasis to receive either an aloe vera or placebo cream. The cream was self-applied three times per day for four weeks. Patients were subsequently followed up for 12 months. The cure rate in the aloe vera group was 83% and only 7% in the placebo group. This inter-group difference was statistically significant (P<0.001). The cream was well tolerated. The authors stated that, even after the follow-up period, there were no relapses.[9]

Wound healing

Schmidt et al. evaluated the time interval required for wound healing using a standard wound management protocol with and without aloe vera gel in a randomized controlled trial (RCT) with 40 women. All patients had complications of wound healing after gynaecological surgery. Only 21 of them completed the study. The mean healing time in the conventional care group (53 days) was significantly shorter (P<0.003) than in the aloe vera gel group (83 days). This trial was not blinded. The details of the standard wound management protocol were not mentioned.[10]

Acne vulgaris

Fulton et al. documented the effects of two different dressings for wound-healing management on full-faced dermabrasion patients. Eighteen patients suffering from acne vulgaris completed the study. Their abraded faces were divided in half. One side was treated with a standard polyethylene oxide gel wound dressing, while the other side was treated with a polyethylene oxide dressing saturated with aloe vera. After 48 hours with the aloe vera dressing, intense vasoconstriction and a reduction in oedema was noted; less exudate and crusting were evident by the fourth day. By the fifth day, reepithelialization was complete to 90% on the aloe side compared with 40-50% on the control side. Overall, wound healing was approximately 72 hours faster at the aloe side.[10]

Dermatitis

Seborrheic dermatitis is a common inflammatory skin disorder for which available topical treatment may be helpful but not curative. The objective of this study was to evaluate the effect of an emulsion formulated from a crude extract of Aloe vera (A. barbadensis) on seborrheic dermatitis. A double-blind, randomized, placebo-controlled prospective clinical trial was performed in 44 adult patients with seborrheic dermatitis. A comparison of symptom scores in the Aloe vera (A. barbadensis) and placebo groups, before and after treatment revealed a significant decrease in scaliness, pruritus and the number of sites involved in seborrheic dermatitis, but not in erythema. Global improvement rates in patients treated with Aloe vera (A. barbadensis) were significantly higher than in placebo-treated patients, as assessed by both dermatologists (58% and 15%, respectively; P=0.009) and patients (62% and 25%, respectively; P=0.03). The results of the present study indicate that Aloe vera (A. barbadensis) crude extract emulsion is effective in the therapy of patients with seborrheic dermatitis.[12]

Treatment of burns

In a clinical study, to check the efficacy of A. vera gel compared with 1% silver sulfadiazine cream as a burn dressing for the treatment of superficial and partial thickness burns, healing of burn wounds was remarkably early in A. vera treated patients than those patients treated with 1% silver sulfadiazine.[13]

Dentistry

Having good antiseptic and anti-inflammatory properties they are used in the treatment of gingivitis and periodontitis. They readily reduce the gingival inflammation and pain associated with it. Clinically proven studies have showed that mouth rinses and dentifrices containing aloe vera have shown a remarkable reduction in gingivitis and plaque accumulation after its use.[14]

Eye diseases

Aloe vera contains multiple pharmacologically active substances which are capable of modulating cellular phenotypes and functions. Aloe vera ethanol and ethyl acetate extracts may be used in eye drops to treat inflammations and other ailments of external parts of the eye such as the cornea.[15]

Ocular surface squamous neoplasia

The patient refused biopsy of this lesion (Figure 1), and traditional treatments and, instead, initiated using A. vera eye drops 3 times daily. At follow-up visits, the lesion

was noted to regress (Figure 2) until it finally resolved 3 months after commencing treatment. No additional topical medications were used, and she has remained tumor free for 6 years.[16]

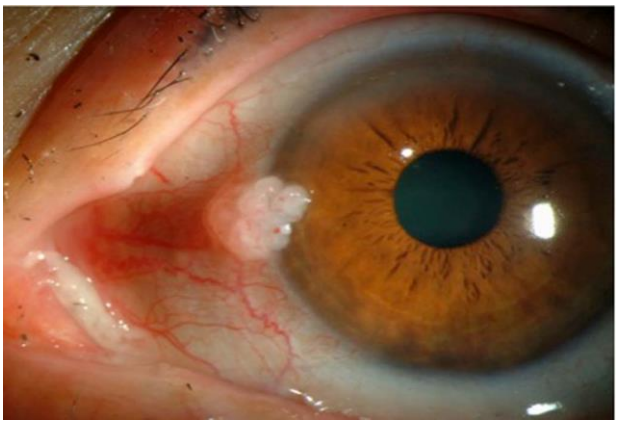

Figure 1: Gelatinous 4.4 mm lesion arising at the medial limbus of the left eye with prominent feeder vessels, at the time of the patient's initial consultation visit.

Figure 2. Rose Bengal staining demonstrating complete regression of the lesion after the patient used a topical A. vera formulation for 3 months.

Adverse effects of aloe vera

No withdrawals owing to adverse effects of aloe vera were reported in any of the above trials. Some patients experienced burning after topical application, contact dermatitis and mild itching.[3,7,8] All adverse effects were reversible and aloe vera was generally very well tolerated.

DISCUSSION

To the best of our knowledge, this is the first systematic review on this subject. In view of the widespread use of aloe vera, perhaps the most surprising finding is the paucity of controlled clinical trials. Furthermore, the few studies that are available are by no means free of methodological flaws. Lack of randomization, lack of blinding, small sample size, lack of intention-to-treat analyses, and lack of power calculation are some prevalent limitations. Furthermore, it is noteworthy that trials tend to originate from the same research groups, and independent replications are, by and large, lacking. Thus, it is problematic to draw firm conclusions from this review.

The question arises whether aloe vera is safe. Studies in mice revealed no acute toxicity in therapeutic doses. In high doses, however, a decrease of CNS activity was noticed. During chronic treatment, there was a decrease in red cell count and significant sperm damage.[17] No systematic investigations exist in humans. In the reviewed trials, no withdrawals or serious adverse reactions were reported.[1]

CONCLUSION

It is concluded that there is some preliminary evidence to suggest that oral administration of aloe vera might be effective in reducing blood glucose in diabetic patients and in lowering blood lipid levels in hyperlipidemia. The topical application of aloe vera does not seem to prevent radiation-induced skin damage. It might be useful as a treatment for genital herpes and psoriasis. The evidence regarding wound healing is contradictory. More and better trial data are needed to define the clinical effectiveness of this popular herbal remedy more precisely.

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