An Overview on Aloe Vera Benefits

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ABSTRACT: ***Aloe vera is well-known for its many therapeutic benefits. This plant is one of the most abundant natural sources of health for humans. The existence of more than 200 distinct physiologically active compounds has been discovered in the plant's chemistry. The interior gel of the leaves contributes to several biological characteristics connected with Aloe species. The majority of study has focused on the biological activities of different Aloe species, which include antibacterial and antimicrobial properties of the leaf gel's nonvolatile components. Aloe species may be found throughout the African and Eastern European continents, as well as nearly everywhere else on the planet. Although the genus Aloe has over 400 species, only a handful, such as Aloe vera, Aloe ferox, and Aloe arborescens, are widely traded. Antitumor, antiarthritic, antirheumatoid, anticancer, and antidiabetic activities are among the therapeutic qualities of Aloe vera. Aloe vera has also been touted as a treatment for constipation, gastrointestinal problems, and immune system deficits. However, there isn't a lot of compelling information on the gel's characteristics. The current study examines the precise composition of Aloe gel, as well as the different phytocomponents that have diverse biological characteristics that aid in improving health and preventing illness.***

KEYWORDS: ***Aloe Vera, Disease, Health, Treatment, Skin.***

1. INTRODUCTION

Natural products are increasingly being used in the prevention and treatment of oral diseases, which may help low-income people in both urban and rural areas. Aloe vera is the most popular and is now getting a lot of scientific interest among the many herbal agents currently accessible [1]. The term Aloe vera comes from the Arabic word "Alloeh," which means "shining bitter material," and "vera," which means "truth" in Latin. Aloe vera has a long and illustrious history going back to biblical times. It is a perennial succulent xerophyte with water storage tissue in the leaves that allows it to thrive in arid regions with little or irregular rainfall. The plant has stiff grey-green lance-shaped leaves with a core mucilaginous pulp holding transparent gel. The polysaccharides found in the gel of Aloe vera leaves are thought to be responsible for the plant's health benefits [2].

Aloe is cultivated in approximately 250 different species all over the globe. Aloe barbadensis Miller and Aloe arborescens are the only two species that are commercially cultivated. The Aloe plant thrives in warm, tropical climates and cannot withstand cold conditions, such as those experienced during the winter [3]. The majority of Aloe is cultivated in the Rio Grande Valley in South Texas, Florida, and Southern California in the United States. Aloe is native to Mexico, the Pacific Rim nations, India, South America, Central America, the Caribbean, Australia, and Africa, among other places. This plant has been called many things throughout the years, including "the wand of heaven," "heaven's gift," and "the quiet healer."

The Aloe species chosen for commercial exploitation or by traditional healers would be determined by their local availability and dispersion. Aloe greatheadii var. davyana (Asphodelaceae) and Aloe ferox Mill are the most commonly distributed Aloe species in South Africa (Asphodelaceae)[4]. A. greatheadii is found in the wild in the northern portions of South Africa, while A. ferox is found mostly in the provinces of the Eastern and Western Cape. Both A. ferox and Aloe vera monosaccharides produced following hydrolysis have the ability to be gel fingerprinted and have a unique characteristic. The primary monosaccharides in A. ferox are different combinations of glucose and galactose, while Aloe vera produces solely mannose. Various extracts from various Aloe species have been used to treat arthritis, skin cancer, burns, eczema, psoriasis, digestive issues, high blood pressure, and diabetes in the past. Direct connection of biological activity would be incorrect since various Aloe species would have variable phytochemical concentrations owing to interspecies variation and changing climate and soil conditions [5].

The polysaccharides found in the pulp of this plant are thought to be responsible for many of the plant's positive benefits [6]. The transparent pulp, sometimes called gel, is utilized in a variety of medicinal, cosmetic, and neutraceutical purposes. Its rind has been shown to have greater anti-oxidative properties in studies. Externally, aloe vera has been used to treat a variety of skin problems such as wounds, burns, and eczema. In the form of

primary Aloe, extract, and powder, these Aloe species are presently recognized in the pharmaco-poeia of several nations [7].

1.1 Action Mechanism and Clinical Efficacy:

1.1.1 Burn wound healing effect:

Aloe vera is a plant that is renowned for its healing properties. In many cultures, Aloe vera has been utilized for traditional medicinal reasons. Aloe vera extracts promote the growth of many cell types in vitro. Many studies have demonstrated that wounds heal quicker when treated with entire Aloe vera gel extracts. Aloe vera may have a direct impact on the wound healing process as a whole, as shown by an increase in the rate of wound contraction. Aloe vera's effect on wound contraction and collagen production has been verified. The mannose-6-phosphate found in Aloe vera gel is thought to be responsible for this characteristic. Aloe polysaccharides stimulate fibroblast proliferation as well as the synthesis of hyaluronic acid and hydroxyproline in fibroblasts, all of which are essential in wound healing extracellular matrix remodeling. In primary human periodontal ligament cells, acemannan enhances periodontal ligament cell proliferation, upregulation of growth/differentiation factor 5, type I collagen, and alkaline phosphatase activity. In a clinical study comparing the efficacy of Aloe vera gel versus 1% silver sulfadiazine cream as a burn dressing for the treatment of superficial and partial thickness burns, healing of burn wounds was remarkably faster in Aloe vera treated patients than in 1 percent silver sulfadiazine treated patients. During the skin wound repair of rats, polysaccharides extracted from Aloe vera stimulate matrix mellatopeptidase (MMP)-3 and metal-lopeptidase inhibitor-2 gene expression, which serves to control the wound healing action of Aloe vera gel.

1.1.2 Antidiabetic effect:

Aloe vera gel has been shown in clinical trials to be a safe antihyperglycemic and antihypercholesterolemic drug for type 2 diabetic patients, with no notable effects on other normal blood lipid levels or liver/kidney function. In vivo and in vitro studies show that the water soluble fraction of Aloe spp. has glucose-lowering properties, and that some of its components affect the expression of glucose transporter-4 mRNA. Aloe vera gel complex decreased body weight, body fat mass, and insulin resistance in obese prediabetes and early nontreated diabetic patients in a randomized controlled study. Furthermore, in a pilot trial of individuals with prediabetes over an 8-week period, two Aloe products appeared to reverse the impaired fasting glucose and impaired glucose tolerance seen in prediabetes/metabolic syndrome. The effectiveness of aloe-emodin-8-O-glycoside extracted from Aloe vera gel in improving glucose transport by altering the proximal and distal indicators involved in glucose absorption and glycogen conversion was addressed in one research.

Tanaka et al. found that db/db diabetic mice chronically fed with the same phytosterols from Aloe vera gel had lower fasting and random blood glucose levels. Jain et al discovered that Aloe vera gel had substantial antidiabetic and cardioprotective action, as it dramatically decreased oxidative stress and increased antioxidant status in streptozocin-induced diabetic rats.

1.1.3 Hepatoprotective effect:

Isolated phytosterols, such as lophenol and cycloartanol, have the potential to cause fatty acid synthesis to decrease and fatty acid oxidation to increase in the liver, resulting in a reduction in intra-abdominal fat and improvement of hyperlipidemia. Furthermore, in Aloe-sterol-treated Zucker diabetic fatty rats, the sterol regulatory element-binding transcription factor 1/peroxisome proliferator-activated receptor (PPAR)-a ratio was reduced, metabolic syndrome-related diseases were alleviated, and liver steatosis was reduced. In white adipose tissue and the liver, aloe formulations inhibit obesity-induced inflammatory responses by lowering levels of proinflammatory cytokines such as PPARg/liver X receptor and 11b-hydroxysteroid dehydrogenase 1, while increasing anti-inflammatory cytokines. The activity of Aloe formula on PPARg/liver X receptor a has been linked to its positive effects on obesity-induced insulin resistance and hepatic steatosis. Aloe vera gel extract protects ethanol-induced fatty liver by decreasing mRNA expression of lipogenic genes in the liver, according to Saito et al. The combination of the probiotic Lactobacillus rhamnosus GG with the antioxidant Aloe vera gel has the potential to lower cholesterol levels and reduce the risk of cardiovascular disease.

1.1.4 Antimicrobial activity:

Antibacterial properties have been reported for Aloe vera. The pure Aloe protein showed significant antifungal action against Candida paraprilosis, Candida krusei, and Candida albicans after being isolated from the Aloe vera leaf gel. Anthraquinones, a structural counterpart of tetracycline, are an active component in Aloe vera. By blocking the ribosomal A site, anthraquinones function like tetracycline, inhibiting bacterial protein production (where the aminoacylated tRNA enters). As a result, bacteria cannot grow in Aloe vera extract-containing medium. Gram-positive and Gram-negative bacteria were shown to be susceptible to an extract of Aloe vera's inner gel by Pandey and Mishra.

Aloe vera gel polysaccharides have been linked to direct bacterial activity by stimulating phagocytic leucocytes to kill bacteria. Pyrocatechol, a hydroxylated phenol found in Aloe vera, is known to be harmful to microorganisms. A recent study found that the Aloe vera inner gel has antibacterial properties against both susceptible and resistant Helicobacter pylori strains, as well as an impact on the H. pylori antimicrobial resistance phenomenon, suggesting that the Aloe vera inner gel could be used in conjunction with antibiotics to treat H. pylori gastric infection.

1.1.5 Antiulcer activity:

Aloe vera leaf extracts have been promoted for digestion and are used in the treatment of peptic ulcer for cytoprotective action, whereby Aloe vera gel expresses antibacterial properties against both susceptible and resistant H. pylori strains and acts as a novel effective natural agent for combination with antibiotics for the treatment of peptic ulcer for cytoprotective action. In a randomized, doubleblind, vehicle-controlled trial, newly formulated aloe- and myrrh-based gels showed to be beneficial in topical treatment of mild recurrent aphthous stomatitis and were superior in reducing ulcer size, erythema, and exudation; myrrh resulted in greater pain reduction.

1.1.6 Effect on estrogen status:

Isolated emodin and aloe-emodin from Aloe vera gel reduce breast cancer cell proliferation by targeting estrogen receptor-a protein stability via different methods, suggesting that anthraquinones may be used to prevent breast cancer cell proliferation by inhibiting estrogen receptor-a. Aloe vera gel also aids in the maintenance of ovarian steroid status in polycystic ovary-like conditions when steroidogenesis has been disrupted and the estrogen:testosterone ratio has been affected.

1.1.7 Immunomodulatory effect:

In human macrophages, Aloe vera gel exhibits significant immunomodulatory action, reducing lipopolysaccharide-induced inflammatory cytokine production and NLRP3 (NACHT, LRR, and PYD domain-containing protein 3) inflammasome expression. The inflammatory process after burn damage may be inhibited by Aloe vera, as shown by a decrease in leukocyte adhesion and proinflammatory cytokines. The administration of Aloe vera has been shown to significantly enhance the reticuloendothelial system's phagocytic and proliferative activities. The cyclooxygenase pathway is directly inhibited by Aloe vera, which decreases prostaglandin E2 synthesis, which is essential in inflammation. The inner gel of aloe also includes anthraquinones and chromone, which have been found to have potent anti-inflammatory properties in murine macrophages. According to this study, Aloe gel contains anthraquinones (aloin) and chromone (aloesin) components, and Aloe gel has pharmacological action in the treatment of inflammatory bowel disease. A recent report of a clinical research examined the therapeutic impact of Aloe vera gel, finding that a 2 percent oral gel is not only helpful in reducing pain and wound size in recurrent aphthous stomatitis patients, but also in reducing the time it takes for the aphthous lesion to heal.

2. LITERATURE REVIEW

Arbaz Sajjad et al. discussed a review on Aloe Vera [8]. The purpose of this study is to examine the composition, activities, and clinical uses of the Aloe vera plant in dentistry in order to determine its efficacy as a useful adjuvant in the treatment of dental disorders. Method. To validate the efficacy of Aloe vera gel in dentistry, a manual and electronic literature search (MEDLINE, Cochrane Central Register of Controlled Trials, and Google Scholar) was conducted up until July 2013 for in vitro and in vivo studies and research presenting clinical, microbiological, immunological, and patient-centered data. We chose and evaluated 38 titles, abstracts, and full-text papers in

total. Aloe vera contains a number of therapeutic characteristics, including anti-inflammatory, antibacterial, antiviral, and anticancer capabilities, which assist to speed wound healing and cure a variety of oral diseases. The polysaccharides found in the gel of Aloe vera leaves are thought to be responsible for the plant's health benefits. Conclusion. Various in vivo and in vitro investigations have revalidated Aloe vera's pharmacological properties in contemporary research. The plant has a lot of promise as a dental remedy. Even though Aloe vera is a promising herb with a variety of clinical applications in medicine and dentistry, more clinical research is needed, particularly to validate and explain the action of acemannan hydrogel in accelerating the healing of aphthous ulcers, as well as to validate the efficacy of Aloe gel on plaque and gingivitis, in order for it to be established in the field of dentistry.

Seyyed Abbas Hashemi et al. discussed a review on the properties of Aloe Vera [9]. The treatment of wounds is crucial and has been the topic of many studies. Natural substances have an important function as supplementary medicine in this respect. Several studies have shown that aloe vera may help wounds heal, particularly cutaneous wounds. As a result, we investigated the impact of aloe vera on cutaneous wound healing in the present review and found that, although aloe vera promotes wound healing as well as other treatments both clinically and experimentally, further research is required to confirm the results. Amar Surjushe et al. discussed a review on Aloe Vera [10]. Aloe vera is a natural substance that is now widely utilized in the cosmetics industry. Despite the fact that it has a variety of applications, controlled studies are required to establish its true effectiveness. This article provides a short overview of the aloe vera plant, its characteristics, mechanism of action, and therapeutic applications.

3. DISCUSSION

Aloe species have been used for medical purposes for millennia due to their phytochemical components. Aloe vera gel is extensively utilized in the culinary, healthcare, and pharmaceutical sectors because of its therapeutic, rejuvenating, and health-enhancing properties. According to the literature, Aloe vera is a highly significant plant because of its wide range of medical qualities and medicinally essential compounds including amino acids, anthraquinones, enzymes, hormones, sterols, and vitamins. Animal studies have shown that polysaccharides extracted from Aloe vera have anti-inflammatory, wound healing, antihepatitis, antigastric ulcer, and antitumorigenic properties in animals, however certain adverse effects of Aloe have been reported in people. As a result, several experimental investigations have been conducted to validate the maximum allowed daily consumption of active Aloe vera gel without causing any adverse effects, in order to define the maximum acceptable daily intake of active Aloe. They were predicated on a four-week oral toxicity study in imprinting control area mice that showed no subacute toxic effects but did reduce male kidney weights. Several research have been conducted to see whether Aloe vera may induce toxicity in animals or people.

Compared to control rats, Aloe vera leaf pulp at a dosage of 100 mg/kg in the drinking water produced reduced body and vital organ weights, decreased red cell counts, severe spermatogenic dysfunction, and a 30% mortality over a 90-day trial. Aloe vera leaf extracts have long been used as a herbal remedy and are now being marketed as a nutritional supplement, as liquid tonics, powders, or tablets, as a laxative, and to prevent a range of ailments. However, several research on rats and mice have shown the effects of Aloe vera extract in order to discover possible harmful or cancer-related risks. 17 Dosed water experiments in mice showed that the leaf pulp had no acute toxicity at 500 mg/kg. 17 However, with larger dosages, there was a reduction in central nervous system activity. Increased mortality, reduced red blood cell count, and substantial sperm damage were seen in subchronic 90-day trials, as well as decreased central nervous system activity. As a result, an upper dosage limit of Aloe vera gel is critical for the treatment of different illnesses, as it aids in the management of disease conditions without causing adverse effects.

4. CONCLUSION

Antioxidant, antibacterial, immune-boosting, anticancer, hypoglycemic, hypolipidemic, wound healing, and antidiabetic are only a few of the pharmacological properties of the plant. Many traditional applications have also been recorded, including burn damage, eczema, cosmetics, inflammation, and fever, all of which are currently being researched. As a multipurpose medicinal agent, it shows promise, but more research is needed to isolate and understand the mechanism of the bioactive chemicals using modern instruments such as high-performance liquid chromatography, high-performance thin layer chromatography, and nuclear magnetic resonance, as well as

longer clinical trials on the road to developing new drugs. The development research of Aloe vera in the treatment of cancer and AIDS has already been authorized by the US Food and Drug Administration. Controlled studies will be needed in the future to demonstrate the efficacy of Aloe vera under different circumstances.

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