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Protective role of Aloe vera in hepatic disorders

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ABSTRACT

Aloe vera, the plant that has been used in traditional medicine, has now become popular because of its beneficial impact on the liver. The liver may be vulnerable to oxidative stress, inflammation, and toxicity owing to its detoxifying and metabolic functions. Anthraquinones (aloin, aloe-emodin), polysaccharides, flavonoids, vitamins, and phenols are some of the many bioactive ingredients found in *Aloe vera* that altogether help make it protective. Their antioxidants abilities are evidenced by the fact that they are capable of neutralizing free radicals, reducing inflammation, and promoting repair processes in cells. *Aloe vera* supplementation may reduce the risk of damaging the liver, improve detoxification, and promote liver regeneration according to scientific research. However, as it lacks sufficient clinical evidence, the use of *Aloe vera* as a first-line treatment is still not advisable. It should be taken only as a supplementary agent, and more research is needed to prove its effectiveness and safe use. Overall, *Aloe vera* stands out as a valuable natural means of improving the liver condition and protecting against various threats.

Keywords: Folk medicine, Aloe vera, detoxification, hepatoprotection

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Introduction

Aloe vera belongs to the botanical family of Liliaceae. More than 400 different species are included in this particular botanical family [1]. This xerophyte is found in arid climates of the subtropics and tropics since it developed the ability to store water within its leaves. Its features include fleshly leaves with an acuminate leaf apex, obtuse leaf apex, and toothed leaf margin, in addition to a characteristic small stem. Two main substances are obtained from these plants - yellow latex and aloe gel. The former is extracted from the central leaf pulp and consists of parenchymal cells that store water and other components. Aloe juice, which is prepared from the marginal cells of the leaves, is yellow and a high-quality latex [2]. For many cultures, *Aloe vera* has been a plant with potent medicinal and cosmetic properties. The clinical applications of *Aloe vera* include immunomodulatory, cardiovascular, antibacterial, and anti-inflammatory. Moreover, the healing properties of *Aloe vera* have been used to treat wounds from ancient times. The use of *Aloe vera* in the treatment of wounds began from the Pharaohs' time.

The largest solid internal organ in the body, the liver executes a series of complicated functions. It is considered to be the home of the soul and is also the center of all mental and psychological activities. It is the metabolic engine of the body and the center of various physiological processes. Furthermore, it is a supportive organ in the digestive system. The primary function of the liver includes the metabolism of nutrients and the removal of waste metabolites. Liver carries out many complex functions, such as synthesis of nearly all plasma proteins, maintenance of hormonal homeostasis of various hormones within the circulatory system and being the central location for many immunological processes which control inflammation through balance of innate and adaptive immunity. Alcohol-induced liver cirrhosis and nonalcoholic fatty liver disease (NAFLD) are the two primary forms of liver diseases [3].

Liver diseases and *Aloe vera* role

Non-alcoholic fatty liver disease (NAFLD1) is presently the most common form of chronic hepatic disease. Aspartate aminotransferase (AST2) and alanine aminotransferase (ALT3) are vital enzymes used to assess the well-being of the liver, and which can be detected in the bloodstream through various laboratory methods to investigate this condition. Elevated levels of AST and ALT do not appear to be associated with NAFLD based on findings from previous investigations [4]. In NAFLD, ALT levels exceed those of AST, while the reverse is seen in advanced cirrhosis and fatty liver disease (Fakhri et al., 2022).

The frequency of Nonalcoholic Fatty Liver Disease (NAFLD) in Asia ranges from 5% to 30%, while it is estimated at 20% to 40% in other parts of the world [5]. As reported by a systematic review and meta-analysis of NAFLD prevalence and associated factors in Iran, the prevalence rate of nonalcoholic fatty liver disease (NAFLD) in Iran was estimated to be 33.9% (95% CI: 26.4% to 41.5%) according to 23 studies with 25,865 participants [6]. It means that about one-third of the people in Iran suffer from non-alcoholic fatty liver disease (NAFLD). Factors increasing the risk of nonalcoholic fatty liver disease (NAFLD) include high-fat and high-protein diets, male sex, presence of metabolic syndrome features, late-night meals, and inactivity.

The condition called cirrhosis develops as a consequence of fibrogenesis and necroinflammation caused by different conditions in the liver. The histological appearance of cirrhosis includes variable regenerative nodules with thick fibrous septa around them. Because of the breakdown of structural elements of the liver and parenchymal loss which occur later on, there will be a severe distortion of the blood vessels in the liver. Portal hypertension and synthetic impairment of the liver will develop as a consequence of that high resistance of portal blood flow [7].

Antioxidants are substances that inhibit oxidation of other substances. As such, since aloe contains antioxidants like polysaccharides, lectins, glycoproteins, and anthraquinones, aloe is used extensively in food, medicine, and cosmetics sectors. Through donating electrons or hydrogen to free radicals, *Aloe vera* compounds help stabilize these reactive molecules. Antioxidant mechanisms of the body can be enhanced through *Aloe vera*. For instance, *Aloe vera* can stimulate the function of endogenous enzymes involved in controlling oxidative stress, including catalase and SOD. Through reducing oxidative stress, *Aloe vera* helps safeguard cells from damage and maintain cell health.

There are several biologically active compounds present in *Aloe vera*, which help confer its anti-inflammatory property. Acemannan is one of the important bioactive components present in *Aloe vera* and is a polysaccharide. This compound has shown to possess anti-inflammatory effects as well as modify the body's immune response. Acemannan helps induce healing reactions through inhibiting the production of pro-inflammatory cytokines. Glycoproteins present in *Aloe vera* help modulate immune functions and inhibit inflammatory mediators, thus playing an important role in reducing inflammation. Flavonoids present in *Aloe vera* act as antioxidants and help reduce inflammation. The pro-inflammatory cytokines that cause inflammation and regulate it are blocked. One such cytokine that is responsible for inflammation is tumor necrosis factor-alpha, and it is often elevated during inflammatory disorders. Studies have found that *Aloe vera* reduces TNF-α levels. The other cytokine that plays a role in inflammation is the interleukin-6. *Aloe vera* can help decrease inflammation through reducing IL-6. *Aloe vera* extracts can significantly decrease cytokine levels, thus explaining their anti-inflammatory nature [8].

Conclusion

Aloe vera's hepatoprotective effects, which have been highly regarded in ancient medicine for centuries, are gradually gaining recognition. The biological compounds present in it may offer significant support in safeguarding the liver through enhanced antioxidant activity, anti-inflammatory actions, and detoxification processes. Nonetheless, it is vital to view *Aloe vera* as an additional supplement, despite some positive evidence from scientific studies. Maintaining proper nutrition, avoiding harmful substances, and consulting medical professionals remain essential steps when ensuring the health of the liver. *Aloe vera* is unique in its contribution towards liver protection because it is a natural healer that can assist in keeping this vital organ safe.

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