



## ARTICLE REVIEW

### Anti-ulcer properties of Aloe Vera in the treatment of gastric ulcers

Propiedades antiulcerosas del Aloe Vera en el tratamiento de la úlcera gástrica

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#### ABSTRACT

**Introduction:** the knowledge of the properties of Aloe Vera allows people to use its phytochemical properties, not only in gastric ulcer, but in a diversity of pathologies that require antioxidant, regenerative, antisecretory and anti-inflammatory power.

**Objective:** to describe the phytochemical compounds present in aloe vera for the treatment of gastric ulcer and to analyze the anti-ulcer properties of aloe vera gel.

**Methods:** a narrative bibliographic review was carried out where a total of 26 documents extracted from the search in databases such as Pubmed, Scielo, Redalyc, Scopus were analyzed. Scientific articles with inclusion criteria such as phytochemical properties of aloe vera, pathophysiology of gastric ulcer, clinical studies of aloe vera in animals and humans, socioeconomic data of Ecuador and books were used as sources of information.

**Development:** pathologies of gastric origin are present in more than half of the world's population, where the factors that affect this problem are gastric ulcers. Aloe vera gel has a cytoprotective effect on the gastric mucosa due to the presence of polysaccharides, minerals, proteins, lipids and vitamins of aloe that stimulate the formation of cyclooxygenases and prostaglandins that protect the intestinal mucosa.

**Conclusions:** aloe vera, due to its rich vitamin C content, acts by reducing cell oxidation, increasing protection against oxidizing agents, which reduces oxidative stress present in the gastric lesion process.

**Keywords:** Aloe Vera; Stomach Ulcer; Phytochemicals.

## RESUMEN

**Introducción:** el conocimiento de las propiedades del Aloe Vera permite a las personas utilizar sus propiedades fitoquímicas, no solamente en la úlcera gástrica, sino en una diversidad de patologías que requieren el poder antioxidante, regenerativo, antisecretor y antiinflamatorio.

**Objetivo:** describir los compuestos fitoquímicos presentes en el aloe vera para el tratamiento de la úlcera gástrica y analizar las propiedades antiulcerosas del gel de aloe vera.

**Métodos:** se realizó una revisión bibliográfica narrativa donde se analizaron un total de 26 documentos extraídos de la búsqueda en bases de datos como Pubmed, Scielo, Redalyc, Scopus. Se utilizaron como fuentes de información artículos científicos con criterios de inclusión como las propiedades fitoquímicas del aloe vera, fisiopatología de la úlcera gástrica, estudios clínicos del aloe vera en animales y personas, datos socioeconómicos del Ecuador y libros.

**Desarrollo:** las patologías de origen gástrico se encuentran presentes en más de la mitad de la población mundial, en donde los factores que inciden en esta problemática son las úlceras gástricas. El gel de aloe vera tiene un efecto citoprotector a nivel de la mucosa gástrica por la presencia de polisacáridos, minerales, proteínas, lípidos y vitaminas del aloe que estimulan la formación de las ciclooxigenasas y prostaglandinas protectoras de la mucosa intestinal.

**Conclusiones:** el aloe vera por su contenido rico en vitamina c actúa reduciendo la oxidación de las células, aumentando la protección contra agentes oxidantes, lo que reduce el estrés oxidativo presente en el proceso de lesión gástrica.

**Palabras clave:** Aloe Vera; Úlcera Gástrica; Fitoquímicos.

## INTRODUCTION

According to the World Health Organization (WHO),<sup>(1)</sup> more than half of the world's population suffers from gastrointestinal pathologies, annually this problem is the cause of more than half a million deaths in the world, gastric ulcers are considered a problem present in the Latin population whose frequency increases with age, and that this problem has not been eradicated since one of the determinants of the disease is the socioeconomic level.

In Ecuador, the poverty rate at the rural level is 42,9 % and at the urban level it is 16,7 %, this factor negatively affects the opportunity to receive definitive treatment to combat the disease.<sup>(2)</sup>

Gastric ulcer begins with inflammation and damage to the gastric mucosa caused by excessive consumption of non-steroidal anti-inflammatory drugs (NSAIDs), microorganisms such as *Helicobacter pylori* present in most cases with a high prevalence worldwide, which is 44 %. stress, and alcohol consumption.<sup>(3)</sup>

Some cases are asymptomatic, but in those that present symptoms, the presence of pain at the level of the epigastrium is common, which is associated with dyspepsia, abdominal distention, a feeling of fullness, nausea and a feeling of early satiety.<sup>(4)</sup>

For its diagnosis, endoscopy, blood tests, and antigen in feces are necessary. As for treatment, it focuses on the cause, but most is based on antibiotic treatment against *Helicobacter pylori*, in conjunction with medications that inhibit acid secretion. In cases of gastric ulcer caused by *Helicobacter pylori*, the cytotoxins and mucolytic enzymes produced by the bacteria are what produce ulcerogenesis.<sup>(5)</sup>

It has been shown in clinical studies that the use of aloe vera gel has positive effects on the gastric mucosa, compared with a proton pump inhibitor such as omeprazole, and an antisecretory such as cimetidine.<sup>(6)</sup> Likewise, it was studied in humans where the relief of the main symptoms such as pain and heartburn disappeared in 94 % of the population in an estimated time of two weeks.

To obtain the properties of this plant, proper handling is required due to the presence of aloin, which is a yellowish viscous component that can be toxic to health.<sup>(7)</sup> This is eliminated by soaking the aloe pulp in water for a couple of days, changing it constantly. Once this technique is carried out, you can take advantage of the safe use of the pulp due to its presence of bioactive polysaccharides (55 %), minerals such as calcium, chromium, copper, iron, magnesium, manganese, potassium, phosphorus, sodium, zinc (16 %), proteins (7 %), lipids (4 %) and vitamins (A, C, E,  $\beta$ -carotene, B1, B2, B3, B6, B12, folic acid), these substances have a synergistic stimulating action for the formation of cyclooxygenases and prostaglandins, protecting the intestinal mucosa from the activity of hydrochloric acid.<sup>(8, 9)</sup>

The properties of aloe vera to treat these types of conditions are not always sufficiently known by specialized personnel and the population, including not only its medical benefits but also its affordability in relation to the low cost of access to it.

Hence, the scientific problem of this research consists of the lack of knowledge of the anti-ulcer properties of aloe vera for the treatment of gastric ulcer. This means that the objective set in this study lies in describing the phytochemical compounds present in aloe vera for the treatment of gastric ulcer and analyzing the antiulcer properties of aloe vera gel.

## METHODS

A narrative bibliographic review was carried out where a total of 26 documents extracted from the search in databases such as Pubmed, Scielo, Redalyc, Scopus were analyzed. Scientific articles with inclusion criteria such as the phytochemical properties of aloe vera, pathophysiology of gastric ulcer, clinical studies of aloe vera in animals and people, socioeconomic data from Ecuador and books were used as sources of information.

The analytical-synthetic method was used, which allows the collection of information and its analysis, which is complemented by the synthesis that results in an extract of all the information analyzed, highlighting those phytochemical characteristics of the aloe vera gel that demonstrate its properties. anti-ulcer.

Document analysis allows us to examine documents that contain important data on the topic studied and that provide adequate information to meet the research objectives.

The research was guided by a non-experimental design, based on the theoretical study of the relevant literature on the components of aloe vera gel that make it interesting for its ability to relieve symptoms and protect the gastric mucosa, preventing the appearance of ulcers. Regarding the facts, a retrospective view is used since the use of aloe vera gel for medicinal purposes has been present for decades and currently studies on its application and properties are scarce.

## DEVELOPMENT

A study was carried out on 76 patients with *Helicobacter Pylori* divided into 3 groups, 2 groups received Amoxicillin + Aloe vera in different doses and the 3rd group received Amoxicillin + Ranitidine as an antisecretory. In patients treated with aloe, the main symptoms (pain and heartburn) disappeared before two weeks of treatment in 94 % of them. In the group treated with Ranitidine, greater eradication of *H. pylori* was obtained.<sup>(10)</sup>

In a study carried out in animals with aloe vera gel plus Indomethacin to test the regenerative action of aloe, it was found that 46,7 % achieved tissue repair and absence of ulcers in the group that received Aloe vera.<sup>(11)</sup>

In 2009, a study carried out in animals in which a gastric lesion was induced with ethanol, received aloe vera extract 5ml/kg/day, with honey and Ranitidine 100mg/kg, a 90,59 % reduction in ulcer lesions was achieved. . Ethanol has a high destructive level in the gastric mucosa characteristic of acute inflammation. A 90,59 % decrease in ulcerative lesions and inflammation generated in the gastric mucosa was noted, relieving symptoms.<sup>(12)</sup>

A study carried out on wounds shows that Acemannan, a soluble acetylated  $\beta$ -(1,4)-polymannose, is considered the main functional component of Aloe vera since it helps tissue regeneration by acting as a repairer. The presence of vitamin C also acts as a collagen-producing antioxidant; in the case of vitamin E, glutathione peroxidase and superoxide dismutase neutralize the inflammatory effects of free radicals.<sup>(13,14)</sup>

In a study carried out in mice with induction of ulcerative colitis and treated with aloe saponaria, the antioxidant activity due to the polyphenols and tannins of the plant was observed, and the inhibitory activity against radicals increased significantly in a dose-dependent manner.<sup>(15)</sup>

In a study carried out in rats induced hepatotoxicity through lipids, they were administered aloe vera juice for four weeks. It improved oxidative stress and reversed liver damage secondary to hepatotoxicity by reducing peroxidase (oxidant) and increasing the production of superoxide dismutase, an important antioxidant defense, and reduced glutathione (protecting the cell against the action of agents). endogenous and exogenous oxidants, as well as maintaining membrane stability.<sup>(16)</sup>

In a study in rats with acute lesions induced in the gastric mucosa, they received ethanolic extract of Aloe vera (Liliaceae) at variable doses, which acts dose-dependently, inhibiting the secretion of gastric acid (antisecretory activity). It is concluded that it is more active as a gastroprotective agent at lower concentrations.<sup>(17)</sup>

The last clinical trial with aloe vera carried out in humans with gastric ulcer was in 2009, which showed positive results relieving the most common symptoms in this type of conditions, which indicates that aloe vera has a potential that needs to be studied. in depth, where it is administered at different doses and with a different handling of the gel to be able to analyze its role as antisecretory, gastroprotective, tissue regenerator, anti-inflammatory of the mucosa among its most important properties in the treatment of gastric ulcer.<sup>(12)</sup>

There are no clinical trials carried out in humans in the last 10 years, the most frequently found are the trials carried out in rats whose results are of great value since, in addition to gastric ulcer, it was proven that at the liver level it can reverse secondary damage. caused by hepatotoxicity, among the most favorable results is the test carried out with rats induced to indomethacin as a gastro-injurious agent, it was shown that due to the presence of the 11 amino acids of aloe gel there is a bioprotective effect on the gastric mucosa, and thus Likewise, there was little presence of ulcers in the rats that received aloe, deciphering that this protective effect is produced by the stimulation of mucus and bicarbonate secretion to counteract the effect of acid chemically by the formation of cyclooxygenases and prostaglandins, managing to protect the mucosa.

This shows that the phytochemical properties of aloe gel can greatly contribute to the treatment and relief of gastric symptoms caused by damage to the gastric mucosa due to hypersecretion of acid since it acts as an antisecretory and repairer against damage already present.

There is a high number of cases of gastric ulcer of multifactorial origin, this may be associated with infections by various microorganisms such as Helicobacter Pylori (HP), Salmonella, Candida albicans, Herpes virus, Alpha Hemolytic Streptococcus, Escherichia coli, Staphylococcus aureus, Proteus vulgaris and Clostridium welchii, despite the fact that HP is one of the most frequent to which a high percentage of pathologies of gastric origin are attributed,<sup>(20)</sup> Likewise, the indiscriminate use of non-steroidal anti-inflammatory drugs (NSAIDs), which are commonly used due to their easy access, certainly provide relief and fulfill their pharmaceutical function, but among their adverse effects, the risk of gastrointestinal bleeding, ulcer or perforation is clearly specified when Doses higher than those indicated are used, all of this combined with liver damage due to hepatotoxicity.<sup>(19)</sup>

Gastric problems also have their origin in people with high levels of stress or those who consume excessive alcohol. All of these factors can act mutually, causing serious injuries to the gastric mucosa. From this it can be seen that the main role of aloe vera, thanks to the analysis of its phytochemical compounds, is to combat oxidative stress caused in cells by the presence of flavonoids, phenols and vitamin C with great antioxidant power, necessary to combat the inflammatory process that arises from the oxidation of cells.<sup>(20,21)</sup>

The lesion present at the level of the gastric mucosa occurs together with an inflammatory process which, although it is related to damage by Helicobacter pylori or hypersecretion of acid, the lesions present can develop a loss of proper functioning of the gastric mucosa, ulceration. , hemorrhage and as a consequence of gastric ulcer due to Helicobacter pylori there is a 3 to 6 times greater probability of developing gastric cancer in the future at advanced ages.<sup>(22)</sup>

Excessive acid production plays a fundamental role in the development of ulcers and erosions, and the control of acid hypersecretion has been the main treatment of choice over time. This treatment was transformed once it was discovered that HP produced a colonization that increases the harmful effects on the mucosa and could only be eradicated with antibiotic treatment together with an antisecretory.<sup>(23)</sup>

According to several studies, aloe vera acts as an inhibitor by blocking the binding of the receptors responsible for acid secretion and this has been compared with the pharmacological action of cimetidine and omeprazole, showing positive results as an adjuvant in the antibiotic treatment for *Helicobacter pylori*. Against this, the antisecretory potential of aloe stands out, remembering that both proton pump inhibitors (omeprazole) and H2 antagonists (cimetidine) achieve greater rapidity in the remission of symptoms.<sup>(11)</sup>

Aloe vera gel is considered to have the ability to relieve the symptoms caused by HP infection, all of this depends on the dose response, but the results have been favorable within a period of two weeks. Which shows that this plant has properties in humans with gastric anomalies. Due to aloe-emodin-9, it also has a bactericidal effect which enhances its action when administered in antibiotic treatment against HP.<sup>(24)</sup>

Aloe vera is a plant native to the region, which adapts to the majority of soils present in Ecuador and whose care does not need much attention. This plant is found in a variety of regions and its low maintenance cost makes it a plant very accessible, which is marketed in different presentations and can be developed naturally in small spaces,<sup>(25)</sup> which makes it a good candidate for easy obtaining, since according to data obtained from the INEC, poverty rates in the country are high and together with this socioeconomic barrier for effective treatment against gastric discomfort, there are also geographical barriers and environmental problems. which cause microorganisms such as *Helicobacter Pylori* to colonize the gastric mucosa and be easily transmitted.<sup>(26)</sup>

## CONCLUSIONS

In the phytochemical analysis of aloe vera gel, it is concluded that it has anti-inflammatory properties due to the activity of inflammatory cytokines, blocking its receptors, which allows relief of the main symptom caused by damage to the gastric mucosa, which is inflammation. Aloe vera, due to its rich content of vitamin C, acts by reducing the oxidation of cells, increasing protection against oxidizing agents, which reduces the oxidative stress present in the process of gastric injury.

## Conflicts of interest

There are no conflicts of interest.

## Authorship contribution

**GRS:** original idea, conceptualization, drafting of the article, approval of the final report.

**EGVV:** methodology, conceptualization, article writing, final review.

**GVMOA:** conceptualization, writing the article, final review.

**ICQB:** methodology, writing the article.

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