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Research Paper

Phytochemical Analysis of Aloe Vera Leaves Extract

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ABSTRACT: *This research work was carried out to assess the phytochemical constituents of Aloe vera. The quantitative and qualitative analyses were conducted using High Performance Liquid Chromatography and physical methods respectively. The result obtained revealed that aqueous and ethanol extracts of Aloe vera contained tannins, saponnins, alkaloids, flavonoids, anthraquinones, terpenoids, steroids, phlobatannins in the following concentration (3.26, 7.14), (1.29, 2.12), (1.15, 1.03), (0.65, 0.66), (2.13, 4.55), (0.32, 0.86), (0.13, 0.33), (2.79, 4.59) respectively. Although, the quantity of the phytochemicals appeared to be higher the ethanol extracts. The results from the qualitative analysis showed that both extracts showed the same level of visibility among all phytochemicals analysed, with the exception of Anthroquinones which was slightly higher in the aqueous extract. These findings have confirmed the medicinal potential of Aloe vera as a source of developing drugs. Therefore, the study recommended that advanced studies should be carried out to discover the specific potentials of each phytochemical identified.*
KEYWORDS*: Aloe vera, Phytochemical, Flavonoids, Alkaloids*

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I. INTRODUCTION

Plants and herbs have assumed major role in the treatment of numerous disorders caused by pathogens and non-pathogens. Infections brought on by harmful microbes have a high death rate in underdeveloped nations. The utilisation of medicinal plants and herbs for the treatment of pathogenic and non-pathogenic disorders has also been promoted by World Health Organisation (WHO, 2015).

According to Santos *et al*. (2009), these infections are becoming more common in hospitals and have the potential to be invasive. Over 80% of the world's population, particularly in developing nations, still receives medical care through traditional medicine that uses plant extracts, according to Igbinosa *et al*. (2009).The resistance of pathogenic microorganismsto treatments is a serious concern in recent times, which is developing day by day (Cohen, 2000; Kumar *et al*., 2013). It is imperative to look for medications that are effective against a variety of pathogens. In order to address this issue, ethnobotanically significant medicinal plants may serve as a source for the identification of novel pharmaceuticals.

Aloe vera has been used as a common folk remedy for as long as civilization has existed. Existing in various parts of Nigeria, *Aloe vera* is more abundant in the southern than northern part of the country. The plant is thought to have positive effects on the healing of wounds and ulcers, diabetes, constipation due to radiation injury, gastrointestinal issues, skin conditions, and stomach disorders (Bamigboye, 2022). Globally, more than 550 different species of aloe are cultivated. Currently, only two species are cultivated commercially: the most common ones are *Aloe barbadensis Miller* and *Aloe aborescens Miller*.

One kind of aloe that is especially well-known for its therapeutic qualities is *Aloe vera*. The Arabic term Alloeh, which means sparkling bitter substance, is the source of the name *Aloe vera*. Vera, on the other hand, signifies true in Latin. Greek scientists believed *Aloe vera* to be a universal cure 2,000 years ago. The Egyptians considered Aloe the plant of immortality. The *Aloe vera* plant is used in dermatology for a number of purposes nowadays (Oxygenetix, 2023).

This study's primary goal was to identify the phytochemical makeup of ethanol and aqueous extracts of Aloe vera.

II. MATERIALS AND METHOD

Quantitative Analysis

After dissolving 3g of the dried extracts from maceration in 100mL of HPLC grade Hex, the mixture was membrane-filtered sterilised. After that, 1.0µl of the filtrate was added to a Buck Scientific (USA) BLC10/l1 High Performance Liquid Chromatography (HPLC) system. This system included an analytical silica column (25 cm x 4.6mm ID, stainless steel, 5µm) for the analysis of phytochemicals, along with a fluorescence detector (excitation at 295 nm and emission at 325 nm). Hexane, tetrahydrofuran, and isopropanol (1000:60:4 v/v/v) were the mobile phase utilised, with a flow rate of 1.0 ml/min. Every phytochemical that was sought after had standards for stock and serial concentrations prepared appropriately and carried out using a similar procedure. Phytochemical concentration in samples was determined using the following formula:

[PHYTO] = [A SAMPLE x [STD] (ppm) xV HEX (ml)] / [A STD x Wt SAMPLE (g)]
Where;

[PHYTO]	=	Concentration of phytochemicals in ppm
[STD]	=	Concentration of standards
A SAMPLE	=	Peak area of sample
A STD	=	Peak area of standard
V HEX	=	Volume of hexane
Wt SAMPLE	=	Weight of sample (AOAC, 2010).

QUALITATIVE DETERMINATION OF PHYTOCHEMICALS

Test for Tannins

About 2 ml of the aqueous extract was stirred with 2 ml of distilled water and few drops of $FeCl_3$ solution were added. The formation of a green precipitate was an indication for the presence of tannins.

Test for Saponins

5 ml of aqueous extract was shaken vigorously with 5 ml of distilled water in a test tube and warmed. The formation of stable foam was taken as an indication for the presence of saponins.

Test for Flavonoids

To 1 ml of aqueous extract was added 1 ml of 10% lead acetate solution. The formation of a yellow precipitate was taken as a positive test for flavonoids.

Tests for Anthraquinones

3 ml of the aqueous extract was boiled with 3 ml of aqueous sulphuric acid and filtered while hot. 3 ml of benzene was added to the filtrate and shaken. The benzene layer was separated and 3 ml of 10% NH_3 added. A pink, red or violet colouration in the ammonical (lower) phase indicates the presence of anthraquinone derivatives.

Tests for Steroids

A red colour produced in the lower chloroform layer when 2 ml of organic extract was dissolved in 2 ml of chloroform and 2 ml concentrated sulphuric acid added indicates the presence of steroids.

Test for Alkaloids

3 ml of aqueous extract was stirred with 3 ml of 1% HC1 on a steam bath. Mayer's and Wagner's reagents were then added to the mixture. Turbidity of the resulting precipitate was taken as evidence for the presence of alkaloids.

Tests for Glycosides

Salkowsk'is ***Test:*** 2 ml of each extract was dissolved in 2 ml of chloroform. 2 ml of sulphuric acid was added carefully and shaken gently. A reddish-brown colour indicates the presence of a steroidal ring (that is, a glycone portion or glycoside).
(AOAC, 2010).

CHAPTER FOUR

III. RESULT

Table 1: Quantitative phytochemicals screening of *Aloe vera* extracts

Samples	Phytochemicals							
	Tannins	Saponnins	Alkaloids	Flavonoids	Anthraq-uinones	Terpenoids	Steroids	Phlobata-nnins
Aqueous extracts	+++	++	++	+	++	+	+	++
Ethanolic extracts	+++	++	++	+	+++	+	+	++

Key: + = slightly present, ++ = present, +++ = highly present

Table 2: Quantitative composition of phytochemicals in the *Aloe vera* extracts

IV. DISCUSSION

The extract's phytochemical study identified the following compounds: phlobatannins, alkaloids, flavonoids, anthraquinones, terpinoids, saponnins, and tannins. The presence of many phytoconstituents, including alkaloids, flavonoids, tannins, saponnins, anthraquinones, terpenoids, steroids, and phlobatannins, is what gives medicinal plants their therapeutic qualities. Flavonoids are thought to be possible antioxidants with protective properties against allergies, inflammation, and spots. In addition to their importance in combating inflammation and microbes, flavonoids are also hydroxylated phenolic substances that have been shown in vitro studies to be produced by plants in response to microbial infection. Tannins are well-known for their use in the treatment of cancer, inflamed or ulcerated tissues, and mild antiseptics. According to Kumar *et al*. (2011), free radical platelet aggregation, bacteria, ulcers, hepatoxins, viruses, and tumours are all related. Saponnins demonstrated potential anti-inflammation, coagulation, an antidiabetic, antioxidant, aldose reductase inhibitory action and cholesterol binding capabilities with finding of Kumar *et al*. (2011). The plant's medical uses, particularly for its antibacterial action against pathogenic organisms, have become known due to the presence of these biologically active chemicals in the extracts. Anthraquinones are the most important active ingredients of *Aloe vera* (Yan, 2009). The antiplasmodial activity of *A. vera* may be explained in the light of the presence of anthraquinones and other quinoid compounds which exert good activity against *P. falciparum* (Sitte *et al*. 1999).

According to Igbonisa *et al*. (2009), tannins have been shown to disrupt the synthesis of proteins in bacterium cells and are useful in the management of intestinal disorders as well as ulcerated or inflammatory tissues. The results of Igbonisa *et al*. (2009) indicate that saponnins have a controlling impact against inflammation and alkaloids have also been reported to be painkillers.

Numerous epidemiological studies have indicated that plants high in antioxidants have a preventive effect on health and against diseases, and that consuming these plants can reduce the incidence of heart disease, stroke, cancer, and hypertension. An essential prerequisite for the industry and other organisations that deal with ajurvedic and herbal products is the quality evaluation of herbal preparations. A herbal product must first have its safety standards established by the WHO before being introduced to the market.

In a variety of industries, including chemistry, food, medicine, and analysis, HPLC is a low-cost technique for sample separation, quantitative identification, or semi-quantitative analysis that can be used to solve various qualitative and quantitative analytical challenges. It is possible to infer from the results that the aloe vera extract included a significant quantity of steroid, phlobatannins, alkaloids, flavonoids, anthraquinones, terpenoids, and tannins. This study will be useful in the future for by providing baseline data in qualifying and quantifying the phytoconstituents in Aloe vera.

V. CONCLUSION

The study has confirmed *Aloe vera* a one of the important medicinal plants that contains important phytochemicals that can be used in the development of drugs for the treatment of existing and emerging diseases.

VI. RECOMMENDATIONS

From the findings and conclusion drawn from this study, the following recommendations are put proffered:

i. More research should be conducted on *Aloe vera* especially to isolate each of the phytochemicals and assess their medicinal uses.

ii. *Aloe vera* should be consumed more, since besides using them as seasoning they also have medical value which is good in treatment of disease and illness.

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