Ilkogretim Online - Elementary Education Online, 2021; Vol 20 (Issue 3): pp. 4010-4018
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.03.414

An Organoleptic Study And Phytochemical Analysis Using Leaves Of Aloe Barbadensis (Linn.)

Renuka Muthukumar[1] & Indumathi Dhanuskodi[2]

[1, 2]Assistant Professor, PG Department of Microbiology, New Prince Shri Bhavani Arts and Science College, Medavakkam, Chennai.

Abstract:
The main objective of the present study is to investigate the organoleptic characters and phytochemical compounds of Aloe barbadensis extract. The fresh leaves of Aloe barbadensis were collected from Chengalpet District, Tamilnadu and studied for its organoleptic character using leaf powder of Aloe barbadensis were found to be bitter in taste with pH 6. The fluorescent test of leaf powder of Aloe vera with different chemicals showed the ability of plant to exhibit fluorescent colour in presence of UV light (365nm) than day light. The extract were obtained using water and methanol as a solvent for phytochemical studies. Among the both extract, Methanolic Extract of Aloe barbadensis were found to be rich in alkaloids, saponins, tannins and phenols. The presence of these novel bioactive secondary metabolites makes the plant to be utilized for antimicrobial activity against different pathogens.

Keywords: Aloe barbadensis, pH, Fluorescent test, Phytochemicals

1. Introduction

Medicinal plants are the richest bio-resource of drugs for traditional systems of medicine. Since evolution, man has been using plant extracts to improve his health and life-style. Prime sources of naturally occurring antioxidants for humans are fruits, vegetables and spices. Search for the novel natural antioxidants from tea, fruits, vegetables, herbs, and spices are continued as efforts have been made by researchers all over the globe. Medicinal plants contain a wide variety of free radical scavenging molecules such as **phenolic compounds** - phenolic acids, flavonoids, catechins, proanthocyanidins, quinons, coumarins, tannins etc., **nitrogen compounds** - alkaloids, amines, betalains etc., vitamins, terpenoids, carotenoids and other secondary metabolites (Kamal & Khan, 2014).

Among the reported medicinal plants, Aloe Vera is used as a popular folk medicine throughout the world . Aloe Vera has long been recognized as a natural product and has been

well known for its herbal, medicinal, beauty, and skin care properties for centuries. The plant has three-sided fleshy leaves, yellow flowers, and fruits containing many seeds. The Aloe Vera leaf contains 75 potentially active elements, including vitamins, minerals, enzymes, lignin, saponins and amino acids, etc., Because of these characteristics, it is one of the most nutrient-dense plants ever discovered. For this variety of benefits, it is widely used in food, pharmaceutical, and cosmetic industries. It can also be used as natural additives and preservatives in foods (Dhrubajyoti Singha et al., 2021).

The name Aloe vera derives from the Arabic word"Alloeh" meaning "shining bitter substance " while "vera " in Latin means "true " . 2000 years ago, the Greek scientists regarded Aloe vera as the universal panacea. The Egyptians called aloe "the plant of immortality . The botanical name of Aloe vera is Aloe barbadensis miller . It belongs to Asphodelaceae [Liliaceave] family, and is a shrubby or arborescent , perennial, pea green color plant . Phytochemical analysis revealed the presences of alkaloid, carbohydrate, tannin most commercialized aloe species and processing of the leaf pulp. Aloe plant is a rich source of many natural Phytochemical possessing health – promoting effectslike , anthroaquinones , vitamins , mineral, polysaccharides , sterols , amino acid saponins and salicylic acid. The extracts were rich in alkaloids , proteins , carbohydrates flavonoids , saponins , glycosides , steroids , terpenoids and phenols and tannin indicates the possibilities of antimicrobial activity against gram positive and gram negative organisms. Its secondarymetabolites have multiple properties such as anti-inflammatory, antibacterial, antioxidant, immune boosting, anticancer, anti-diabetic, anti-ageing and sunburn relief. Several uses of Aloe vera also have been reported such as for burn injury, eczema, cosmetics, inflammation andfever in traditional medicine systems(Kumar et al., 2017).

2. MATERIALS AND METHODS

2.1. Materials

The plant of Aloe vera (Aloe barbadensis) were collected from the garden of New Prince Shri Bhavani Arts and Science college, Medavakkam, Chengalpet District, TamilNadu. The plant specimen was taxonomically identified as Aloe vera from the Department of Biotechnology, NPSBASC, Medavakkam.

2.2. Collection & Preparation of Leaves of Aloe barbadensis

The fresh leaves of Aloe vera (Aloe barbadensis) were collected in a sterile polyethylene bags and washed well with distilled water. Then leaves were cut into thin pieces and sun dried in a tray for about 48-72 hours until all plantparts become well dried. After drying, the plant materials are then powdered by using grinder and placed into a sterile closed container.

2.3. Water and Dry Matter Content:

The water content is determined by following the method of Benzidia et al.,2018.

Water content (%) = [(W1 – W2)/ W1] × 100

Whereas

W_1 stands for = Weight of the sample before drying;

W_2 = stands for Weight of the sample after drying.

Thus, dry matter content was extracted from water content as shown in the formula below:

Dry matter content (%) = 100 - Water content (%)

2.4. Organoleptic Study of Leaf Powder of Aloe barbadensis (Linn.)

The method described by **Shashikanth and Ramachandra Reddy (2008)** with slight modifications was followed for the investigation of organoleptic study of leaf powder of Aloe barbadensis based on their colour, odour, touch, taste and pH.

2.5. **Fluorescence Analysis of Leaf Powder of Aloe barbadensis (Linn.):**

The method described by **Priya Rothore, 2020** was followed for the fluorescence analysis of leaf powder. The leaf powder was treated with various chemicals exhibited various colour changes in the day light as well as on exposure to UV light of wavelength 365nm.

2.6. Aqueous and Methanol Extraction of Aloe barbadensis(Linn.)

The aqueous extraction is done by taking 5 grams of the plant powder and mixed with 200 ml of distilled water in a beaker.The mixture is heated on a hot plate at 30°C-40°C and mixed with continuous stirring for 20 minutes. The mixture is filtered using Whatmann filter paper and the filtrate is used for further preliminary phytochemical analysis (Rojina Bista, Arjun Ghimire and Sadikshya Subedi, 2020). Twenty grams of powdered plant materials mixed with 100ml of methanol The extracts preparations were done as previously described by Alade and Irobi, 1993. The plant extracts were prepared by using soxhlet apparatus collected and stored for further studies.

2.7. Phytochemical Analysis of Aloe barbadensis(Linn.)

An aqueous and methanolic extracts were screened for the presence ofthe phytochemical classes by using the standard following methods (Jaradat, Hussen and Ali, 2015).

Test For Alkaloids - Wagner's Test

1-2ml of both aqueous and methanol extracts was treated with few drops of Wagner's reagent. Formation of reddish-brown precipitate indicates the presence of alkaloids.

Test For Flavonoids - Ferric Chloride Test

A few ml of test samples taken separately, few drops of ferric chloride were added which resulted in the formation blackish red precipitate indicates positive for flavonoids.

Test For Terpenoids - Salkowski Test

2ml of both aqueous and methanol extracts was treated with 1ml of chloroform and then few drops of concentrated H_2SO_4 were carefully added to form a layer. A reddish brown coloration at the interface indicates the presence of terpenoids.

Test For Glycosides - Concentrated sulphuric acid test

Few drops of Concentrated H_2SO_4 added to test sample resulted in appearance of reddish colour indicates positive for glycosides.

Test For Saponins - Foam Test

2ml of both aqueous and methanol extracts was diluted with 5ml distilled water and it was shaken for 5minutes. Stable layer of foam indicates the presence of saponins.

Test For Tannins - Braymer's Test

1ml of both aqueous and methanol extracts were treated with 2ml of 5% ferric chloride solution. Appearance of blue-black colour indicates the presence of tannins.

Test For Phenols - Ferric Chloride Test

1-2ml of both aqueous and methanol extracts was treated with 1ml of 5% ferric chloride solution. Appearance of blue-black colour indicates the presence of phenolic compounds.

Test For Steroids - Salkowski Test

1ml of both aqueous and methanol extracts was treated with 1ml of chloroform and concentrated sulphuric acid was added along the sides of the test tube and shaken well. Chloroform layer appears red and acid layer showed greenish yellow colour indicates the presence of steroids in the extract.

Test For Carbohydrates - Molisch's Test

2-3ml of both aqueous and methanol extracts was treated with few drops of molisch's reagent and 1ml of concentrated sulphuric acid was added along the side of test tube. Formation of violet colour ring at the junction indicates the presence of carbohydrates.

Test for Proteins - Ninhydrin Test

2-3ml of both aqueous and methanol extracts was heated with few drops of 1% ninhydrin reagent in boiling water bath for ten minutes. Emergence of purple or bluish colour showed the presence of proteins.

RESULTS & DISCUSSION

A common variety of Aloe vera (Aloe barbadensis) was collected from Chengalpet district was used to test for the presence of phytochemicals. The fresh Aloe vera leaves were collected and subjected to drying for their phytochemical composition, organoleptic characters and flourescence ability were analyzed.

Water and Dry Matter Content

The water and dry matter content of fresh Aloe vera (Aloe barbadensis) leaves were 97.6% and 2.4% respectively (Figure 1). The results show that Aloe vera is rich in water because of its richness in mucilage which allows the retention of water. Our results confirm that the Aloe vera plant leaf is composed primarily of water 97.4–99.5%. This result is similar to the studies done by Ahmed and Hussain, 2013 and Boudreau et al., 2013 where water and dry matter content were respectively 97% and 3% respectively. For various reasons, a good determination of the moisture content is still an essential and important element for the analytical procedures.

Figure 1: Processing of Aloe barbadensis (Linn.) Leaves for Water and Dry Matter Content

ORGANOLEPTIC STUDY OF ALOE BARBADENSIS (Linn.)

The leaves of Aloe barbadensis were collected, washed, shade dried and made into powder. The leaf powder was studied for their organoleptic characters like colour, odour, touch, taste and pH (Table 1 and Figure 2).

Table 1. Organoleptic Characters of Leaf Powder of Aloe Barbadensis (Linn.)

Figure 2. Organoleptic Character of Aloe Barbadensis (Linn.)

S.No.	CHARACTERISITIC FEATURES	RESULT
1.	Colour	Green
2.	Odour	Pungent
3.	Touch	Powdery
4.	Taste	Slightly bitter
5.	pH	6

FLUORESCENCE ANALYSIS OF ALOE BARBADENSIS (Linn.)

The leaf powders treated with various chemicals exhibited various colours on exposure to day light and UV light (365 nm). The differences in the colour change of samples are observed (Table 2; Figure 3& 4).

Table 2. Fluorescence Analysis of Leaf Powder of Aloe barbadensis (Linn.)

S.No.	Tests	Day light	UV light (365nm)
1.	Leaf Powder	Green	Dark Green
2.	Leaf Powder +1N HCL	Light Green	Dark Brownish Green
3.	Leaf Powder +1N NaOH	Dark Greenish brown	Fluorescent Yellowish Green

4.	Leaf Powder + methanol	Bright Green	Pale Green
5.	Leaf Powder + water	Light Green	Light Green

Figure 3. Fluorescent Character of leaf powder of leaf powder of Aloe Barbadensis (Linn.)in Day light

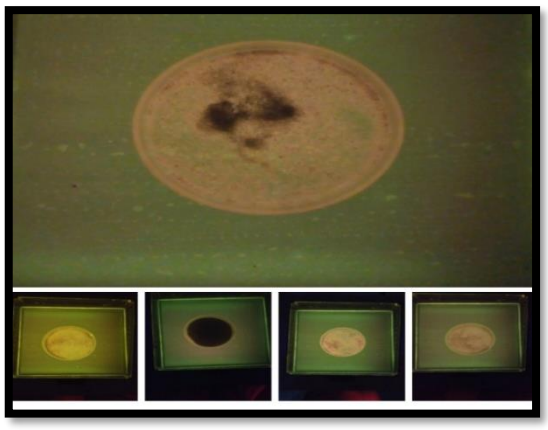

Figure 4. Fluorescent Character of Aloe Barbadensis (Linn.)in UV light(365nm)

Phytochemical Qualitative Analysis of Aloe barbadensis

The aqueous and methanol extract of Aloe barbadensis were analysed for the phytochemical analysis were depicted in Table 3; Figure 5 & 6. The methanol extract of leaf powder of Aloe barbadensis were found to produce alkaloids,saponins,tannins,phenols than aqueous extract which showed the presence of alkaloids and carbohydrates. The similar study was described by Rojina Bista, Arjun Ghimire and Sadikshya Subedi, 2020; DharajiyaD, PagiN, JasaniH, PatelP , 2017 and Tripati et al., 2013 for aqueous extract.The present study shows methanolic extract of Aloe barbadensis possess good phytochemical composition indicates its role against antimicrobial activity (Table 3; Figure 5& 6).

Table 3. Phytochemical Analysis Of Extracts Of Aloe barbadensis (Linn.)

S.No.	Phytochemical Constituents	Phytochemical Tests	Aqueous Extract	Methanol Extract
1.	Alkaloids	Wagner's Test	+	+
2.	Flavonoids	Ferric Chloride Test	-	-
3.	Glycosides	Concentrated Sulphuric Acid Test	-	-
4.	Phenolic Compounds	Ferric Chloride Test	-	+
5.	Trepenoids	Salkowski Test	-	-

6.	Tannins	Braymer's Test	-	+
7.	Steroids	Salkowski Test	-	-
8.	Saponins	Foam Test	-	+
9.	Carbohydrates	Molisch's Test	+	-
10.	Proteins	Ninhydrin Test	-	-

Figure 5.Phytochemical Analysis of Aqueous Extract of Aloe barbadensis(Linn.)

Figure 5.Phytochemical Analysis of Methanol Extract of Aloe barbadensis(Linn.)

Since this plant had been used in the treatment of different ailment such as malaria, dysentery, diarrhea, skin burn etc., the medicinal roles of these plants could be related to such identified bioactive compounds. The presence of these biologically active compounds in the extracts has made the plant to be known for its medicinal use especially for antimicrobial activity against pathogenic organisms(Manimegalai and Nithya, 2015).

CONCLUSION:

The present study have focused on the phytochemical analysis of the methanolic and aqueous extract obtained from Aloe barbadensis(Linn.). The result showed that Aloe vera is a potential plant containing phytochemicals can be utilized in various medicinal preparation and the control of various life-threatening diseases caused by gram negative bacteria, gram positive bacteria and yeast infections. But the toxicological properties of the plant should be studied further to make it use widely in pharmaceutical, food and cosmetic industries.

Reference

1. Kamal A, Khan M M R.2014. Phytochemical evaluation of some medic- inal plants. Indian Journal of Plant Sciences. 4(4):5-8.

2. Dhrubajyoti Singha, Md. Fahad Jubayer , Kumkum Devnath , Delara Akhter , Thottiam Vasudevan Ranganathan , Md. Towhidur Rahman and Md. Anisur Rahman Mazumder. 2021. Nutritional, Textural, and Sensory Quality of Aloe Vera Leaf Gel Powder Fortified Plain Cake. MDPI 4: 430–443.
3. Kumar S, Yadav A, Yadav M and Yadav J P. 2017. Effect of climate change on phytochemical diversity, total phenolic content and in vitro antioxidant activity of Aloe vera (L.) Burm.f. BMC Res. Notes. 10(1):60.
4. Benzidia B, Barbouchi M, Hammouch H, Belahbib N, Zouarhi M and Erramli H. 2018. Chemical composition and antioxidant activity of tannins extract from green rind of Aloe vera (L.) Burm. F. Journal of King Saud University – Science. 1-23.
5. Shashikanth, J & Ramachandra Reddy, P. 2013. Macroscopic and microscopic standardization of Vitex negundo(L.) stem bark. Journal of Research and Education of Indian medicine, 19(3-4), 93-96.
6. Priya Rathore. 2020. Pharmacognostical profile (Fluorescent test) of InVitro proliferation an important medicinal plant Aloe Vera Barbadensis (L.). International Journal of Pharmaceutical Research and Applications. 5(2): 01-02.
7. Rojina Bista, Arjun Ghimire and Sadikshya Subedi. 2020. Phytochemicals and Antioxidant Activities of Aloe Vera(Aloe Barbadensis). Journal of Nutritional Science and Healthy Diet. 1(1): 25-36.
8. Alade P I and Irobi O N. 1993. Antimicrobial activities of crude leaf extracts of Acalypha wilkensiana. Journal of Ethnopharmacology. 39: 171-174.
9. Jaradat N, Hussen F and Ali A A.2015. Preliminary phytochemical screening, quantitative estimation of total flavonoids, total phenols and antioxidant activity of Ephedra Alata Decne. Journal of Material Environmental Science . 6(6):1771-1778.
10. Ahmed M and Hussain F. 2013. Chemical composition and biochemical activity of Aloe vera (Aloe barbadensis Miller) leaves. International Journal of Chemical and Biochemical Sciences.3:29-33.
11. Boudreau M D, Mellick P W, Olson G R, Felton R P, Thorn B T, Be- land F A.2013. Clear evidence of carcinogenic activity by a whole-leaf extract of Aloe barbadensis Miller (Aloe vera) in F344/N Rats. Toxicol Sci. 2013;131(1):26-39.
12. Dharajiya D, Pagi N, Jasani H, Patel P. 2017. Antimicrobial activity and phytochemical screening of Aloe vera (Aloe barbadensis). International Journal of Current Microbiology and Applied Sciences. 6(3):2152-2162.
13. Tripathi A, John S A, Rao K P, Ramteke P W. 2013. Comparative study on phytochemical constituents, antimicrobial and plasmid curing property of Aloe vera and Ocimum Sanctum. Journal of Ecophysiology. Occupation and Health. 13(3-4):1-6.
14. Manimegalai K, Nithya K. 2015. Phytochemical and XRD analysis of Aloe vera leaf powder. International Journal of Pharmacy & Life Sciences. 6(5):4461-4465.