International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

Analysis of Qualitative and Quantitive Constituents and Antimicrobial Activities of *Aloe Vera* L. against Some Selected Pathogens

Souvagyalaxmi Sahoo[1], Sangita Dixit[2]

[1, 2]Tectona Biotech Resource Center (TBRC), Bhubaneswar-751002, Odisha, India

Abstract: ***Herbal medicines have been used in medical practices since antiquity. Aloe vera is a medicinal plant within the family Liliaceae. The present study was to investigate phytochemical residences, antimicrobial pastime of Aloe vera extract. Phytochemical screening confirmed that the methanolic extract showed best possible amount of phytochemicals compared with solvent like acetone and chloroform. Chloroform extract of roots exhibits the presence of rich phytochemicals compared to methanol and acetone. Antimicrobial activity was examined utilising disc diffusion method in three human pathogens like Bacillus subtilis, Staphylococcus aureus, and Escherichia coli and also fungus like Aspergillus niger, Fusarium oxisporum, Penicillium chrysogenum. The extraction has inhibitory effect against bacteria and fungus pathogen respectively. In our study, the TLC profiling of the different stages of Aloe vera callus, , regeneration of shoot, Aloe vera leaf and root extracts confirms the presence of a diverse staff of phytochemicals. The proposed HPTLC method presents a good resolution with gallic acid. The approach is fast, easy and specific.***

Keywords: Anti microbial activity, pathogenic microorganism, TLC, HPTLC, *Aloevera*

1. Introduction

Medicinal plants play an essential function in the development of amazing therapeutic agents. These crops are very historic and simplest genuine ordinary drugs priceless in several ways for the healing of extraordinary diseases. They can be used directly or in extracted forms for the management of various ailments due to presence of quite a lot of phytochemicals [1]. *Aloevera* barbadensis Mill. is underexplored leguminous plant in every single place world belongs to Liliaceae family [2]. It has thick, tapered, spiny leaves growing from a short stalk close floor stage. Concentrated extracts of *Aloe* leaves are used as laxative and as a haemorrhoid treatment. Its gel can help to stimulate the physique's immune method [3]. *Aloe vera*contain one-of-a-kind equivalent to saponins, anthraquinones, mucopolysaccharides, steroids, nutrients and glucomannans [4].

Aloe plant comprises 25 percentage of solid fraction that include sugars. Sugar acts as immune modulators ready of enhancing and retarding the immune response [5]. Anthroquinone is a phenolic compound and these compounds exert a strong purgative effect, which are amazing antimicrobial sellers and possess strong analgesic effects [6]. Biological activities of *Aloe vera* comprise advertising of wound treatment, antifungal undertaking, hypoglycemic or antidiabetic affects, anti-inflammatory, anticancer, immunomodulatory and gastro protective houses [7]. Exclusive species of *Aloe* have been used as an antiviral, for remedy of ulcer and even melanoma as a result of its immune modulating effects [8]. Therefore, there's an acute need of establishing certain novel plant derived antimicrobial products.

HPLC and TLC are used for identification of barbaloin content within *Aloe vera* plant [9]. The barbaloin substance of latex from uncommon *Aloe* species was once evaluated through quite a lot of systems and observed to be in between 10-25% on dry weight intent of the latex and round 1% on a leaf dry weight premise. A number of chromones, anthrones, anthraquinones, and their C-glycosyl mixes were detached from one of a kind *Aloe vera* species [10]. Barbaloin from new leaves of A. Arborescens in the beginning secluded and distinctive. The leaves include just a few free anthraquinones like Aloin, Isobarbaloin, Barbaloin, Aloetic acid, Anthracene, Aloe-Emodin, Ester of Cinnamic acid, Chrysophanic acid, Emodin, Resistannol and Ethereal oil [11].

Although, the efficacy of the plant will depend on its habitat, soil sort, environmental effect and etc. Hence, it should be wanted to monitor the endeavor of medicinal vegetation earlier than they' were used for therapeutic purposes. The reward learns was implemented on the determination of the phytochemical accessories and to validate its antimicrobial undertaking in one-of-a-kind solvent extract.

2. Materials and Methods

2.1 Phytochemical Test (Qualitative)

Preparation of Plant Extract: Fresh Leaves and root of *Aloe vera* were collected from the outskirt. The Leaves and root of *Aloe vera* were air-dried and grinded into fine powder. Four gram of grinded powder had been percolated with one 150 ml of solvent (Methanol, Acetone, and Chloroform) for extraction and kept at soxhlet 150 ^{0}C temperature for 24 hours. After extraction, the extract used to be taken for phytochemical evaluation.

Alkaloid : Wagners test: Two ml of filtrates, few drops of wagner reagent (1.27g Iodine + 2 g potassium iodide was dissolved in 5 ml of water and made up to 100 ml with distilled water) were added by the side of the test tube. A reddish-brown precipitate confirmed the test as positive.

Anthraquinones: Chloroform layer test: Five ml of extract was taken in dry test tube and 5ml of chloroform was added and shaken for 5 min. Then extract was filtered and the filtrates shaken with equal volume of 10% of ammonium solution (Dissolve 40 ml of 25% ammonium hydroxide and make the volume to 100 ml with distilled water). A pink violet or red colour in the ammonical layer indicates the presence of anthraquinones.

Cardiac glycosides: NaoH reagent:1ml of extract was dissolved in 1ml of sodium hydroxide solution (to make 1 N solution, 4g of sodium hydroxide was dissolved in distilled water and made the volume to 100 ml). A yellow colour indicates the presence of glycosides.

Flavonoids: NaOH test: 1ml extract was treated with aqueous NaOH and HCl, the colour changes to orange yellow in presence of flavonoid.

Saponins: Foam test:-1ml of extract was shaken with little quantity of water. The foam produced persists for 10 minutes confirms the presence of saponins.

Steroids: Salkowski tests: 1ml extract when shaken with 1ml concentrated sulphuric acid and on standing yield red colour.

Tannins: Ferric chloride test: 1ml extract mixed with 1ml 1% ferric chloride solution gives blue, green or brownish green colour.

Terpenoid: Salkowski test: Added 0.5 ml of chloroform with 2ml of extract mix And then added 1ml of concentrated Sulphuric acid from the side to form a ring. Formation of reddish-brown precipitate at the interface indicates the presence of terpenoids.

Antimicrobial analysis:

Preparation of Plant Extract: The powdered plant material was subjected for successive extraction using solvents such as ethyl acetate, aqueous extract, ethanol, methanol, DMSO, acetone. One gm of the powder was taken and added to 10 ml of solvent and kept it 24 hours at room temp. Then, the extract ware filtered whatmann No. 1. Then centrifuge at 10,000 rpm for 20 min at –4°C (Pawar B.T. and Papdiwal P.B 2010).

Bacterial Cultures: Gram-positive and Gram-negative bacterial and fungal culture were collected from Department of Biotechnology, Bharampur University and OUAT, BBSR for antimicrobial assay. All bacterial and fungal strains were cultured in Nutrient broth in a incubator for 48hr at 37°C. The antibacterial and fungal activity of *A. vera* extract was tested using Agar dish Diffusion Technique [8].

Disc Preparation: The 6mm (diameter) discs were prepared from whatmann No. 1 filter Paper and sterilized by autoclave at 121°C. After the sterilization the moisture discs had been dried on hot air oven at 50°C. Then various solvent extract discs and control discs were prepared.

2.2 Antibacterial and Antifungal Activity

The sterile nutrient agar plates and potato dextrose agar plates were prepared. The bacterial test organisms like *Staphylococcus aureus*, *Bacillus subtilis*, and *Escherichia coli* were spread over the nutrient agar plates. The fungal organism like *Aspergillus niger, Penicillium chrysogenum* and *Fusarium spp.* were spread over the potato dextrose agar plates. After the microbial lawn preparation three different extracts of plant disc were placed on the organism inoculated plates with equal significant difference between extract used and also distance control discs were also prepared. All bacterial plates were incubated at 27°C for 24 hrs and fungal plates at 24°C for 72hrs. Antimicrobial activity was determined via measuring the diameter of zones of inhibition (mm) produced after incubation. For each test, three replicates had been carried out.

2.3 Chromatographic techniques

The plant extract of this plant was subjected to TLC to confirm conformation the presence different secondary metabolites on analytical plates. HPTLC is an improved method of TLC which utilizes the convention technique of TLC in more optimized way.

Activation of TLC plate:. *Aloe vera* callus, shooting, regeneration and in vivo *Aloe vera* leaf and root extracts using methanol solvent were used for TLC. Around 3 gm of the powder was taken in a Soxhlet extractor and extracted with methanol. The solvent recovered from the speedy fit glass distillation. 15 µl of the extract were loaded on the analytical plate (2.5 cm above from the bottom) and dried in air for thirty minutes. The spotted plates were kept in a previously saturated developing chambers containing mobile phase, ethyl acetate: methanol: water in the ratio 10:2:1 and allowed to run 3/4th of the height of the prepared plates. The different bands of chromatograms were observed under visible light and Iodine stain. The Rf values were calculated by using the below formula:
Rf= Distance travelled by extract / Distance travelled by solvent

2.4 HPTLC analysis

Preparation of gallic acid solution (standard): The standard gallic acid (40µg/ml) arrangement was readied by exchanging 4 mg of gallic acid, weighed, into a 100 ml volumetric flask, then dissolved in 50 ml methanol. It was then sonicated for 10 minutes and the last volume of the arrangements was made up to 100 ml with methanol to get stock arrangements containing 40µg/ml.

Preparation of plant extract: The sample was dried, finely powdered through mortal pestle. About 3 gm of the powder was taken in a Soxhlet extractor and extracted with methanol. The solvent recovered from the speedy fit glass distillation. At that point the extract of *Aloe vera* was acquired by 24 hours heat extraction. The extract was collected and was subjected to drying at -30°C for 2 days. The dried concentrate was appropriately put away for further investigation and examination.

Developing Solvent System: Various solvent systems were attempted, to extract, yet the satisfactory determination was acquired in the solvent n Hexane.

Sample Application: Application of bands of each extract was done (4mm long and 1µl in fixation for leaf) using spray technique. Sample were applied in copy on pre-covered silica gel 60F254 aluminum sheets (5 x 10 cm) with the assistance of Linomat 5 applicator attached to CAMAG HPTLC framework, which was customized through WIN CATS programming.

Development of Chromatogram
After the application of sample, the chromatogram was developed in Twin trough glass chamber 10 x 10 cm saturated with solvent n-Hexane 20 minutes.

Detection of Spots
The air-dried plates were seen in ultraviolet radiation to mid-day light. The chromatograms were examined by densitometer at 360nm in the wake of splashing with anisaldehyde sulphuric acid. The Rf values and unique mark information were recorded by WIN CATS programming.

3. Result and Discussion

3.1 Phytochemical analysis

The outcomes of phytochemical screening of the leaves and roots of *Aloe vera* in different solvent extract were presented in Table 1. Alkaloids were reward in all the solvent extracts, and Anthraquinones were totally present in all plant extract. Cardiac glycosides were evident high quantity in chloroform, and low amount in Methanol and acetone extracts of the Leaves. It additionally shows that Flavonoids and terpenoids had been reward in methanol and choloform. Tannins have been present in low amount, Chloroform and Methanol and acetone soluble extracts. Saponins were present in all of the solvent extract whereas Steroids had been present low amount in all the extracts of the plant leaves. Phytochemical screening of extract of root barks of *Aloe vera* using methanol, acetone and chloroform have been compared. Alkaloids and anthraquinones have been present in low amount in all the solvents' extract. Cardiac Glycosides have been extremely gift in the methanol solvents' extracts in comparison acetone and chloroform solvents' extract in root of the plant. Saponins, Flavonoids Tannins and Trepenoids were reward low amount in all extracts of *Aloe vera* root. Steroids had been located highly present most effective in Acetone extract compared to other two solvent extract of the plant's root. Cardiac Glycosides were highly present in the methanol solvents' extracts compared acetone and chloroform solvents' extract in root of the plant. The alkaloids, saponins and tannins in more than a few antibiotics used in treating long-established pathogenic traces [9, 11]. Steroids are reward in all leaf and root plant extract while highly present in acetone extract of root. Steroids have been reported to have antibacterial properties [12]. It also shows that Flavonoids and terpenoids reward in methanol and chloroform in leaves extract whilst present in low amount of all solvents extract in root of the plant. In the recent review showed that flavonoids and tannins are phenolic compounds and plant phenolics are a major group of compounds that act as primary antioxidants or free radical scavengers [13].

Table 1: Phytochemical Result

Phytochemicals	Methanol extract		Acetone extract		Chloroform extract	
	Leaf	Root	Leaf	Root	Leaf	Root
Alkaloids	+	+	+	+	+	+++
Anthraquinones	+++	+	+++	+	+++	+
Cardiac glycosides	+	+++	+	+	++	+
Flavonoids	++	+	++	+	++	+
Saponins	+++	+	+++	+	++	+
Steroids	+	+	+	+++	+	+
Tannins	+	+	+	+	+	++
Terpenoids	++	+	+	+	++	+

3.2 Antimicrobial Analysis

Many of the infectious diseases are still a major challenge to health issues all over the world. The emergence of resistance to antibiotics has further compounded the problem [14]. The results of antibacterial activity of leaf extracts of *Aloe vera* is presented in figure1.The different solvents extracts i.e Ethyl Acetate, methanol & aqueous were tested against the human pathogenic bacteria, namely, *Escherichia coli, Bacillus subtilius, and Staphylococcus aureus.* It was observed that Ethyl Acetate extract showed maximum zone of inhibition 6mm, 4.8mm & 2mm against the bacterium E. coli *Bacillus subtilius, Staphylococcus aureus* respectively. Based on the above observation Ethyl acetate extract was again evaluated for antimicrobial activity against *Escherichia coli* and *Bacillus subtilius* and *Staphylococcus aureus* (Table 2). The graphical representation of the average of zones inhibition of Ethyl acetate extracts in increasing conc. of *Aloe vera* is shown in Figure 2.

Table 2: Anti-bacterial activity of Aloe vera leaf extract in different solvent

Microbial Strain	Ethyl Acetate	Methanol	Aqueous
Zone Of In hibition (*in mm*)			
E.coli	**6**	5	4
B.subtilis	**4.8**	4	2
S.aureus	**2**	2	0

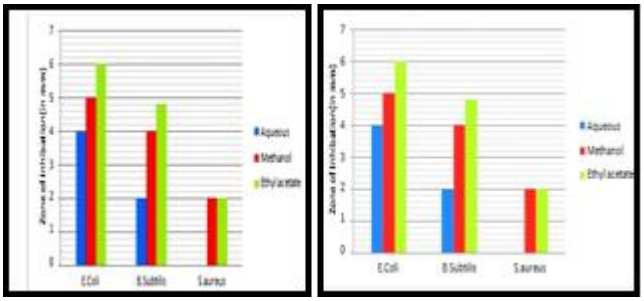

Figure 1: Showing the anti-bacterial activity in different solvent extraction

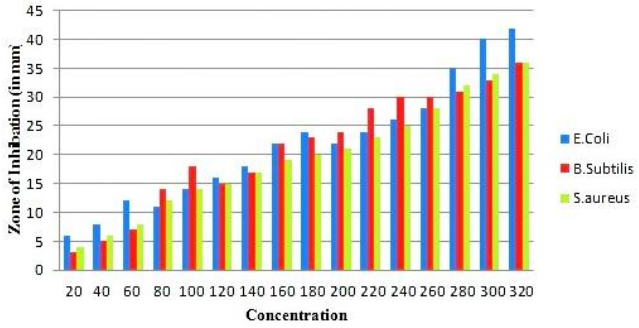

Figure 2: Showing the anti-bacterial activity with different Aloe vera leaf extract concentration

3.3 Antifungal Activity

The Acetone, DMSO portions of *Aloe* leaf extract were shown to display antifungal activity against all tested fungi between 4 and 42 mm, against three fungi *Aspergillus niger, Penicillium chrysogenum & Fusarium spp.* at the tested concentration. Among two portions of *A. vera* extract, acetone portions revealed highest antifungal activity whereas the control did not exhibit inhibition on the tested fungi. Leaf extracts of *Aloe vera* were screened for antifungal activity against *Aspergillus niger, Penicillium chrysogenum & Fusarium spp.* The maximum zone of inhibition 42 mm for *Aspergillus niger*, 30 mm for *Penicillium chrysogenum* & 30 mm for *Fusarium spp* were observed (figure-3). The *Aloe vera* leaf extracts showed little the zone of inhibition against the *Fusarium spp*. All the five different concentrations (100, 200,400,600,800 µg/ml) of leaf extracts of *Aloe vera* showed the inhibitory effect on the fungal sps (Table -3). However, specific plant compounds of *Aloe vera* such as authraquinones and di-hydracy anthraquinones as well as saponins [3,12] have been proposed to have direct antimicrobial activity.

Table 3: Anti-fungal Activity of the Aloe vera Leaf extracts

Name of the Fungus	Conc. of *Aloe vera* leaf extract in µg/ml & Zone of Inhibition (in mm)									
	Acetone Extract					DMSO Extract				
	100	200	400	600	800	100	200	400	600	800
Aspergillus niger	14	26	30	38	42	9	11	4	15	26
Fusarium spp.	14	26	27	27	28	7	11	0	27	30
Penicilliumchrysogenum	5	10	16	17	30	4	6	7	11	15

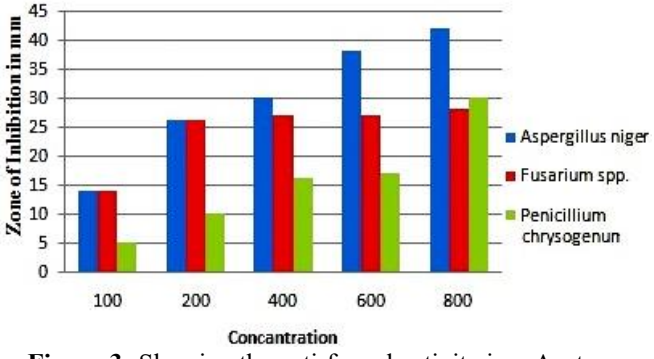

Figure 3: Showing the anti-fungal activity in Acetone solvent extraction

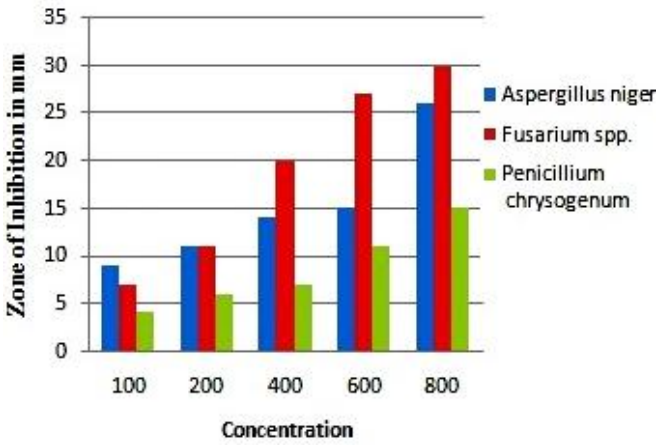

Figure 4: Showing the anti-fungal activity in DMSO solvent extraction

3.4 TLC analysis

TLC plates of *Aloe vera* mother plant, in vitro regeneration, callus, multiplication and in vivo root are shown in Figure (11, 12). The method of TLC involved solvent system of methanol, in mobile phase ethyl acetate: methanol: water (10:2:1). Number of spots and Rf values with their detecting reagents are shown below in (Table-4). All TLC bands in UV light and iodine stain result are shown in Figure 5 respectively. In our study, the TLC profiling of the different stages of *in vitro Aloe vera* plant like callus, shooting, regeneration and *in-vivo Aloe vera* leaf and root extracts in the methanol solvent system confirms the presence of a diverse group of phytochemicals. Ethyl acetate: methanol: water (10:2:1) was used as mobile phase. In UV light and iodine stains of *in vivo* leaf extract, one band was clearly shown. The Rf values were 0.33. In regeneration plant extract, four bands were observed in the UV light and Iodine stain. The Rf values were 0.33, 0.43, 0.53, and 0.90 respectively. There had three bands showed in the root extract of *Aloe vera* mother plant and its Rf value ware 0.53, 0.62 and 0.89 respectively. The callus extract showed five bands in UV light and two bands in iodine stain. The Rf values of callus extract ware 0.24, 0.46, 0.62, 0.84 and 0.90. *Aloe vera* shooting stages extract showed three bands in UV light and one in iodine stain. The Rf values ware 0.43, 0.53 and 0.80. From the above discussion, we found that Callus and regeneration methanolic solvent extract showed better secondary metabolites compared to the mother plant, root and shooting stages.

Table 4: TLC of Aloe vera methanol extract in mobile phase petroleum Ethyl acetate: methanol: water (10:2:1)

Pigment Band	*Aloe vera* Explant	Distance of Pigment migrates (mm)	Distance of solvent migrates (mm)	Rf Value
1	Mother plant	2.2	6.6	0.33
1	Regeneration Plant transferred to green house	2.2	6.6	0.33
2		2.9	6.6	0.43
3		3..5	6.6	0.53
4		6.0	6.6	0.90
1	Mother plant Root	3.5	6.6	0.53
2		4.1	6.6	0.62
3		5.9	6.6	0.89
1		1.6	6.6	0.24

2	Callus developed from leaf explants	3.1	6.6	0.46
3		4.1	6.6	0.62
4		5.6	6.6	0.84
5		6.0	6.6	0.90
1	Development of shoot from Callus	2.9	6.6	0.43
2		3.5	6.6	0.53
3		5.3	6.6	0.80

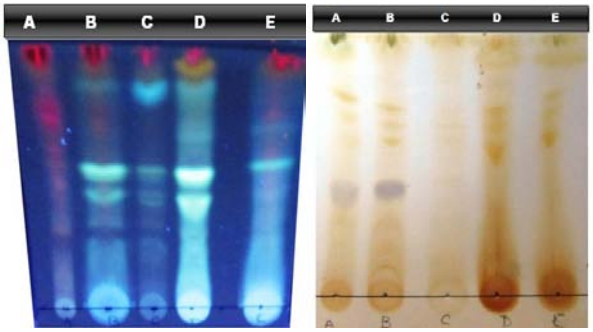

Figure 5: Visualisation of TLC plate under UV light (left) and white light(Right). A-Mother plant, B-Regeneration plant transferred to green house, C-Mother plant root, D-Callus developed from leaf explant, E-Development of shoot from callus

3.5 HPTLC Analysis

HPTLC is an advanced type of planar chromatography used extensively in the recent years for fingerprinting of medicinal plants, products and for screening lichen substances. In the present study, HPTLC finger print scanned at wavelength 360nm of all 3 extracts i.e. *Aloe vera* mother plant, *in vitro* regeneration, and *in vivo* root with standard as Gallic acid gives an impressive result that directing towards the presence of number of phytochemicals. The method of HPTLC involved solvent system of methanol, in mobile phase hexane. All the result i.e. peak start, peak end positions and peak apex of the spot were shown below in Table-5., the HPTLC finger print scanned at wavelength 360nm for methanol extract of mother plant *Aloe vera* leaf showed six polyvalent phytoconstituents and corresponding ascending order of Rf values ranged from 0.06 to 0.95 in which highest concentration of the phytoconstituents was found to be 27.17% and its corresponding Rf value was found to be 0.95. The corresponding phytoconstituents is presented in peak-6. This Rf value is same as the standard Rf value which having 10.99% phytoconstituents concentration. The second highest phytoconstituents concentration has 20.97% and its corresponding Rf value have found 0.47. This phytoconstituents is present in peak-3.

The third highest phytoconstituents is 13.97% with the Rf value 0.73 has peak No.-4. The fourth less concentration of the phytoconstituents is 13.84% has been 0.36 Rf value and was found to be peak No-2. The fifth less phytoconstituents is 12.43% having Rf value 0.06 and is present in peak 1. The last less phytoconstituents concentration was found to be 11.62% with and its corresponding Rf value 0.83 present in peak no. - 5. These entire phyto constituents graph is present in Figure-14.The HPTLC profile of in vitro *Aloe vera* leaf were generated 9 polyvalent phytoconstituents and corresponding ascending order of Rf values start from 0.04 to 0.95. All the corresponding HPTLC chromatogram was presented in Figure 15. The highest phytoconstituents was found to be 18. 90% and its relative Rf worth was observed to be 0.03 have peak no-6. The second highest phytoconstituent concentration have 15.17 % and is found in Rf value of 0.95 with peak no-9. This Rf value is same as the Rf value of standard garlic acid which have 10.99 % corresponding phytoconstituent. The third highest phytoconstituents have 11.86 % is found in Rf value of 0.74 with peak no-7. 10.45 % of was observed in peak no-5 which have fourth highest phytoconstituents and also observed 0.34 Rf value. The fifth highest peak was observed in peak no.-8 which has 9.65% phytoconstituents is found in 0.84 Rf value. The sixth less prominent peak is peak no-4 have 9.34% conc. of the phytoconstituents and 0.30 Rf value. The seventh less conc. of the phytoconstituents was observed to be 8.56% its corresponding Rf value was found to be 0.04. This is found in peak no.-1. The eights less conc. of the phytoconstituents was 6.65% have Rf value 0.21and was found to be peak no.-3. The last and less conc. of the phytoconstituents was observed to be 5.09% and its corresponding Rf value was found to be 0.15 which is found in peak no.-2. The phytoconstituents graph is present in Figure-15.HPTLC fingerprint scanned at wavelength 360 nm for methanolic extract of *in vivo Aloe vera* plant root showed six polyvalent phytoconstituents and corresponding ascending order of Rf values start from 0.04 to 0.95 in which highest conc. of the phytoconstituents was observed to be 20.86 % and its corresponding Rf value was found to be 0.37 and 0.65 respectively. This is found to be peak no.- 3&4. The second highest conc. of the phytoconstituents was observed in 20.12 % and its corresponding Rf value was observed in 0.74 respectively. These phytoconstituents was observed in peak no.-5. The third less conc. of the phytoconstituents was observed to be 18.62 % which have 0.28 Rf value and this was found in peak no.-2. The fourth less prominent peak no. was 1 has been observed in 10.52% conc. of the phytoconstituents and has 0.04 Rf value. The last and less conc. of the phytoconstituents have 9.02% and is found in Rf value of 0.95 with peak no-6. This Rf value is same as the Rf value of standard Gallic acid which have 10.99 % corresponding phytoconstituent. The corresponding HPTLC chromatogram was displayed in Figure 16.

However, *in vitro Aloe vera* leaves of the plant have highest bioactive compound compare to *in vivo Aloe* leaf and root part of mother plant. All these Plant extract shows one similar Rf value compare to standard Rf value. From the results, it could be concluded that *Aloe vera in vitro* raised plant. It contains various phytoconstituents compare to *in vivo* and root extract. 3-dimensional representation of the scanning data of the all *Aloe vera* methanolic extracts HPTLC plate shown in Figure. 13. Therefore, it is recommended that *in vitro Aloe vera* plant can be taken as phyto pharmaceutical importance.

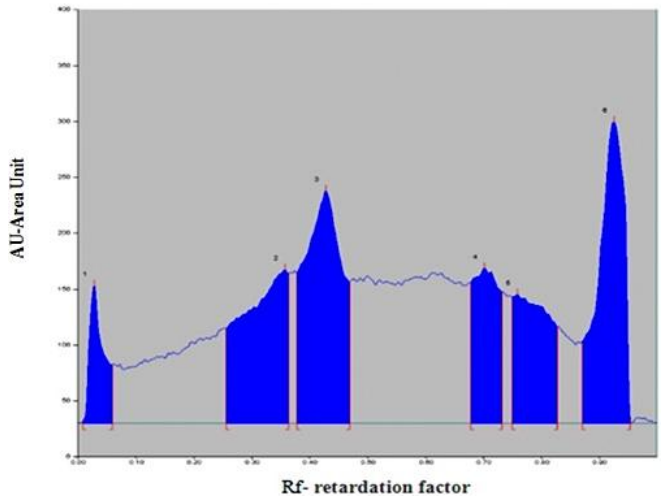

Figure 6: HPTLC chromatogram of in vivo Aloe vera methanolic leaf extract showing different peaks of phytoconstituent

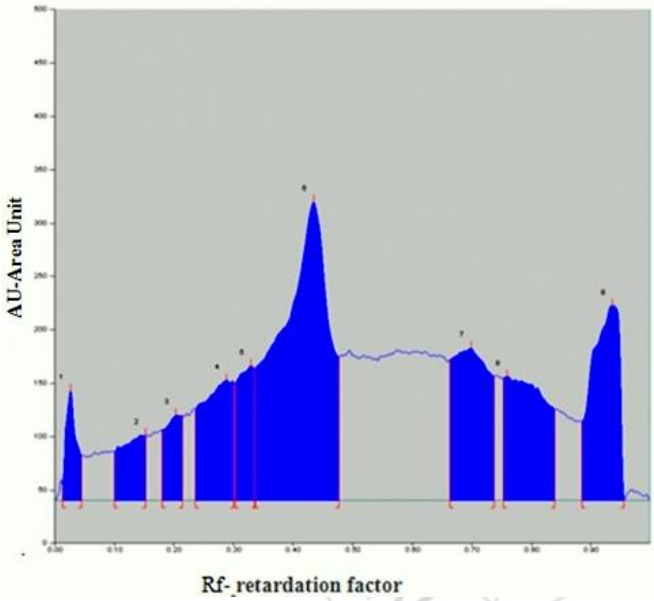

Figure 7: HPTLC chromatogram of in vivo Aloe vera methanolic leaf extract showing different peaks of phytoconstituent.

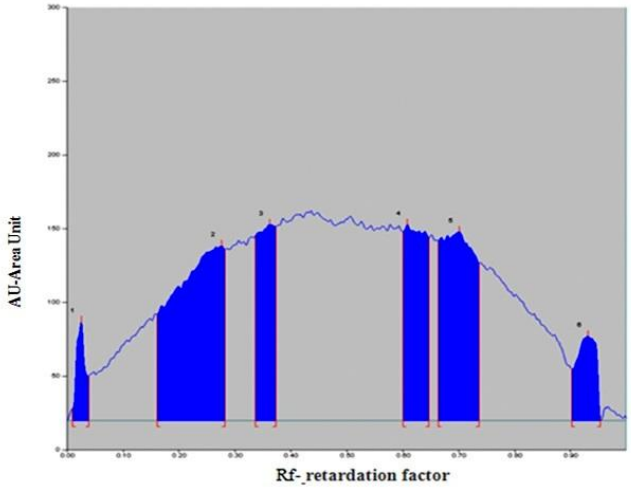

Figure 8: HPTLC chromatogram of in vivo Aloe vera methanolic root extract showing different peaks of phytoconstituen.

Table 5: HPTLC profile of the methanolic extract of a) Standard b) in vitro c) in vivo d) Root

Peak	Start Position (Rf)	Start Height (AU)	Max Position (Rf)	Max Height (AU)	Max %	End Position (Rf)	Height (AU)	Area (AU)	Area %
a) Standard (Gallic Acid)									
1	0.06	11.1	0.10	23.9	3.00	0.11	22.2	785.6	1.54
2	0.13	25.7	0.21	54.3	6.81	0.22	52.3	29.2	5.79
3	0.23	56.4	0.25	72.8	9.13	0.25	65.3	1489.1	2.93
4	0.26	68.1	0.29	85.2	10.69	0.31	80.6	3042.8	5.98
5	0.66	124.9	0.78	383.6	48.15	0.85	85.8	371.0	72.96
6	0.85	86.3	0.87	89.6	11.24	0.90	75.0	2882.4	5.67
7	0.91	75.3	0.92	87.5	10.99	0.95	5.3	2609.2	5.13
b) *In vitro Aloe vera* Leaf									
1	0.01	1.9	0.03	123.5	12.43	0.06	52.4	26800.0	5.65
2	0.26	85.1	0.36	137.4	13.84	0.36	134.3	9644.4	20.32
3	0.38	134.9	0.43	208.3	20.97	0.47	126.9	121.5	25.52
4	0.68	126.3	0.70	138.7	13.97	0.73	117.5	5718.9	13.86
5	0.75	112.9	0.76	115.4	11.62	0.83	86.3	6578.3	13.86
6	0.87	73.6	0.93	269.9	27.17	0.95	2.5	107.9	22.59
c) *In vivo Aloe vera* Leaf									
1	0.01	15.1	0.03	103.0	8.56	0.04	41.7	1655.4	2.81
2	0.10	45.6	0.15	61.2	5.09	0.15	61.2	2340.6	4.02
3	0.18	66.2	0.20	80.0	6.65	0.21	79.3	2076.8	3.56
4	0.24	85.6	0.29	112.4	9.34	0.30	110.8	5254.2	9.02
5	0.30	108.8	0.33	125.8	10.45	0.34	123.6	3224.8	5.54
6	0.34	124.0	0.44	279.3	23.23	0.48	134.7	207.3	35.59
7	0.66	132.1	0.70	142.7	11.86	0.74	116.8	7975.4	13.69
8	0.75	114.4	0.76	116.1	9.65	0.84	85.4	7360.8	12.64
9	0.89	73.3	0.94	182.6	15.17	0.95	1.1	7652.2	13.14
d) Root of mother plant									
1	0.01	8.2	0.03	67.0	10.32	0.04	29.9	938.5	3.30
2	0.16	71.7	0.28	118.6	18.62	0.28	116.0	9703.3	34.13
3	0.34	125.3	0.36	132.8	20.86	0.37	131.7	3895.0	13.70
4	0.60	127.9	0.61	132.8	20.86	0.65	123.9	4877.6	17.16
5	0.66	121.7	0.70	128.1	20.12	0.74	106.8	7147.8	25.14
6	0.90	34.8	0.93	57.5	9.02	0.95	1.5	1869.8	6.58

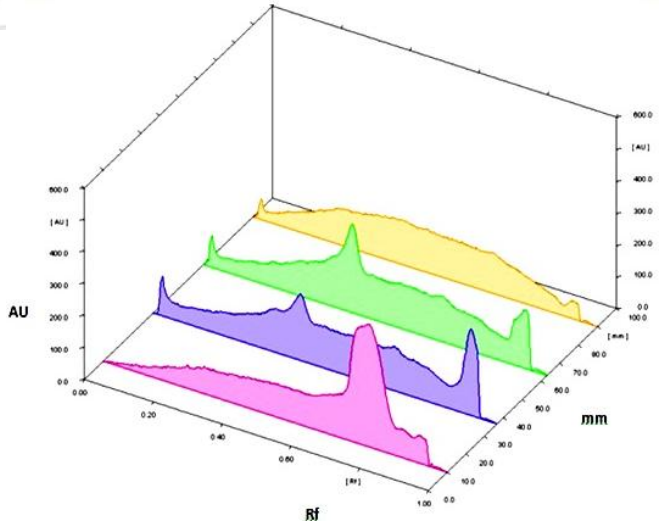

Figure 9: 3-Dimensional representation of the scanning data of the all Aloe vera methanolic extracts with standard

4. Conclusion

From the above evidence, it is concluded that plant extracts having great impact on phytochemical and antimicrobial activity against bacterial and fungal pathogens. This can be used in the treatment of infectious diseases. This study would lead to the establishment of some compounds that could be used to formulate new and more potent antimicrobial drugs of natural origin.

5. Acknowledgements

The authors are grateful to the Tectona Biotech Resource Centre (TBRC), Odisha. for financial support.

References

[1] Patel DK, Kumar R, Prasad SK, Hemalatha S. "Pharmacologically screened aphrodisiac plant-A review of current scientific literature," Asian Pac J Trop Biomed, I (1): pp. 131-138, 2011.
[2] Lanjhiyana S, Garabadu D, Ahirwar D, Bigoniya P, Rana AC, Patra KC, Lanjhiyana SK, Karuppaih M, "Antihyperglycemic potential of *Aloe vera* gel in experimental animal model," Ann Biol Res, 2(1), pp. 17-31, 2011.
[3] Davis YUS Muhammad and Aliyu BS, "Antibacterial activity of anthraquinone none fraction of *Vitex doniana*," Pak. J. Biologic. Sci, pp. 1-3, 2007.
[4] Liu C, Leung MY, Koon JC, "Macrophage activation by polysaccharide biological response modifier isolated from *Aloe vera* L. var. Chinensis (Haw)," Berg. Int Immunopharmacol, (6) pp. 1634-1641, 2006.
[5] Kahlon J.B., "Inhibition of Aids virus replication by Ale Mannan *in vitro Molecular," a Biothermy, (3), 127-135,* 1991
[6] L. J. Lorenzetti, R. Salisburry, J. L. Beal and J. N. Baldwin, "Bacteriostatic property of *Aloe vear*," J. of the Pharm. Sci., (53), pp. 1287-1290, 1964.
[7] Hamman, J.H., "Composition and application of *Aloe vera* leaf gel," Molecules, (13) pp. 1599-1616, 2008.
[8] Kemper, K.J. and Chiou, V, "*Aloevera*: The Longwood Herbel Task Force," The Center for Holistic Pediatric Education and Research, pp. 1-24, 1999.
[9] Ishii Y, Tanizwa H, Takino Y., "Fluorophotometry of barbaloin in Aloe," Chem Pharm Bull., (32) pp. 4946-50, 1984.
[10] Park, Y., And Jo, T.H, "Perspective of Industerial Application of *Aloe vera*," New perspective on Aloe, pp. 191-200, 2006.
[11] B.K. Vogler and E. Ernst, Br. J. General Practice, (49) pp. 823, 1999.
[12] O. O. Agarry, M. T. Olaleye and C. O. Bello-Michael, "Comparative antimicrobial activities of *Aloe vera* gel and leaf," *African journal of Biotechnology*, IV (12), pp. 1413-1414, 2005.
[13] Kubmarawa D, Ajoku GA, Enworem NM, Okorie, "Roles of agricultural biotechnology in ensuring adequate food security in developing societies," Afr. J. Biotechnol*, (*6), pp. 1690-1696, 2007.
[14] Mensah JK, Okoli RI, Ohaju-Obodo JO, Eifediyi K, "Aqueous extract of Telfairia occidentalis leaves reduces blood sugar and increases haematological and reproductive indices in male rats," Afr. J. Biotechnol, (7) pp. 2304-2309, 2008.
[15] Raquel, F.E, "Bacterial lipid composition and antimicrobial efficacy of cationic steroid compounds," Biochemica et Biophysica Acta, pp. 2500-2509, 2007.
[16] GA Ayoola1, HAB Coker, SA Adesegun, AA Adepoju-Bell1, K Obaweya, EC Ezennia, TO Atangbayila, "Phytochemical Screening and Antioxidant Activities of Some Selected Medicinal Plants Used for Malaria Therapy in Southwestern," Nigeria*,* 7(3): pp. 1019-1024, 2008.
[17] Ali H. and Dixit S, " *In vitro* antimicrobial activity of flavanoids of *Ocimum sanctum* with synergistic effect of their combined form" *Asian Pacific Journal of Tropical Disease*, pp. 396-398, 2012.
[18] Aliyu, B.S. "Common ethnomedicinal plants of the semi-arid regions of West Africa – Their descriptions and phytochemicals," Triumph publishing company limited, Gidan Sa'adu Zungur, Kano, Nigeria, (1), pp. 93-94, 2006.

Author Profile

Souvagyalaxmi Sahoo has completed her Master of science (M. Sc.) in Biotechnology from MITS School of Biotechnology, Bhubaneswar, Odisha, India in 2005 and Bachlor of Science (B.Sc) in Botany (Hons.) from P.N. college, Khorda, Odisha, India in 2002. Her field of interest is in Plant Tissue Culture, Molecular biology, Microbiology and Biochemistry studies. She now with Tectona Biotech Resource centre, Bhubaneswar, Odisha.

Sangita Dixit has completed her Master of Science (M. Sc.) in Bioinformatics from Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India in 2013 and Bachlor of Science (B.Sc.) in Chemistry (Hons) from F.M. University, Balesore, Odisha, India in 2011. Her field of interest is in Bioinformatics and Biochemistry studies.