ULTRASONIC EXTRACTION OF BILAWANOL FROM SEMICARPUS ANACARDIUM FRUIT FOR FORENSIC

Rajendra Tayade [1], Abhilash Sukhadeve [2*], Dr. R. K. Wanare [3], Prafulla P. Choudhari [4], Mayur Khedkar [5], Shubhangi Patil [6], Nihal Mishra[7]

Abstract

Semicarpus Anacardium Linn is one of the most prominent, effective, and widely used herbs for natural treatments. Semicarpus anacardium contains a variety of flavonoids, including jeediflavanone, semicarpuflavanone, galluflavanone, nallla flavanone, semarcarpetin, and bilawanol in the fruit, as well as amentoflavone and quercetin in the leaves. The internal administration of juice by quakes may result in accidental poisoning. The juice is introduced in the vagina as a punishment for infidelity. Bilawanol is extracted from fresh fruits collected from the farm of Semicarpus anacardium using an ultrasonic assisted technique. Extracted alkaloids are identified by different methods such as colour tests, thin layer chromatography, and infrared spectroscopy techniques used for forensic analysis.

Keywords: Colour test; Infrared Spectroscopy; Forensic Analysis; Phytochemical; Alkaloids

[1]Asst. Prof Department of Chemistry Institute of Science Nagpur. Maharashtra, India

[2*]Asst. Prof Department of Chemistry Government Forensic Science Nagpur. Maharashtra. India

[3]Asst. Prof Department of Chemistry, Jawaharlal Nehru Arts, Commerce and Science College, Wadi, Nagpur Maharashtra India

[4]Asst. Prof Department of Chemistry G.S. Tompe Arts, Commerce and Science College, Chandur Bazar, Amravati

[5]Asst. Prof Department of Chemistry, Hislop College, Nagpur, Maharashtra, India

[6]Asst. Prof Department of Chemistry, The Institute of Science Mumbai, Maharashtra, India

[7]PhD Research Scholar Department of Chemistry Institute of Science Nagpur. Maharashtra, India

1. Introduction

One of the most beneficial, responsive, and frequently utilised herbs in home treatment is Semecarpus anacardium Linn (SA). Fruits are 2-3 cm wide, ovoid, smooth, and shiny black when they are ripe, which is between December and March. In June, the plant blooms, and later it produces fruit. It is easily identified by its huge leaves and the red flame of resin that it emits, which turns black when exposed.(Kshatri,j et al 2018) It has no particular predilection for any particular soil. In addition to amentoflavone and quercetin in the leaves, the Semicarpusannacardium plant also includes jeediflavanone, semicarpuflavanone, galluflavanone, nalllaflavanone, tetrahydrobustaflavone, semarcarpetin, and bilawanol in the fruit Tetrahydroamentoflavone was prepared semi-preparatively using HPLC and was quantified using HPTLC in Semicarpus anacardium and its polyherbal preparations.THA, (Aravind et al 2008) a significant flavonoid, is an allusion to Bhallataka It has many different therapeutic qualities. Bhilawanol, an o-dihydroxy molecule, and Semicarpol, a monohydroxy phenol, are the plant's active ingredients. The rise of infections (Anandkumar, W.),that are resistant to antibiotics is one of the biggest dangers to the effective treatment of microbial diseases, as evidenced by the phytochemical screening activity of Semicarpus anacardium. The current study's target was to evaluate a methanolic extract of Semicarpus anacardium nut antifungal and phytochemical characteristics of oil.Semicarpus anacardium methanolic extract was tested against four fungi at different concentrations (6.25, 12.5, 225, 37.5, 50, and 62.5 ug/ml), according to preliminary phytochemical research. specifically, Sclerotium rolfsii, Alternaria species, Fusarium oxysporum, and Rhizctoniasolanii. The study's findings provide a scientific foundation for the plant extract's future development as an antifungal agent. The standardisation of fruits from Bhallataka according to the Protocol for pharmacopoeial testing, which includes powder microscopy, screening using physical and chemical methods, HPTLC fingerprinting, and GC-MS analysis, is done in "Analytical Standards of Fruits of Bhallataka-Semicarpus anacardium." In a preliminary phytochemical test, sugar, tannins, quinones, sterols, saponins, flavonoids, and steroids found in plants. Using an 8:1 ratio of toluene to ethyl acetate as the mobile phase, HPTLC profiling of an ethanolic extract indicated the presence of phytochemicals with variable RF values. Five of eleven chemicals found in the diethyl ether fraction of the GC-MS analysis were recognized (Bala, I., 2011). The usage of bioactive substances in several business sectors, such as the food and pharmaceutical industries, indicated In addition to the classic techniques, many new ones have been created, but no one technique has been accepted as the best way to extract bioactive substances from plants (Lekshmi, R., 2016). Semicarpus anacardium L. Carpus anacardium seed oil's phytochemical composition as well as its physical and chemical characteristics were identified. The findings suggest that S. Anacardium seed oils, along with their physiochemical characteristics and phytochemical contents, have been discovered to be ideal for creating biopesticide formulations for the control of fungal and insect pests. The biopesticide anacardium has the potential to be effective.(Azmir, J 2013), Semicarpus anacardium L. is a well-known plant in Ayurveda ,Siddha medicine, and it is a well-known herb for combating cancer. Numerous medical characteristics, in particular anti-cancerous activity, have been found to exist in it. This study examines the pharmacology, distribution, and phytochemistry of S. ancardium. Furthermore, plantanacardium is mentioned (Srinivasan, A.2016) After being biosynthesized, silver nanoparticles from Semicarpus anacardium Linn were studied kinetically. According to the current standard describes a quick, environmentally friendly, and easy procedure for converting $AgNO_3$ to Ag^0 from Semicarpus anacardium linn. aqueous extract of f-leaf The existence of silver nanoparticles was verified using a UV-visible spectra. Techniques like SEM and XRD were employed to confirm the structure of silver nitrate. The kinetic properties of AgNps with respect to temperature and time were thoroughly investigated (Rao, M.V., 2008) Different disorders can be treated with Bhallataka's

therapeutic capabilities. It should not, however, be used without first going through the Semicarpus anacardium detoxification procedure since it can be damaging to the health. The Bhallataka nut includes a number of bioactive elements, such as minerals, vitamins, amino acids, phenolic compounds, bhilawanols, bhilvonoids etc. With the aid of numerous investigations, these substances' particular qualities, such as antibacterial, antihelminthic, antioxidant, anticancer, etc., have been established (Sheikh, M.V 2016)

2. Experimental

Materials

Methanol, chloroform, petroleum ether, and S-ethyl acetate were all of analytical and highest purity. deionised water, ethanol, acetone, carbon tetrachloride, potassium iodide in iodine solution, S. D. Fine, n-hexane of Hi-Media, India Ltd., and agar agar, Muller Hinton agar, Merck Co. (Germany), carbon tetrachloride, potassium iodide in iodine HCL, ferric choride solution, picric acid, hexane, and toluene are some of the ingredients.

Instruments

A Perkin Elmer UV-visible spectrophotometer was used for UV-visible spectra, and a sonicator was used for extrusion. Infrared spectra were collected using Bruker FT-IR instruments.

3. Results and Discussion

Colour Tests

Extracted fruit ether extract were carried out. First, 1 gram of iodine was dissolved in 5 ml of distilled water with 1 gram of potassium iodide to make Wagner's reagent. The extract now contains Regent. It was noticed that the colour changed to a reddish brown, indicating the presence of the alkaloid. Saturating a picric acid solution (one gram of picric acid dissolved in three millilitres of distilled water) produced Hager's Reagent. The extract now contains Regent. It was noticed that the colour changed to yellow, indicating the presence of the alkaloid.

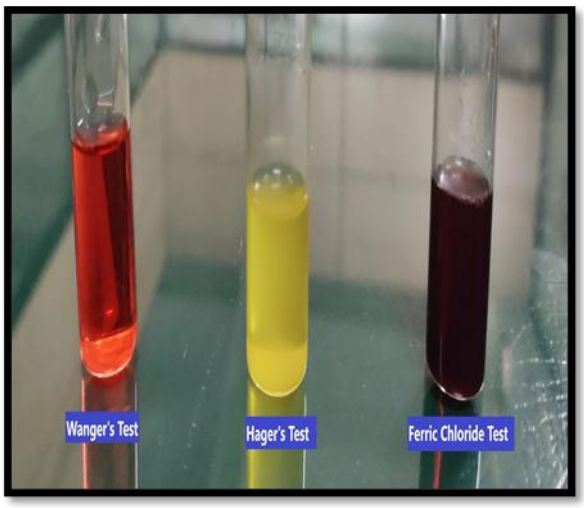

Figure. 1: Colour tests

Thin Layer Chromatography

The TLC of ether extracts of fruits was done by using ready-made MERK TLC plates. Threedifferentsolvent systems were used n-Hexane:Ethyl Acetate (9:1), Toulene:Ethyl Acetate (9:1), and n-Hexane:DiethylEther:Acetic Acid (6:4:1). Standard Rf was used to figure out the bilawnol alkaloid's RF value (Table 1), which was found to be good.

Figure. 2: TLC

Fourier-Transform Infrared Spectroscopy:

Using an FTIR-BRUKER system with a 400–4000 cm^{-1} wavelength range, the material was analysed.Version 7.0.129 of the OPUS operating system was being used by the device. In FTIR, a Golay detector is used.. The sample was kept on the sample holder, and the transmission spectra were taken. The peaks of the transmission spectra are obtained from the position, shape, and relative intensities of the vibrational bands in the FT-IR spectra of a sample. Graph shows peak at 3324 (O-H Stretch) Carboxylic acid, 2830 (C-H Stretch) Aldehyde, 1653(C=C Stretch) Stretch alkene, 1412(O-H Bend) Carboxylic acid, 1112 (C- C) Ketone 1019 (C-O Stretch) 753 (C-H Bend) Aromatic which confirms the structure of bilwanol (fig) .

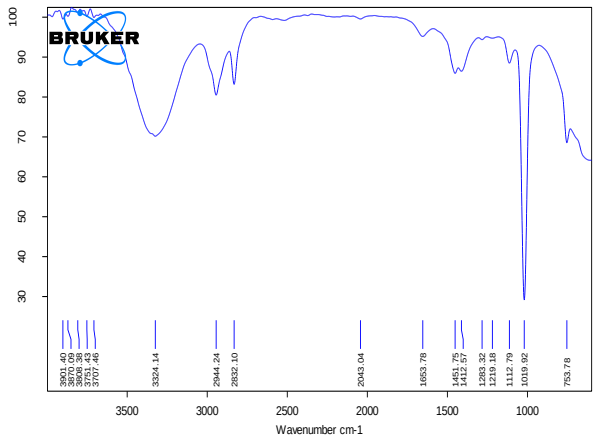

Figure. 3:FTIR

Antibacterial activity

The study evaluated the antibacterial activity of a synthesized extracted alkaloidagar well diffusion procedure was used . The results indicated that the inhibition of bacterial growth progressively rise with an increase in the concentration of the extracted alkaloid. $Gram^-$ bacteria showed better results with a larger zone of inhibition compared to $gram^+$ bacteria. This is because $gram^-$ bacteria shows thin peptidoglycan layer, which makes it easier for the extracted alkaloid to penetrate the cell wall and denature or kill the bacteria, causingsuppression of bacterial cell wall production and plasmolysis. The synthesized extracted alkaloid was effective against Pseudomonas aeruginosa and Staphylococcus aureus, causing opposed to bacterial cell wall generation in each of these strains. The study also highlighted the importance of surface area in the binding of particles to bacteria.Particles that are smaller have a higher surface area for contact based on this concept.and therefore, exhibit a stronger bactericidal effect compared to larger particles.

Figure. 4 Antibacterial activity of extracted *Semicarpus anacardium*

Semicarpus anacardium was extracted in two different solvents: petroleum ether and methanol, which produce varying results when analysed using different techniques.

TABLE I. Methanolic and Pether Extract Comparison

Sr.no	Extract	Color test			TLC	UV	IR
		$FeCl_3$	Hager	Wager			
1	Methanol	+	+	+	+	+	+
2	Pet Ether	+	+	+	-	-	+

$^+$positive ;$^-$negative

Conclusions

Bhilawanol was isolated from the fruits of *Semicarpus anacardium linn. belongs to (Family* Anacardiaceae),known as Bhallataka or Bhilawa, by using the ultrasonicate technique and preparative TLC. UV-Visible Spectroscopy, Infrared Spectroscopy, and a colour test were used to examine it. Ultrasonication is a less time-consuming and widely available technique. A small amount of sample yields better results than other extraction methods. The nutshell of fruit is *Semicarpus anacardium*, which is good for improving the digestive system. It is also used as a brain tonic, to treat brain weakness, and to boost intelligence. The Bhilawanol Extraction of *Semicarpus Anacardium* from Fruit by Preparative TLC and Ultrasonicator shows better result as compared to other extraction methods.

Acknowledgement

Authors are thankful to The Head, Department of Chemistry, Institute of Science, College, Nagpur, and Government Institute of Forensic Science,Nagpurfor providing laboratory facilities.

Conflict Of Interests

The authors declare that none of their known economic conflicts with others or close personal ties appear to have made an effect on the findings provided in this work**.**

Author Contributions

Each author provided an important addition to the work, engaged in its review, editing, and analysis, and gave it their final approval before it was published.

References

Kshatri, J., Rao, C.V. and Settaluri, V.S., 2018. Neutralization of toxins in aqua culture using probiotics. *INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH*, *9*(6), pp.2484-2489.

Puri, H.S., 2003. Traditional Herbal Medicine for Modern Times, Rasayana–Ayurvedic Herbs for Longevity and Rejuvenation

Gautam, R., Saklani, A. and Jachak, S.M., 2007. Indian medicinal plants as a source of antimycobacterial agents. *Journal of ethnopharmacology*, *110*(2), pp.200-234.

Aravind, S.G., Arimboor, R., Rangan, M., Madhavan, S.N. and Arumughan, C., 2008. Semi-preparative HPLC preparation and HPTLC quantification of tetrahydroamentoflavone as marker in Semecarpus anacardium and its polyherbal formulations. *Journal of pharmaceutical and biomedical analysis*, *48*(3), pp.808-813.

Anandkumar, W., A CRITICAL REVIEW ON BHALLATAK.

Atawodi, S.E., Adekunle, O.O. and Bala, I., 2011. Antioxidant, organ protective and ameliorative properties of methanol extract of Anogeissus leiocarpus stem bark against carbon tetrachloride-induced liver injury. *International Journal of Pharmaceutical Sciences and Research*, *2*(6), p.1443

Rajakrishnan, R., Samuel, D. and Lekshmi, R., 2016. Analytical standards of fruits of Bhallataka-Semecarpus anacardium Linn. *Journal of Ayurvedic and Herbal Medicine*, *2*(1), pp.20-25.

Azmir, J., Zaidul, I.S.M., Rahman, M.M., Sharif, K.M., Mohamed, A., Sahena, F., Jahurul, M.H.A., Ghafoor, K., Norulaini, N.A.N. and Omar, A.K.M., 2013. Techniques for extraction of bioactive compounds from plant materials: A review. *Journal of food engineering*, *117*(4), pp.426-436.

Srinivasan, A., Suresh, B.D., Senthilkumar, N. and Murugesan, S., 2016. Physicochemical properties and phytochemical constituents ofSemecarpus anacardium L. seed oil. *Advances in Applied Science Research*, *7*(3), pp.151-154.

Gouthaman, T., Kavitha, M.S., Ahmed, B.A., Kumar, T.S. and Rao, M.V., 2008. A review on Semecarpus anacardium L: An anticancer medicinal plant. *Phytopharmacology and therapeutic value*, pp.193-221.

Sheikh, M.V., Devadiga, N. and Hate, M., 2016. Biosynthesis and kinetic studies of silver nanoparticles from semecarpus anacardium

linn. f and their application. *World J Pharm Pharm Sci*, *4*, pp.1732-1739

Akare, P.D., Tumram, A.C., Lambat, R.D. and Suryawanishi, S.S., 2015. www. ijrap. net. *Phytochemistry*, *6*, p.5.

Bagewadi, Z.K., Siddanagouda, R.S. and Baligar, P.G., 2012. Phytochemical screening and evaluation of antimicrobial activity of Semecarpus anacardium nuts. *International journal of pharmacology and pharmaceutical technology*, *1*(2), pp.68-74.

Bagewadi, Z.K., Siddanagouda, R.S. and Baligar, P.G., 2012. Phytochemical screening and evaluation of antimicrobial activity of Semecarpus anacardium nuts. *International journal of pharmacology and pharmaceutical technology*, *1*(2), pp.68-74

Maurya, S.K., Seth, A., Laloo, D., Singh, N.K., Gautam, D.N.S. and Singh, A.K., 2015. Śodhana: An Ayurvedic process for detoxification and modification of therapeutic activities of poisonous medicinal plants. *Ancient science of life*, *34*(4), p.188

Pednekar, P.A. and Raman, B., 2013. Multielement determination in methanolic soxhlet leaf extract of Semecarpus anacardium (Linn. f.) by ICP-AES technique. *Asian journal of Pharmaceutical and Clinical Research*, *6*(3), pp.132-7.

PallaviD. Akare, Arvind CharandasTumram, Rajendra Dashrath Lambat, Shama Shirish Suryawanishi. Therapeutic significance of Semecarpus anacardium Linn.: A review. Int. J. Res. Ayurveda Pharm. 2015;6(4):463-46

Bahir, S.S., Wayal, R.S., Barke, A.S., Shelke, T.T., Gunjegaonkar, S.M., Hadke, S.P. and BAYAS, J.P., 2013. Preliminary phytochemical investigation of Semecarpus anacardium Linn. *International journal of pharmacy and pharmaceutical sciences*, *5*(3), pp.102-107

Tiwari, S.S., Singha, R.S. and Rawatb, A.K.S., 2015. Phytochemicals, heavy metals and antioxidant studies on Semecarpus anacardium Linn.(Fruit). *J. Indian Chem. Soc*, *92*, pp.1-7.

William, B.J., 2007. The original of the soxhlet extractor. *Chemical education*, *84*, pp.1913-1915.