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PHYTOCHEMICAL SCREENING AND GC-MS ANALYSIS OF PHYTOCHEMICALS PRESENT IN VARIOUS EXTRACT OF *SENNA AURICULATA* LINN. FLOWERS

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ABSTRACT

In the basic healthcare systems of underdeveloped nations, medicinal plants are regarded as the most significant. A plant's medicinal qualities are determined by the biochemical components found in the plant sections used to make medication. The Fabaceae family includes the well-known medicinal herb *Senna auriculata.* The goal of the current investigation was to assess the phytochemical screening and identification of potential bioactive ingredients in the various extract of flowers of *Senna auriculata.* Alkaloids, glycosides, terpenoids, phenols, tannins, and flavonoids were among the phytochemicals found in the various fraction of *Senna auriculate* flower. The three extracts have 21 bioactive components, the main phytocompound in different extracts being 13-Docosenamide (Z), along with phytol, resorcinol, vitamin E, β-Sitosterol, and resorcinol monoacetate. Therefore, the plant's medicinal properties may be due to the presence of these

phytochemicals. Hence, more Numerous physiologically active compounds have been found in *Senna auriculata* flower extracts, necessitating further biological and pharmacological study.

Keywords: *Senna auriculata*, Selective sequential extraction, GC-MS analysis, Soxhlet extraction

INTRODUCTION –

Modern synthetic and chemical medications are frequently investigated cautiously due to their negative effects **[1]**. While traditional herbal remedies are becoming increasingly popular due to their increased naturalness, friendliness to the environment, and lack of adverse consequences **[2]**.Therefore, despite all of the advantages of contemporary synthetic medications, individuals continue to favor natural medications derived from plants over those made from chemicals.**[3]** Many cultures employ plants as medicine, and because they contain specific bioactive components that are used by the pharmaceutical industry, they may be used to make a wide range of powerful pharmaceuticals **[4]**. Phytochemicals, or secondary metabolites, are found in many forms in plants. By acting alone, in combination, or synergistically, phytochemicals can help cure a variety of diseases and promote wellness **[5], [6]**. Phytochemicals are necessary in the pharmaceutical industry to develop new drugs and therapeutic agents **[7]**. Examples of phytochemicals with a range of biological activities include antioxidant, anti-inflammatory, anti-cancer, and anti-diarrhea properties. Terpenoids, flavonoids, and alkaloids are some examples of these compounds **[8]**.

Senna auriculata (L.) (Family: Fabaceae or Leguminosae), a common nutritional plant, their roots, branches, stems, barks, seeds, fruits, and flowers is widely used in Indian traditional medicine **[9]**. *Senna auriculata* is a plant whose various parts have yielded fatty acids, steroids, flavonoids, anthraquinones, and their glycosides.The phytochemicals that are typically found in various parts of palnt are utilized to address a range of diseases. Plant possess antioxidant **[10]** antibacterial **[11], [12]** anti-inflammatory **[13]** analgesic and antipyretic **[14]**. Our lab recently published a report on the isolation of secondary metabolites from this plant.

The extraction process that is being discussed is easy to use, quick, affordable, and requires less solvent. When determining the concentration of certain active ingredients in herbs used in cosmetics, medications, the food or pharmaceutical

sector, the environment, or forensic applications, the GC-MS technique can be a useful tool **[15]**. It combines two analytical methods into one to analyze chemical component combinations. Mass spectroscopy examines each component independently after gas chromatography separates the mixture's constituent parts **[16]**. Gas chromatography – Mass Spectrum analysis will help to determine which bioactive substances are included in plant extract. The literature review indicated that a great deal of work on phytochemical stimulation of this fascinating plant has been done. *Senna auriculata* has garnered interest from researchers globally due to its high therapeutic value. The goal of the current work is to recognize the bioactive constituents in the Pet ether, ethyl acetate, and methanol extracts of Senna auriculate flowers using GC-MS which might have therapeutic benefits. The primary goal of our current study is to identify the compounds present extract of *Senna auriculata* flowers by phytochemical screening of various extracts.

1. MATERIALS AND METHOD-

1.1. Chemicals –

Analytical grade reagents and substances were all employed in the study.

1.2. Plant collection and identification -

Senna auriculata Linn. flowers were gathered for the study in October and November 2015 from Sangamner, Ahmednagar, India, and identified at the S. N. Arts, D. J. Malpani Commerce and B.N.Sarada Science college, Sangamner. The identical voucher specimen (SSD-1) was placed in the herbarium department. Also, the Botanical Survey of India in Pune, Maharashtra, verified the authenticity of the plant specimen.

Distilled water was used to properly wash the flowers. For 10 days, the cleaned flowers were stored at room temperature in the shade. The thoroughly dried flowers were ground in a grinder and kept for later use in airtight glass vials.

1.3. Preparation of plant extract –

Senna auriculata flowers that had been ground and shade-dried were extracted utilizing a sequential, selective process employing solvents with varying polarity, specifically petroleum ether, Ethyl acetate and methanol. petroleum ether, ethyl acetate, and methanol. The extract was then dried off using a rotary evaporator (Heidolph Labrota,4000 Efficient, Germany) **[17]**.

1.4. Preliminary Phytochemical Screening –

The methods outlined by Singh **[18]** were used to perform phytochemical profiling of the crude extract of Pet ether, Ethyl acetate and methanol fraction of *Senna auriculata* flowers**[19], [20]**.

1.5. The GC-MS analysis –

The extracts of methanol, ethyl acetate, and pet ether GC equipped with an Elite-5 capillary coloumn (5% phenyl & 95% methyl polysaccharides Siloxane) & a mass detector turbo mass gold of the compound, which was which was run in E1 mode, was used to perform the Gas chromatography -Mass spectrometry (GC-MS) study. In the estimate, a polar column called Elite wax (Polyethylene glycol) (30mm x 0.25mm X 0.25umdf) is utilized. As a carrier gas, an inert gas such as hydrogen nitrogen, or helium - is utilized at a flow rate of 1 milliliter per minute, divided 10:1.

The Test samples component is evaporated in the GC equipments injection Section and seprated in the column using the adsorption and desorption techniques. Using software-controlled temperature programs, various component is eluted from the mixture according to their respective boiling points. The oven's temperature range for the GC column is 1100 to 2800 degrees. Retention time (RT) is the amount of time that each component eluted from the GC column. The GC runs for thirty-six minutes in total. The mass detector picks up the eluted component. In a GC-MS analysis, the spectrum of the known components kept in the NIST library determines the name, molecular weight, and structure of the test materials constituent parts. The process of identifying the constituent's parts. The process of identifying the constituents involved contrasting their mass spectra with those found in the Wiley ans NIST libraries, in addition to comparing their retention indices with existing literature.

1.6. Identification of chemical constituents -

Based on GC retention time on HP-5MS coloumn and comparing thr spectra with computer software data of standard, bioactive chemicals isolated from various extracts of Senna auriculate were identified.

2. RESULT –

2.1. Percentage yield –

A mean percentage yield of 4.26 (SD = 0.28) for pet ether extract, 2.41% (SD = 0.08) for ethyl acetate extract & 7.21% (SD = 0.30) for methanol extract were produced from 500 gm of air-dried powdered flowers. Methanol yields the highest yield percentage.

2.2. Screening for phytochemicals:

The existence of alkaloids, flavonoids, saponins, tannins, phenols, steroids, and terpenoids was discovered using phytochemical screening of the pet ether, ethyl acetate and methanol fraction Senna auriculate flowers, as indicated in **Table 1**.

2.2. Bioactive compound present in the extract -

Major chemical GC-MS analysis was used to identify the main chemical components of the *Senna auriculata* flower. The pet ether extract showed the presence of Heneicosane (5.63%), phytol (1.22%), Tricosane (4.85%), n-Tetracosanol1 (1.30%), 13-Docosenamide, (Z) (5.07%), Squalene (5.90%), n-Tetracosanol1 (3.43%), Vitamin E (12.25%) **Figure 1** and **Table 2** illustrate this.

The SAEA extract showed the presence of Benzofuran, 2,3-dihydro (1.12%), Hydrazinecarboxamide, 2-(phenylmethylene) (2.65%), Resorcinol monoacetae (11.12%), Cyclohexane, (2-methoxyethyl) (1.30%), 3,7,11,15-Tetramethyl 2-hexadecinlol (1.04%) as presented in **Figure 2** and **Table 3**.

The SAME extracts showed major component including Resorcinol (16.68%), 13-Docosenamide, (Z) (14.69%), Benzofuran, 2,3-dihydro (5.14%), Benzo [c] phenanthrene, 1-methyl (2.78%), Anethole (1.38%), Dibutyl phthalate (1.22%) as presented in **Figure 3** and **Table 4**.

Table 1: Phytochemical screening of extracts from flowers of *Senna auriculata.*

Phytoconstituents	Test	SAPE	SAEA	SAME
Steroids	Liebermann-Burchard	+	-	+
Terpenoids	Salkowski reaction	+	-	+
Alkaloids	Dragendorffs test	-	+	+
Glycosides	Keller-Killani test	-	+	+
Saponins	Foam test	-	+	+
Tannins& phenolic compounds	Ferric chloride test	-	+	+
Flavonoids	Shinoda test	-	+	+
Carbohydrates	Benedicts test	-	-	+

(-) and (+) shows negative and positive test

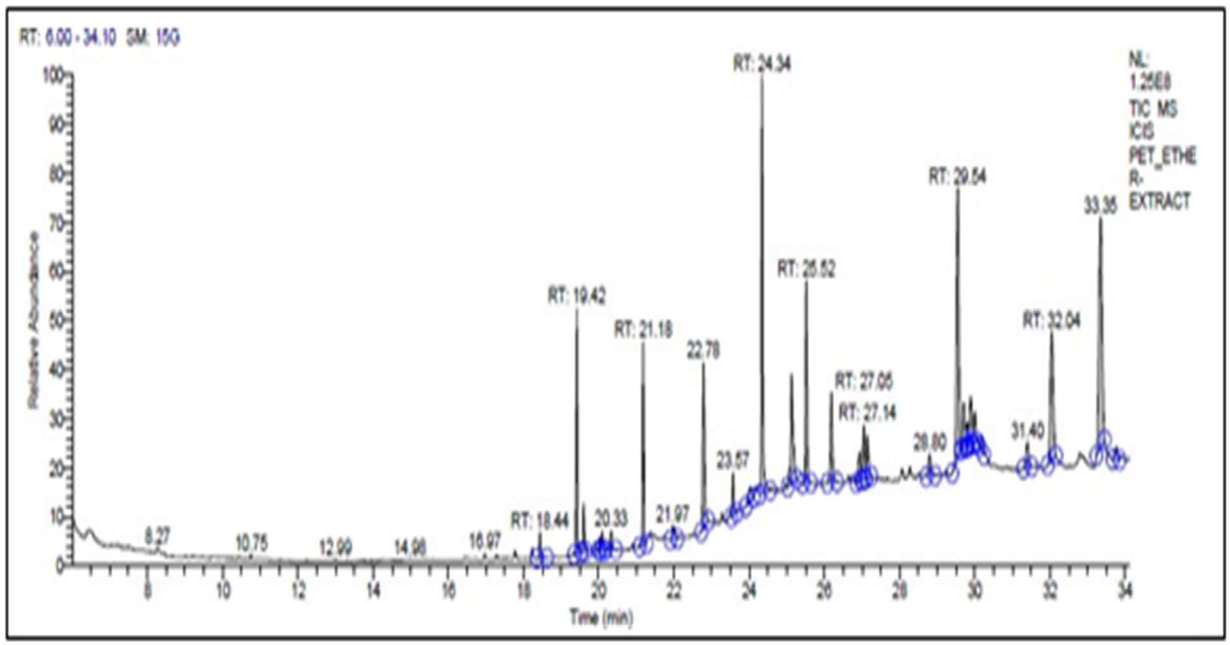


Figure 1: A chromatogram showing the phytocompound ingredient in pet ether extract.

Table 2: Phytoconstituents identified from *Senna auriculata* flower extract SAPE

Retention time (min)	Components	Peak Area (%)	Structure of compound
19.42	Heneicosane	5.63	
19.59	Phytol	1.22	
21.18	Tricosane	4.85	
23.57	n-Tetracosanol	1.30	
25.13	13Docosenamide, (Z)	5.07	
25.52	Squalene	5.90	
29.54	Vitamin E	12.25	
32.04	Stigmasterol	7.46	
33.34	β-Sitosterol	14.60	

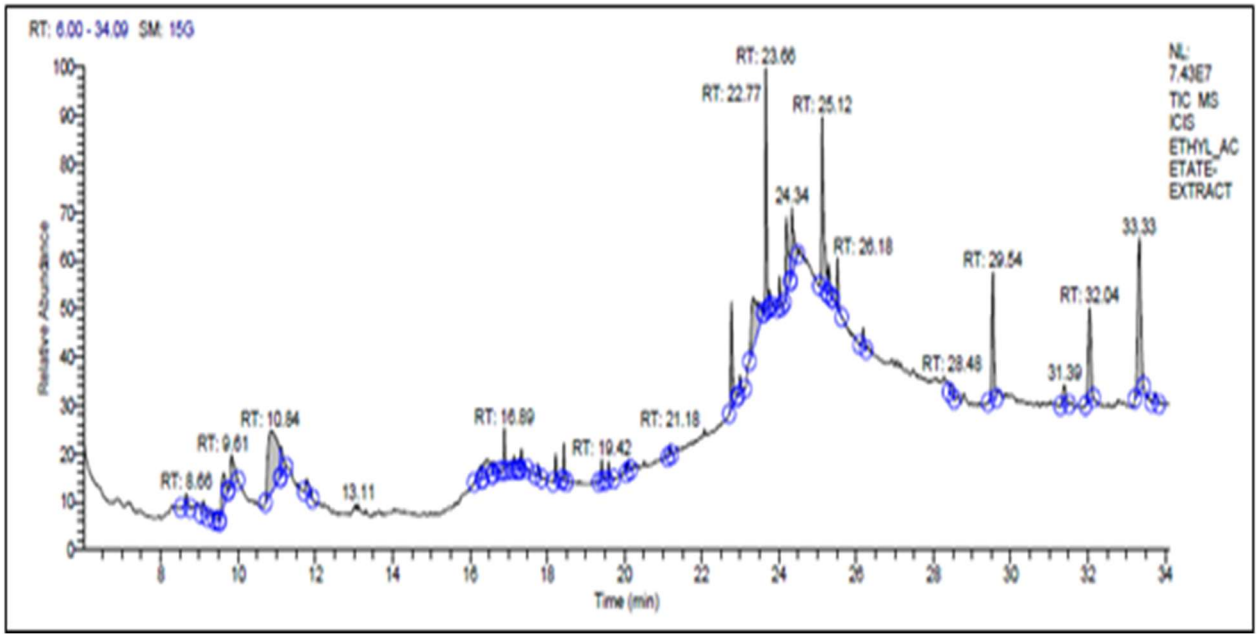


Figure 2: A chromatogram showing the bioactive ingredient in Ethyl acetate extract

Table 3: Phytoconstituents identified from *Senna auriculata* flower extract SAEA

Retention time (min)	Components	Peak Area (%)	Structure pf Compound
9.61	Benzofuran, 2,3dihydro	1.12	
9.83	Hydrazinecarboxamide, 2-(phenylmethylene)	2.65	
10.84	Resorcinol monoacetate	11.12	
11.78	Cyclohexane, (2methoxyethyl)	1.30	
16.89	3,7,11,15Tetramethyl2hexadecen1ol	1.04	

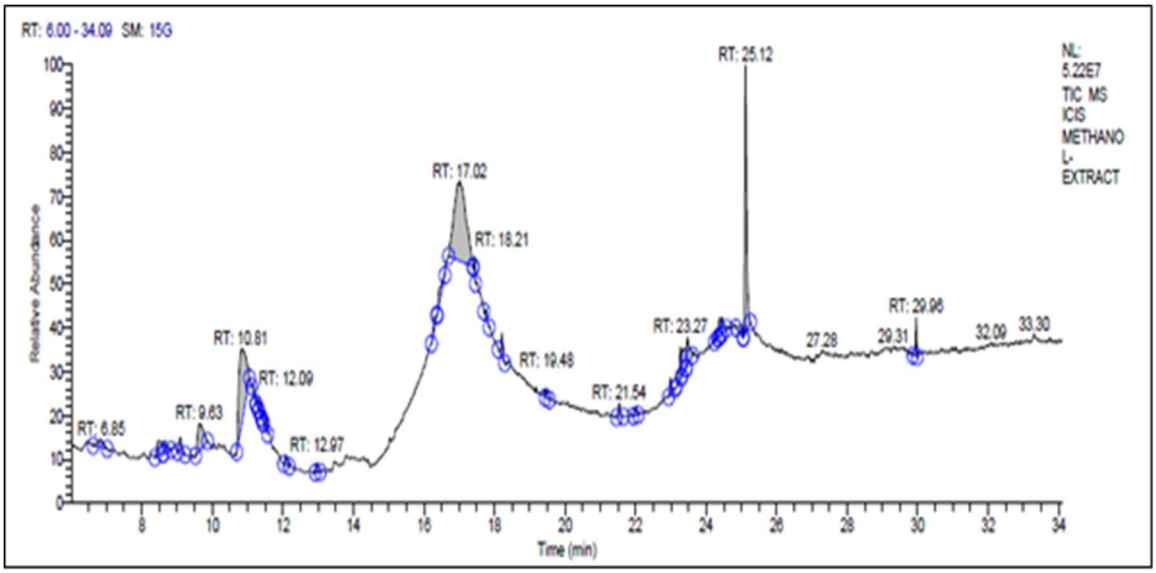
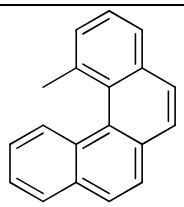
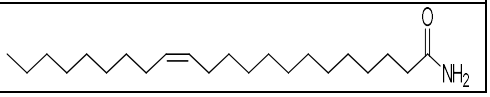


Figure 3: Chromatogram showing the bioactive ingredient in Methanol crude extract

Table 4: Phytoconstituents identified from *Senna auriculata* flower extract SAME

Retention Time (min)	components	Peak area (%)	Structure of Compound
9.09	Anethole	1.38	
9.63	Benzofuran, 2,3dihydro	5.14	
10.81	Resorcinol	16.68	
18.21	Dibutyl phthalate	1.22	

23.34	**Benzo[c]phenanthrene, 1-methyl**	**2.78**	
25.12	**13-Docosenamide, (Z)**	**14.69**	

3. DISCUSSION -

The phytochemical substances included in herbal plants must be identified by qualitative screening. Before moving on to a more in-depth phytochemical analysis, this process is a basic preliminary prerequisite. Indian rural communities frequently use the crude extract from a native plant for medical and other uses. Even though they may expose people to natural businesses on a massive scale, crude extracts and medications made with natural chemicals. The biological and phytochemical screening of plant extracts from conventional preparations used in popular medicine is the first step towards achieving this aim. The phytocompounds may indicate the traditional usage of medicinal plants. It is well known that they have therapeutic action against a number of human conditions, including diuretics, skin conditions, hypercholesterolemia, and hyperglycemic disorders.

One of the first stages in determining if a species of plant has any unique compounds or a group of compounds is to do a GC-MS analysis in order to comprehend the nature of the active principles in medicinal plants. The key components' existence and retention duration were verified by the GC-MS spectrum profile. The peak heights show the relative concentrations of the constituents found in the extracts. By cross-referencing their mass spectra with the NIST library's, the phytoconstituents were identified and quantified.

All extracts' GC-MS analyses revealed the existence of several bioactive substances.

It has been demonstrated that a few of the main biological chemicals have pharmacological properties, which may aid in the plant's ability to recover. Phytol shows antioxidant and antinociceptive activity **[21]** Antimicrobial **[22]**. Antiscraching **[23]** and Anti-inflammatory **[24]** vitamin E exhibit antioxidant **[25]** antinociceptive **[26]** Neuroprotective **[27]** anticancer **[28]** and Analgesic **[29]** activity. In addition, Beta sitosterol blocks the generation of reactive oxygen species, oxidative stress, and

inflammatory cytokines that are inhibited by steroids[30]. Beta sitasterol shows Antibacterial activity **[31]**.13 Dococenamide (Z) shows antimicrobial, antioxidant and anti-inflammatory activity **[32]**. Dibutyl phthalate and anethole shows antimicrobial activity **[33], [34]**. Squalene has hypocholesterolemia, anticancer, chemopreventive, and antioxidant properties **[35], [36]**.

The current study unequivocally demonstrates that all *Senna auriculata* flower extracts contain significant amounts of bioactive chemicals, suggesting that they might be used as a medicinal source to create helpful medications to treat a range of illnesses and ailments in humans.

CONCLUSION

The biological activities of the found phytocomponents have been linked to anti-cancer effects, analgesic, anti-inflammatory, hepatoprotective, antihypercholesterolemic, anti-diabetic, and anti-microbial, according to the investigation's findings. *Senna auriculata* is therefore suggested as a source of phytopharmaceutical value. Additional research is necessary to potentially create new medications utilizing some of the bioactive chemicals present *Senna auriculate.*

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Conflicts of interest -

CONFLICTS OF INTEREST

There aren't any conflicts to disclose.

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