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Research Article

Preliminary Phytochemical Analysis of Root Extracts of *Argemone mexicana* Linn

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Abstract

Argemone mexicana is an indigenous plant often called prickly poppy. It is part of the *Papaveraceae* family. Argemone mexicana is recognized for its medicinal advantages within traditional medicine systems. In recent decades, there has been a growing interest in researching the therapeutic properties of this plant, which is reported to exhibit antimicrobial, antidiabetic, antioxidant, and hepatoprotective effects. Furthermore, the plant has been documented for additional actions such as larvicidal effects, wound healing properties, cancer-related effects, antihelmintic actions, and neuropharmacological investigations. Given these medicinal attributes, this plant can be considered a significant resource of therapeutic compounds. Phytochemicals were also identified to clarify the potential reasons behind the pharmacological effects. Extracts from the leaves were analyzed for primary phytochemicals using established methods. From the current research, we conclude that the phytochemical analysis of the *Argemone mexicana* Linn root extracts indicated the presence of alkaloids, phenols, sugars, terpenoids, glycosides, flavonoids, and tannins.

Keywords: *Argemone Mexicana,* Traditional medicine, Phytochemicals, alkaloids and flavonoids.

INTRODUCTION

Herbal medicine involves the use of medicinal plants for the prevention and treatment of illnesses: it spans from the traditional and folk medicines of various countries to the application of standardized and measured herbal extracts. Typically, a deep-rooted cultural connection and widespread usage in a Traditional Medical System may indicate safety. Remedies derived from herbs require a robust and thorough evaluation of their pharmacological properties and safety, which can be achieved through new biological technologies like pharmacogenomics, metabolomics, and microarray methods. Given the significant and increasing use of naturally derived substances globally, it is unwise to depend only on tradition or long-held beliefs; explanatory and practical studies are beneficial and should be seen as complementary in gathering reliable data for both healthcare providers and patients[1]. "Phyto" originates from Greek, meaning plant, and phytochemicals are generally associated with plant pigments. "Fight-o-chemicals" refers to phytochemicals that help defend your health. They exhibit complementary and overlapping mechanisms within the body, such as oxidant effects, modulation of detoxification enzymes, immune system stimulation, hormone metabolism regulation, and antibacterial and antiviral effects. To protect themselves from reactive oxygen species, plants have developed antioxidant compounds, including phytochemicals. Brightly colored fruits and vegetables such as those in yellow, orange, red, green, blue, and purple—typically contain the highest levels of phytochemicals and nutrients[2]. Argemone mexicana is a yearly herb commonly referred to as Mexican prickly poppy. It is part of the Papavaraceae family. Indigenous to tropical America, it has spread to tropical and subtropical areas worldwide. In India, it flourishes in temperate regions as a weed in wastelands, cultivation fields, and roadways. In traditional medicine, the entire plant of A. mexicana is widely employed for treating tumors, warts, skin conditions, inflammation, rheumatism, jaundice, leprosy, piles, worm infestations, and dysentery[3]. *Argemone Mexicana* is widely employed in traditional healing practices to address numerous

ailments. Various parts of the plant are extensively used in Ayurveda, Siddha, Unani, and homeopathy. It is known to possess antimicrobial properties, wound healing abilities, larvicidal and chemosterilant capabilities, nematicidal and allelopathic effects, alongside antimalarial, antibacterial, antifungal, molluscicidal, anticancer, hepatoprotective, anti-HIV, and neuropharmacological activity. Chemical analyses of this plant have identified the presence of alkaloids, amino acids, phenolics, and fatty acids. A. mexicana shows potential as an effective biocontrol agent[4]. The plant is employed in various regions worldwide for treating numerous ailments, including tumors, warts, skin affections, inflammation, rheumatism, jaundice, leprosy, microbial infections, and malaria. Notably, the plant yields a diverse range of chemical constituents, although alkaloids are predominantly present and Beyond therapeutic benefits[5]. Antimicrobial and cytotoxic assessments of the leaf extracts were executed using disc diffusion and brine shrimp lethality bioassay techniques, respectively, while an in vitro thrombolytic model was utilized to evaluate the clot lysis effect of the extracts, using streptokinase as a positive control. Antioxidant activity was assessed through free radical scavenging tests employing 2,2-diphenyl-1-picrylhydrazyl (DPPH) and nitric oxide (NO) assays, in addition to total phenolic content[6]. Herbal medicine consists of utilizing medicinal plants for preventing and treating diseases, encompassing a broad range from traditional practices to standardized herbal extracts. While deeply rooted cultural traditions and widespread practices in traditional medical systems may imply safety, the effectiveness of interventions, especially in herbal medicine, relies not only on tradition but also on the active principles present in minimal concentrations or mystical-energy principles. A significant challenge in herbal treatments is the inadequate information regarding extract composition, which necessitates an extensive evaluation of pharmacological properties and safety through advanced biological technologies like pharmacogenomics and metabolomics. Solely relying on tradition or ancient wisdom is not advisable given the increasing global utilization of natural substances, highlighting the need for explanatory and practical studies to collect reliable data for healthcare professionals and patients. The A. mexicana leaf and stems demonstrate significant antifungal and anticancer properties[7]. The potential effects of ethanolic and aqueous extracts of the aerial portions of Argemone mexicana Linn on glucose balance in acute normoglycemic and alloxan-induced hyperglycemic rats, including oral glucose tolerance tests[8]. The objective of the study is to identify new anticancer compounds from the indigenous plant, *Argemone mexicana* Linn, recognized for its traditional medicinal significance and varied pharmacological activities. The movement toward herbal medicine is prompted by the limitations of modern synthetic drugs, including symptomatic relief, incomplete treatment, adverse effects, and high costs. This research aims to conduct preliminary phytochemical screening, characterize the plants.

The separation depends on the different affinities of substances for both phases. The compounds in the mobile phase glide across the stationary phase's surface. The movement happens such that those compounds with a greater affinity for the stationary phase proceed slowly, while others move quickly. Hence, the mixture is separated. Once the separation process is finalized, the distinct components from the mixture show up as spots at their corresponding levels on the plates. Their characteristics and identities are determined through appropriate detection methods[9].

The retention factor is calculated as following formulae,

$$Rf = \frac{Distance\ travelled\ by\ the\ solute}{Distance\ traveled\ by\ the\ solvent}$$

In the field of chemistry, column chromatography is a method utilized to isolate particular chemicals from mixtures. It is commonly used on preparatory scales that range from micrograms to kilograms. A sample mixture is introduced into an adsorbent column, such as one filled with alumina or silica gel. An organic solvent or a blend of solvents (referred to as the eluent) is then passed through the column. The sample's components distribute themselves between the moving eluent and the stationary packing material (silica or alumina), leading to the separation of the constituents. Molecules with different polarities distribute themselves to varying extents, resulting in their movement through the column at different rates. The eluent is collected in fractions[10].

MATERIAL AND METHODS

Collection & Authentication of Plant:

The plant *Argemone mexicana* Linn. (Papaveraceae) was gathered from its natural environments in Jaibalaji nagar, Malaiadipudur, Sathyamangalam (TK), Erode (DT), Tamil Nadu during January 2024. Its identification was confirmed by Dr. K. Sangeetha, Assistant Professor, Department of Agronomy, J.K.K. Munirajah College of Agricultural Science, T.N.Palayam, Gobichettipalayam (TK), Erode (DT), Tamil Nadu, India.

Preparation of Plant Extracts:

50 grams of shade-dried root powder of Argemone mexicana Linn. was extracted using the hot continuous Soxhlet extraction technique. The plant material underwent successive extraction with petroleum ether (boiling point 60°C-80°C) and methanol (99.9% v/v) (500ml) for four days within a Soxhlet apparatus. This method involves the continuous circulation of the solvent through the extractor multiple times. The vapour released from the solvent is channelled into the condenser, where the liquid that forms is sent back to the extractor for continued extraction. The setup consists of an extractor body (thimble) linked to a lateral siphon tube, with the bottom end connected to a distillation flask and the opening of the extractor joined to the condenser using standard fittings. Porcelain beads were included in the round-bottom flask to prevent bumping. After assembling the extractor, the plant material was extracted until the solution's color in the siphon tube turned pale. The extracts were dried at room

temperature, and the yield was kept in an airtight container.

Table. 1: Percentage yield of roots on Argemone mexicana Linn

S. No	Solvent used	Theoretical yield (%w/w)
1	Petroleum ether	0.75
2	Methanol	5.80

Phytochemical Analysis:

The Root extracts of *Argemone Mexicana Linn* was subjected to a preliminary phytochemical evaluation to determine the presence of various phytoconstituents using the methods outlined in Khandelwal 2008.

In vitro Argemone mexicanna (AMET) Antioxidant activity:

The aqueous extract of Argemone mexicanna (AMET) was examined for in vitro antioxidant properties utilizing DPPH, ABTS, FRAP, and NO to assess the antioxidant capabilities of the Argemone mexicanna (AMET) aqueous extract. Furthermore, Argemone mexicanna (AMET) was evaluated using the DPPH assay.

Determination of DPPH radical scavenging activity:

The antioxidant effectiveness of the Argemone mexicanna (AMET) sample was evaluated for its free radical scavenging ability through DPPH (1, 1-Diphenyl-2-Picryl-Hydrazyl) free radicals (Brand-Williams et al., 1995). A volume of 100µL of the SC extract was placed in a microtiter plate. Then, 100µL of 0.1% methanolic DPPH was introduced to the samples and incubated in the dark for 30 minutes. The samples were subsequently observed for color change; discoloration from purple to yellow indicated strong positivity, while pale pink signified weak positivity. The absorbance was measured using an Elisa plate reader at 490nm. Ascorbic acid served as the reference standard. All analyses were conducted in triplicate, and the mean values were recorded.

Radical scavenging activity was determined using the equation:

$$\text{DPPH radical scavenging activity (\%)} = \frac{(Absorbance\ of\ control - Absorbance\ of\ test\ sample)}{(Absorbance\ of\ control)} \times 100$$

In vitro AMET Anti-inflammatory activity - Inhibition of albumin denaturation:

The reaction mixture was separately prepared by combining 0.5ml of the aqueous extract of AMET with its compounds A, B, and C (1mg/ml) and 0.45 ml of a 5% aqueous bovine albumin solution. The pH (6.3) of the solution was adjusted with a few drops of 0.1N HCl at 37 ˚C for 20 minutes, then heated to 57 ˚C for 30 minutes. The solution was cooled, transferred to 96 well plates, and the absorbance was recorded at 660nm. Diclofenac sodium (1000µg/ml) was used as a standard, and the control consisted of 0.05ml distilled water.

The percentage of inhibition of albumin denaturation was calculated using the formula,

$$\text{Percentage of inhibition (\%)} = \frac{(A\ control - A\ sample)}{(A\ control)} \times 100$$

Where A control represents the absorbance of the reaction mixture without the drug, and A sample signifies the absorbance of the reaction mixture with the sample.

RESULTS AND DISCUSSION:

Phytochemical Analysis:

Qualitative Analysis

Methanolic extract and Petroleum ether extract of roots on Argemone mexicana Linn was subjected to various chemical tests for detection of phytoconstituents and results obtained are illustrated in Fig.1 and Table 2. The phytochemical screening revealed that the crude petroleum ether extract of roots of Argemone mexicana contains flavonoids and steroids. The methanolic extract of Argemone mexicana roots contains glycosides, flavonoids, glycosides, alkaloids and Steroids.

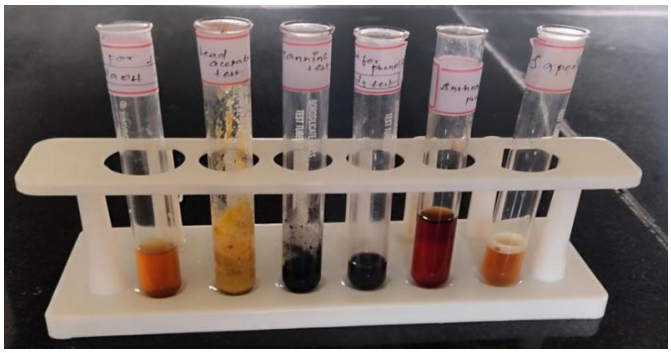

Figure 1: Phytochemical analysis of *Argemone mexicana* linn root

Table 2: Results of qualitative analysis of extracts of *Argemone mexicana* Linn root

S. No	Phytochemical Test	Petroleum ether extract	Methanolic extract
1	Alkaloids	-	+
2	Flavonoids	+	+
3	Tannins	_	+
4	Phenols	_	+
5	Glycosides	+	+
6	Proteins	_	+
7	Terpenoids	_	+
8	Saponins	_	-
9	Carbohydrates	_	+
10	Steroids	+	+

NOTE: (+) Present (-) Absent

Thin Layer Chromatography

The methanolic extract of Argemone mexicana Linn was subjected for Thin Layer Chromatography by using various solvent systems. The following solvent system showed 2 to 4 different spots with different Rf values on development. The results are showed in Table.3. The Thin Layer Chromatography of the methanolic extract of Argemone mexicana Linn root showed the maximum number of spots on solvent system Ethyl acetate: Methanol (4:2) using p-toluene sulphuric acid as detecting agent. The Rf values of the spots were found to be 0.42, 0.57, 0.71 and 0.96 respectively. It indicates the presence of flavonoids in the Methanolic extract of Argemone mexicana Linn root.

Table 3: Thin Layer Chromatography of Methanolic Extract of Argemone Mexicana Linn Root

Solvent system	No. of spots	Colour of spots	Detecting agent	Rf value
Toluene: Ethyl acetate (5:5)	2	Green Green	Iodine chamber	0.72 0.88
Ethyl acetate: Methanol (3:7)	1	Brown	Iodine chamber	0.89
Ethyl acetate: Methanol (4:2)	4	Brown Brown Brown Brown	P-Toluene sulphuric acid	0.42 0.57 0.71 0.96
Toluene: Chloroform: Acetone (4:2.5:5)	1	Green	P-Toluene sulphuric acid	0.73
Benzene : Ethyl acetate (7.5:2.5)	2	Brown Brown	Iodine chamber	0.59 0.72
Benzene: Ethyl acetate: Diethylamine (7:2:1)	3	Brown Brown Brown	Iodine chamber	0.29 0.65 0.78

Column Chromatography

The methanolic extract of Argemone mexicana Linn was subjected for Column Chromatography by using various solvent systems. The results are showed in Table.4. Upon performing TLC from the fraction of 89-92 using Antimony III Chloride as the detecting agent, it showed the maximum number of spots on solvent system Benzene: Ethyl acetate: Diethylamine (8:2). The Rf values of the spots was found to 0.89, 0.76.

Table 4: Fraction collected from Column Chromatography of Methanolic Extract of Argemone Mexicana Linn Root

S. No	Fractions	Eluent	Ratio	Nature of residue	No of spot in TLC	Rf value	TLC eluting solvent system
1	4	Pet.Ether	100	Colourless	--	--	Ethyl acetate: Methanol
2	5-8	Pet.Ether: Benzene	9 : 1	Colourless	--	--	Ethyl acetate: Methanol
3	9-12	Pet.Ether: Benzene	8: 2	Colourless	--	--	Ethyl acetate: Methanol
4	13-16	Pet.Ether: Benzene	7 : 3	Colourless	--	--	Ethyl acetate: Methanol
5	17-20	Pet.Ether: Benzene	6 : 4	Colourless	--	--	Ethyl acetate: Methanol
6	21-24	Pet.Ether: Benzene	5 : 5	Colourless	--	--	Ethyl acetate: Methanol
7	25-28	Pet.Ether: Benzene	4 : 6	Colourless	--	--	Ethyl acetate: Methanol
8	29-32	Pet.Ether: Benzene	3 : 7	Colourless	--	--	Ethyl acetate: Methanol

9	33-36	Pet.Ether: Benzene	2 : 8	Colourless	--	--	Ethyl acetate: Methanol
10	37-40	Pet.Ether: Benzene	1 : 9	Colourless	--	--	Ethyl acetate: Methanol
11	41-44	Benzene	100	Colourless	--	--	Ethyl acetate: Methanol
12	45-48	Benzene: Chloroform	9 : 1	Light green colour	1	0.90	Ethyl acetate: Methanol
13	49-52	Benzene: Chloroform	8: 2	Green colour	1	0.89	Ethyl acetate: Methanol
14	53-56	Benzene: Chloroform	7 : 3	Green colour	--	--	Ethyl acetate: Methanol
15	57-60	Benzene: Chloroform	6 : 4	Light Green colour	--	--	Ethyl acetate: Methanol
16	61-64	Benzene: Chloroform	5 : 5	Yellowish Green colour	--	--	Ethyl acetate: Methanol
17	65-68	Benzene: Chloroform	4 : 6	Faint yellow colour	--	--	Ethyl acetate: Methanol
18	69-72	Benzene: Chloroform	3 : 7	Colourless			Ethyl acetate: Methanol
19	73-76	Benzene: Chloroform	2 : 8	Colourless	--	--	Ethyl acetate: Methanol
20	77-80	Benzene: Chloroform	1 : 9	Colourless	--	--	Ethyl acetate: Methanol
21	81-84	Chloroform	100	Colourless	--	--	Ethyl acetate: Methanol
22	85-88	Chloroform: Methanol	9 : 1	Light yellow colour	1	0.90	Ethyl acetate: Methanol
23	89-92	Chloroform: Methanol	8: 2	Yellow colour	2	0.89 0.76	Benzene: Ethyl acetate: Diethylamine
24	93-96	Chloroform: Methanol	7 : 3	Yellow colour	1	0.78	Benzene: Ethyl acetate: Diethylamine
25	97-100	Chloroform: Methanol	6 : 4	Light yellow colour	--	--	Benzene : Ethyl acetate: Diethylamine
26	101-104	Chloroform: Methanol	5 : 5	Faint Yellow colour	--	--	Ethyl acetate: Methanol
27	105-108	Chloroform: Methanol	4 : 6	Colourless	--	--	Ethyl acetate: Methanol
28	109-112	Chloroform: Methanol	3 : 7	Colourless	--	--	Ethyl acetate: Methanol
29	113-116	Chloroform: Methanol	2 : 8	Colourless	--	--	Ethyl acetate: Methanol
30	117-120	Chloroform: Methanol	1 : 9	Colourless	--	--	Ethyl acetate: Methanol
31	121-124	Methanol	100	Colourless	--	--	Ethyl acetate: Methanol

Infra-Red Spectroscopy

The methanolic extract of Argemone mexicana Linn was subjected for Infra Red Spectroscopy. The results are showed in Fig.5 and Table.5. IR spectra of the isolated compound Methanolic Extract of Argemone Mexicana Linn Root was carried out and data showed the presence of phenolic O-H at 3388.77 cm-1, C-H methylene stretch at 2983.01 cm-1, C-H stretching vibration at 2827.74 cm-1, functional group ketone at 1720.56 cm-1, quinone functional group at1652.09 cm-1, aromatic ring stretch at 1511.28 cm-1, O- H bending at 1401.33 cm-1, alcoholic O-H out of plane bend at 669.32 cm-1.

Table 5: IR spectral data of Methanolic Extract of *Argemone Mexicana* Linn Root

S. No	Functional groups	Frequency cm-1
1	Phenolic O-H	3388.77cm-1
2	C-H methylene stretch	2983.01cm-1
3	C-H Stretching vibration	2827.74cm-1
4	Ketone group	1720.56cm-1
5	Quinone	1652.09cm-1
6	Aromatic ring stretch	1511.28cm-1
7	O-H bending	1401.33cm-1
8	Alcoholic O-H out of plane	669.32cm-1

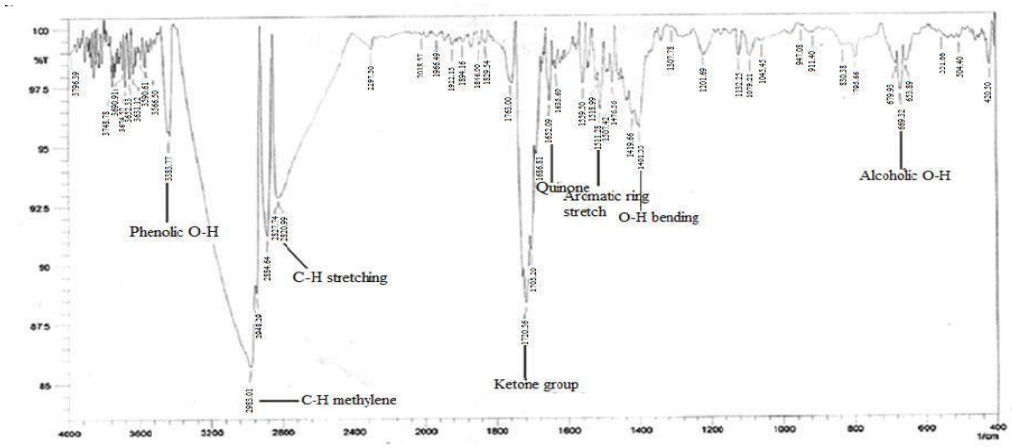

Figure 2: IR Spectrum of Methanolic Extract of Argemone Mexicana Linn Root

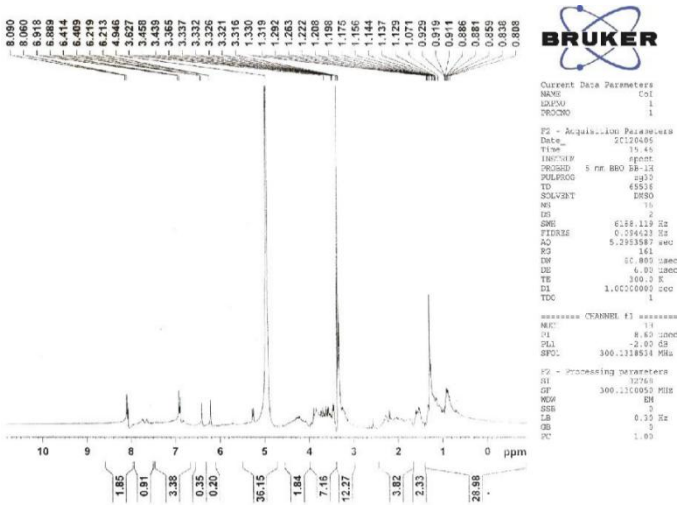

Figure 3: NMR Spectrum of Methanolic Extract of *Argemone Mexicana* Linn Root

In vitro antioxidant and anti-inflammatory activity of Argemone Mexicana:

The ethanolic root extract of Argemone mexicana (AMET) juice has shown anti-inflammatory and antioxidant properties. Argemone mexicana (AMET) powder extract has shown in vitro antioxidant activity by DPPH assay in the current investigation. At 400 mg/ml AMET, the inhibition percentage is 76% (Table 7), and the IC_{50} value was found to be 109.2829 mg/ml compared to the standard ascorbic acid IC_{50} value of 33.7334 mg/ml (Table 8). As a result, antioxidant activity is significant compared to the standard ascorbic acid vitamin C (Fig. 6). A previous paper reported that the root

extract exhibited the highest flavonoid levels. Antioxidant potential displayed dose-dependent behavior, peaking at 17.37±1.86% at 1000 µg/ml, though lower than ascorbic acid's 29.83±8.9% at the same concentration. The IC50 values of the root extract and ascorbic acid were reported as 451.26 and 137.78 µg/ml, respectively (Rakesh, S., Kumar, A., and Roy, A., 2023). The inhibition of the albumin denaturation method was used to measure the anti-inflammatory activity in vitro. In comparison to standard diclofenac sodium, neither the crude extract AMET nor its separated constituents exhibit any appreciable anti-inflammatory efficacy. When compared to standard diclofenac sodium, the aqueous extracts of AMET exhibit moderate anti-inflammatory efficacy. At 100 mg/ml, AMET had a 58.5% (Table 9) IC_{50} value of 124.5701 mg/ml compared to the standard diclofenac sodium IC_{50} value of 121.29 mg/ml (Table 10). A previous paper reported that the ethanol extract of the roots of A. mexicana was studied in mice and rats, respectively. These results correlate with the traditional use of the plant by the traditional medical healers and support the use of the plant in the management of inflammation and skin diseases. (Ibrahim, H.A., et al. 2016) While we were carrying out different concentrations in a dose-dependent way and comparing them with the standard, many of them showed the antioxidant and anti-inflammatory properties of AMET. Overall investigation results, such as AMET, had significant antioxidant and good anti-inflammatory activity. (fig 7). *Argemone mexicana* root extracts' potential in pharmacology for tackling oxidative stress and inflammation.

Table 7: AMET In-vitro antioxidants activity by DPPH assay

S.No	Concentration(mg)	COD	SOD	%inhibition	Average (%)	IC50(mg/ml)
1	100 mg	0.28	0.06	78%	72.5%	109.2829 mg/ml
2		0.28	0.09	67%		
3		0.28	0.08	71%		
4		0.28	0.07	75%		
5		0.28	0.08	71%		
6		0.28	0.06	78%		
1	200 mg	0.28	0.08	71%	69.5%	
2		0.28	0.08	71%		
3		0.28	0.08	71%		
4		0.28	0.09	67%		
5		0.28	0.08	71%		
6		0.28	0.09	67%		
1	300 mg	0.28	0.08	71%	73%	
2		0.28	0.05	82%		
3		0.28	0.09	67%		
4		0.28	0.09	67%		
5		0.28	0.07	75%		
6		0.28	0.06	78%		
1	400 mg	0.28	0.07	75%	76%	
2		0.28	0.06	78%		
3		0.28	0.07	75%		
4		0.28	0.05	82%		
5		0.28	0.07	75%		
6		0.28	0.08	71%		
1	500 mg	0.28	0.09	67%	69%	
2		0.28	0.07	75%		
3		0.28	0.08	71%		
4		0.28	0.10	64%		
5		0.28	0.09	67%		
6		0.28	0.08	71%		
In-vitro anti-oxidant activity compared to Standard vitamin C						
1	100 mg	0.36	0.02	94%	94%	
2		0.36	0.02	94%		
3		0.36	0.02	94 %		

Table 8: AMET ANTIOXIDANT IC_{50} VALUE (mg/ml) Compared to STANDARD VIT C IC_{50} VALUE (mg/ml)

S. No	Concentration (mg)	Average (%)	IC_{50} (mg/ml)
1	100 mg	72.5%	109.2829 mg/ml
2	200 mg	69.5%	
3	300 mg	73%	
4	400 mg	76%	
5	500 mg	69%	
Standard Ascorbic acid vitamin C			
1	50 mg	91%	33.7334 mg/ml
2	100 mg	87%	
3	150 mg	86%	
4	200 mg	92%	
5	250 mg	84%	

Table 9: AMET Invitro Anti inflammatory activity by the protein denaturation

S. No	Concentration(mg)	COD	SOD	%inhibition	Average(%)	IC_{50}(mg/ml)
1	100 mg	0.30	0.14	53%	58.5%	124.5701 **mg/ml**
2		0.30	0.11	63%		
3		0.30	0.12	60%		
4		0.30	0.13	56%		
5		0.30	0.11	63%		
6		0.30	0.12	60%		
1	200 mg	0.30	0.18	40%	41%	
2		0.30	0.17	43%		
3		0.30	0.16	46%		
4		0.30	0.19	36%		
5		0.30	0.17	43%		
6		0.30	0.18	40%		
1	300 mg	0.30	0.17	43%	41%	
2		0.30	0.19	36%		
3		0.30	0.18	40%		
4		0.30	0.18	40%		
5		0.30	0.16	46%		
6		0.30	0.17	43%		
1	400 mg	0.30	0.18	40%	49%	
2		0.30	0.10	66%		
3		0.30	0.15	50%		
4		0.30	0.15	50%		
5		0.30	0.17	43%		
6		0.30	0.16	46%		
1	500 mg	0.30	0.16	46%	43%	
2		0.30	0.17	43%		
3		0.30	0.18	40%		
4		0.30	0.16	46%		
5		0.30	0.17	43%		
6		0.30	0.18	40%		
Invitro Standard Diclofenac sodium						
1	100 mg	0.30	0.08	73%	75%	
2		0.30	0.07	76%		
3		0.30	0.07	76%		

TABLE 10: AMET ANTI-INFLAMMATORY ACTIVITY IC_{50} VALUE (mg/ml) Compared to STANDARD DICLOFENAC SODIUM IC_{50} VALUE (mg/ml)

S. No	Concentration (mg)	Average (%)	IC_{50} (mg/ml)
1	100 mg	58.5%	124.5701mg/ml
2	200 mg	41%	
3	300 mg	41%	
4	400 mg	49%	
5	500 mg	43%	
Standard Diclofenac sodium			
1	50 mg	91%	121.29mg/ml
2	100 mg	93%	
3	150 mg	85%	
4	200 mg	89%	
5	250 mg	88%	

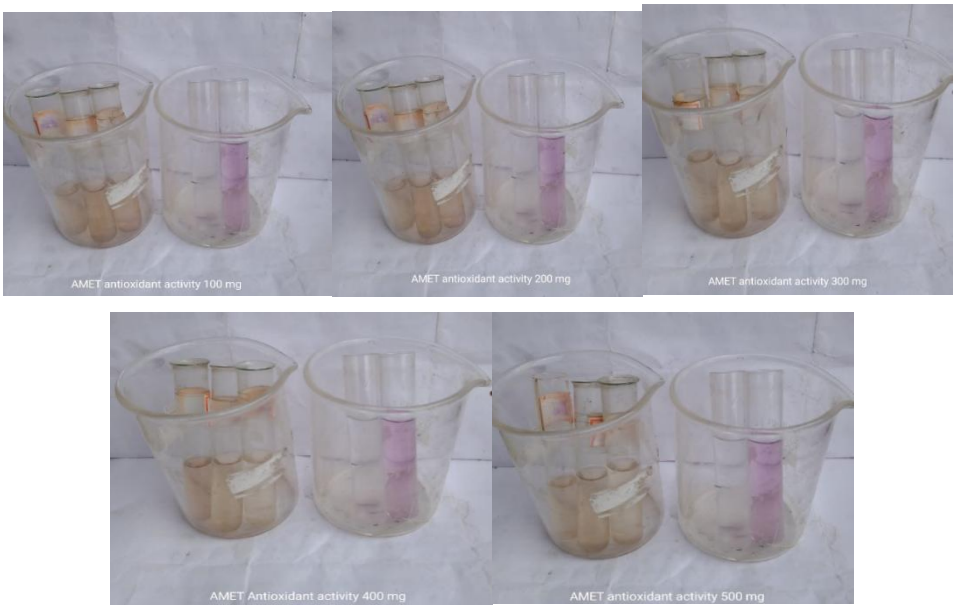

Figure 4: In vitro AMET antioxidant activity by DPPH assay

Figure 5: Invitro AMET anti-inflammatory activity by protein denaturation method

CONCLUSION:

A variety of herbs and herbal extracts contain different phytochemicals with biological activity that can be of valuable therapeutic index. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. The phytochemical screening revealed that the crude petroleum ether extract of root of *Argemone mexicana* Linn contains Flavonoids and Steroids. The methanolic extract of *Argemone mexicana* roots contains Glycosides, Flavonoids, Alkaloids and Steroids. Characterisation of the methanolic extract of *Argemone mexicana* Linn root done by Thin layer chromatography, column chromatograph, IR and NMR spectroscopy to identify the flavonoids in the methanolic extract of *Argemone mexicana* Linn root. The ethanolic root extract of *Argemone mexicana* exhibits significant antioxidant activity and moderate anti-inflammatory activity, as determined by Pharmacological evaluation.

Conflict of Interest Regarding the research authorship and/or publication of this paper, the author(s) have stated that they have no potential conflicts of interest.

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