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Phytochemical Screening and in Vitro Anti Arthritic Activity of Arundo Donax Plant

Kanchan Sahni[1], Mrs. Amrita Bhaiji[2] , Prof. (Dr.) Manisha Tandon[3]

[1]Research Scholar Department of Pharmacognosy RKDF College of Pharmacy, Bhopal (M.P.), 462047
[2]Associate Professor Department of Pharmacognosy RKDF College of Pharmacy, Bhopal (M.P.), 462047
[3]Professor Department of Pharmacognosy RKDF College of Pharmacy, Bhopal (M.P.), 462047

ABSTRACT
Arundo donax L. (Giant reed) is a perennial and rhizomatous plant that belongs to the Poaceae family and one of the most widespread species of the genus Arundo. The plant is of general occurrence across the globe. It has been included amongst the worst invasive species of the world because it displaces the native flora and deteriorates the ecological state of lands wherever it grows. The plant also possesses several medicinal properties, and therefore, has traditionally been used by several ethnic groups across the world to cure various ailments. According to the World Health Organization (WHO), almost 80% of the world's population relies on indigenousmedicinal plants to cure diseases . With the immense existing potential and rich knowledge about medicinal plants at the ethnic level, the ethnomedicinal system has reinforced the discovery of several therapeutically important drugs such as Quinine and Artemisinin from the Amazon and China, respectively. Thus, the present study aimed to summarize the existing knowledge of ethnomedicinal uses, phytochemistry, and pharmacological aspects of A. donax L. This research hopefully will provide baseline information for other researchers who intend to work on this plant.

KEYWORDS: Arundo Donax Plant Ethnomedicinal values Pharmacology Phytochemistry Giant reed.

INTRODUCTION

"Arthritis" is a combinatorial word originated by the mixing of Latin and Greek. In Greek, "Arthron" signifies joint and in Latin "Itis" specifies inflammation. Thus arthritis is normally viewed as a disease caused as a result of inflamed joints. Inherently, it is not just a single disease rather a collection of medical problems collectively termed as "Arthritis". Nearly 47 million adults and 300,000 children suffer in the US alone . The disease can incapacitate permanently if proper treatments are not provided in time. Globally, it imposes a huge financial burden through wage loss along with the cost of medications . Several treatment pathways are now available just to control the disease but no imminent cure is found yet. For proper understanding about the disease, it is worthy to know the mechanics of a bone joint. Usually, when a bone moves or twists on similar piece(s) to maintain the functional flexibility, it is then characterized as a joint. During movement the ligaments act as elastic bands to help keep the bones in the same place.

MATERIALS AND METHODS

COLLECTION OF PLANT

The fresh plant materials of collected from the region in Uttar Pradesh. It was washed, dried under shade, and sieved for making dust-free and kept at room temperature or shade

EXTRACTION PROCEDURE

Using a cold extraction procedure, the prepared leaf were extracted twice using methanol (10:2 mL/kg). The samples were placed in the solvents and shaken frequently for approximately three days at room temperature. Each and every extract was concentrated using a rotary evaporator at 40 °C after being vacuum-filtered via Whatman No. 1 filter paper. For additional research, the crude extracts were stored in new vials and chilled at 4oC.

PHYTOCHEMICAL SCREENING OF THE EXTRACTS

The phytochemicals screening of the various solvents extract were carried out using standard procedures.

TEST FOR GLYCOSIDES

Small amount of the extracts was put in 1 mL of water in a test tube followed by the addition of 1 mL of NaOH. A yellow precipitate indicates the presence of glycosides.

TEST FOR PHENOLS

The extract (5mg) was dissolved in distilled water and 3 mL of 10% lead acetate solution was added. A bulky white precipitates indicated the presence of phenols.

TEST FOR FLAVONOIDS

A few drops of concentrated hydrochloric acid were added to a small amount of the extract. Immediate development of red colour indicates the presence of flavonoids.

TEST FOR SAPONINS

An amount 1 mL of each extract was diluted with distilled water to 20 mL and shaken in a graduated cylinder for 15 min. The formation of foam of about 1cm indicates the presence of saponins.

EVALUATION OF ANTI-ARTHRITICS ACTIVITY

PROTEIN DENATURATION

The Mizushima and Kobayashi (1968) denaturation of proteins method was used to perform the in vitro anti-arthritic experiment. The resulting mixture (5 ml) contained 2 ml of extracts from plants at different doses (10, 20, 50, and 100 µg/L), 2.8 ml of phosphate-buffered saline (PBS, pH 6.4), and 0.2 ml of egg albumin. As a control, the same volume of double-distilled water is employed. After that, the combination was heated for five minutes at 70 °C after being incubated for fifteen minutes at 37 °C in a BOD incubator. Following cooling, the vehicle was used as a blank for assessing the absorbance at 660 nm.

RESULT & DISCUSSION

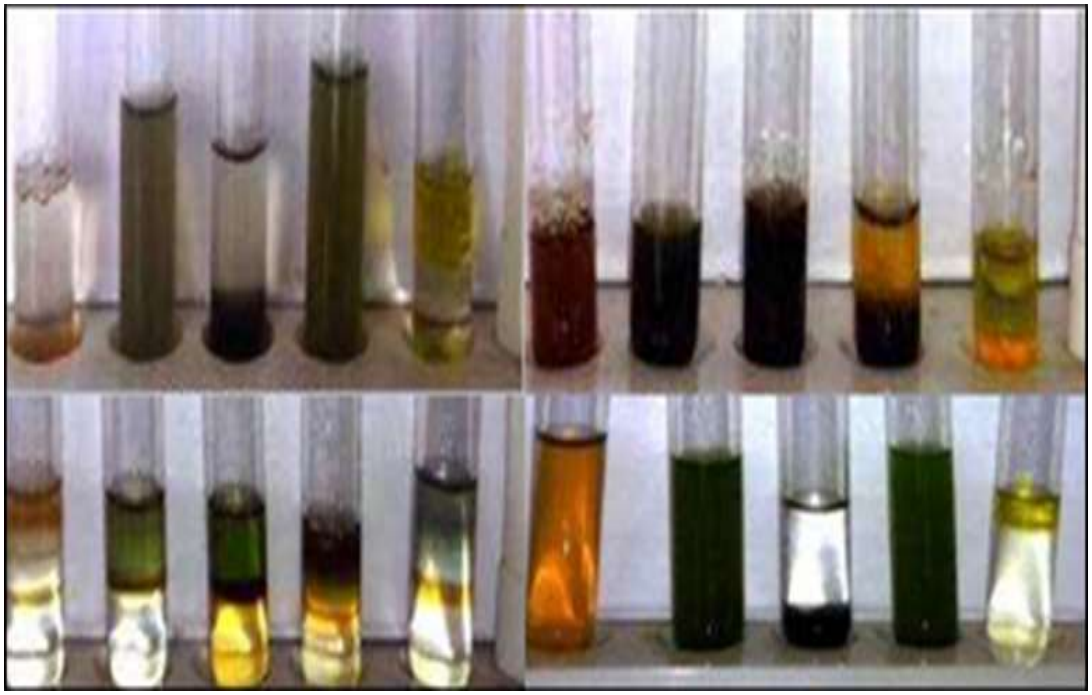


Table : Physiochemical analysis of the extract

A .Test for Alkaloids:		
1	Wagner's test	+
2	Dragendroff's test	+
3	Mayer's test	+
B .Test for Glycosides:		
1	Fehling's test	+
2	Legal's test	+
C .Test for Flavonoids:		
1	Shinoda test	-
2	Zinc chloride test	+
3	Alkaline reagent test	+
D .Test for Tannins		
1	Gelatin test	+
2	Ferric chloride test	+
E .Test for Protein and Amino		
1	Million's test	+
2	Ninhydrin test	+
3	Xanthoproteic test	+
4	Folin's test	+
F .Test of Fats and Fixed oil		
1	Stain test	+
2	Saponification test	+

G .Test of Triterpenoid		
1	Salkowski test	+
H .	Test for Gum and Mucilage	+
I .	Test for Phenolic	+
J .	Test for Steroid	+

Table Phytochemical investigation
Phytochemicals of Plant and fruits += Present;- = Absent

HPTLC AND TLC ANALYSIS OF EXTRACTS.

Using silica gel HPTLC plates, four different mobile phases previously described for the separation of flavonoids were tested: ethyl acetate: formic acid: water (6:1:1, v/v), ethyl acetate: formic acid: acetic acid: water (100:11:11:26, v/v), ethyl acetate: methyl ethyl ketone: formic acid: water (50:30

The newly created mobile phase ethyl acetate: methanol: formic acid: water (20:2.7:0.5:02 v/v) was the only one that permitted us to see variations between the extracts analyzed.

Regarding the use of these solvent solutions allows for excellent separation of flavonoids. (See Figures 7 and 8 for further information). This mobile phase is an improvement over the older approach described by Brasseur and Angenot, and it may eventually replace the approach specified in the European Pharmacopoeia's most recent edition. All of the species investigated contained Quercetin, Rutin, Luteolin, and Vitexin (Rf = 0.97, 0.53, 0.59, and 0.78, respectively). Rutin was found in the majority of the plant species as a typical compound. Various types of tryptamines viz.N, N–dimethyltryptamine, 5–methoxy–N, N–dimethyltryptamine, bufotenine, etc., have been isolated from the rhizome, which possesses mild psychedelic effects . A lectin isolated from the rhizome of Giant reed is reported to have anti-tumorous properties . Despite having immense ethnomedicinal importance, there is a lack of systematic account of the literature on Giant reed. To the best of our knowledge, no review article published till date highlighting its ethnomedicinal values and therapeutic potential.

The flavonoids contained in these plants are arranged in the following order: Rutin>Luteolin>Vitexin>Quercetin. The florescence bands of the majority of flavonoids are not visible at 254 nm, however they are visible at 366 nm.

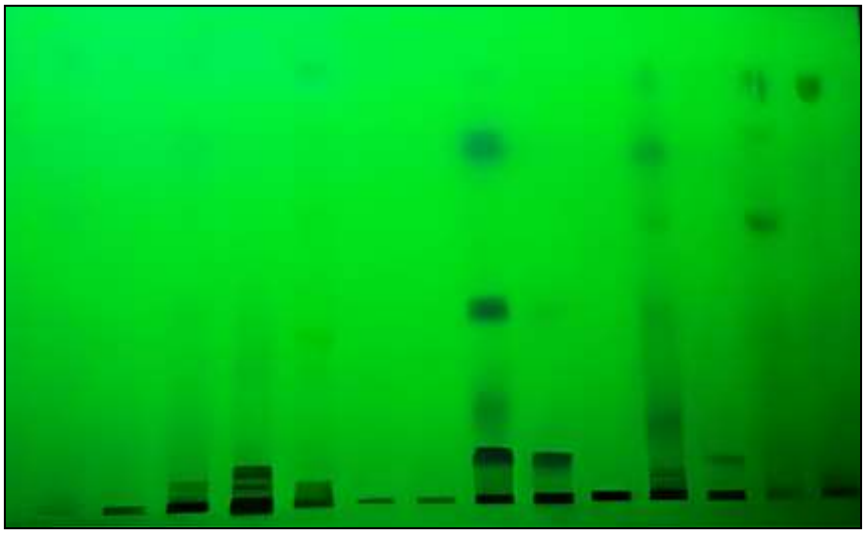
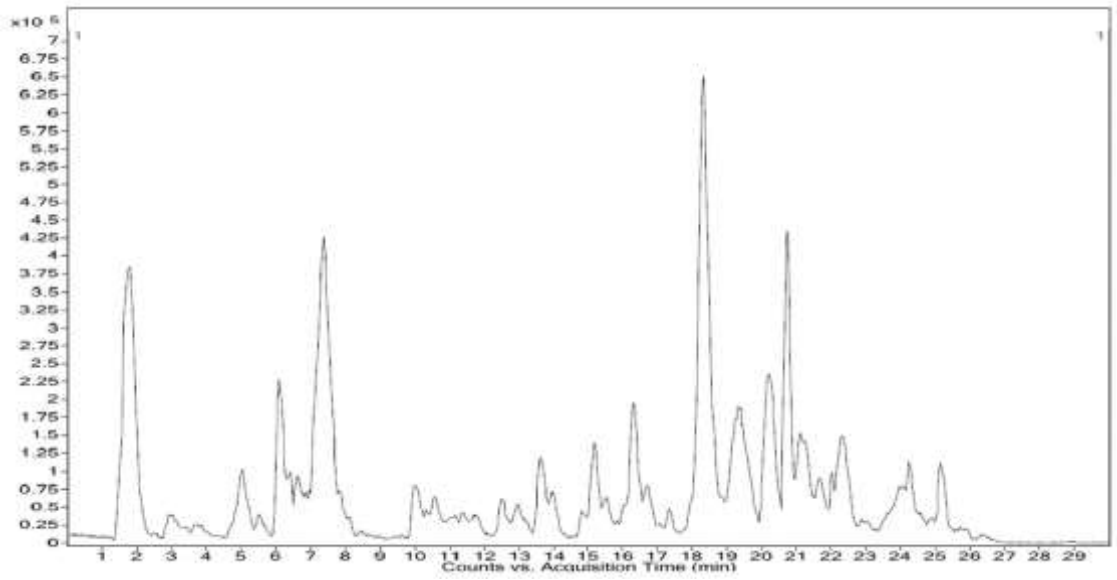


Figure : HPTLC fingerprint



ANTI-INFLAMMATORY ACTIVITY

PROTEIN DENATURATION

Arundo donex extract (µg/ml)	Percentage
0.01	19.29±1.34
0.1	19.58±0.62
1	20.71±0.66
10	22.43±1.32
100	23.73±3.36
1000	27.65±0.73

MEMBRANE STABILIZATION

S. no.	Arundo donex (µg/ml)	Percentage
1	10	44.05 ± 1.02
2	20	51.04 ± 0.59
3	50	57.34 ± 1.74
4	100	63.46 ± 1.23

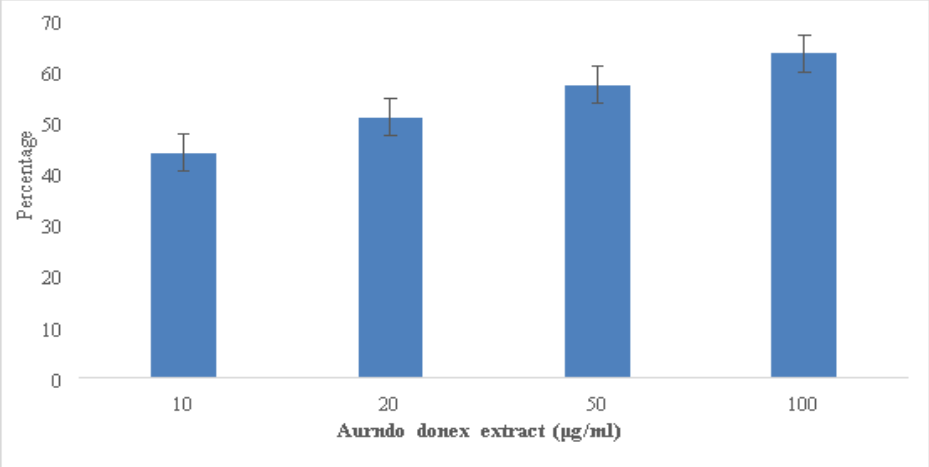
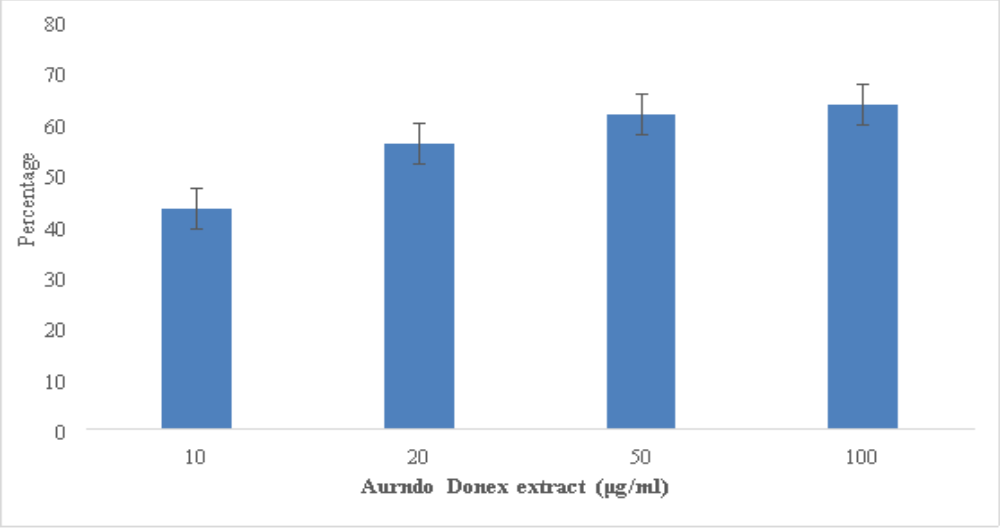


Figure : Graphical analysis of Membrane stabilization

GRAPHICAL ANALYSIS OF PROTEASE INHIBITOR.

S. no.	Arundo donex extract (µg/ml)	Percentage
1	10	43.35
2	20	56.12
3	50	61.69
4	100	63.79



DISCUSSION:

Inflammation is a complicated process that typically results in pain & comprises multiple events, including increased muscle permeability, granulocyte & mono nucleate cell movement, and granulomatous tissue development. (63 %) Despite the reality that we all feel pain, it is an unpleasant sensation that cannot be accurately measured. Both centralised mechanisms, which are activated by diverse pain perception input, and periphery sensory afferent neurons that are activated in sick situations may be involved in peripheral or neurological pain. Since the hot-plate paradigm has a variety of

benefits, such as sensitivity to potent antinociceptives and minimum tissue harm, it was chosen to research peripheral antinociceptive effect. The role of prostaglandins as well as bradykinins in pain has been hypothesised. Phenolic compounds are thought to decrease the synthesis of prostaglandins (64). Many phenolic compounds have been found to have analgesic effects. In additional studies, it has been demonstrated that a number of flavanoids, including rutin, quercetin, l have antinociceptive activities. An ethanol-based extract of Quisqualisindica included flavonoid and tannin, which may suppress prostaglandin and bradykinin production.

The peritoneum is known to create unpleasant compounds as a result of exposure to nociceptors acetic acid, which results in the wriggling reflex (65). The extract's resistance to noxious stimuli may mean that it prevented the production of irritants, which reduced the number of trembles in the animals. Prostaglandins are thought to sensitise, which is why chemical substances produce writhing.

CONCLUSION

The present study was aimed at the medicinal plants for the treatment of anti Artheritic activity.

Some of them are already reported as anti Artheritic activity drug, but for some still no work has been done and these are only used traditionally.

It is high time efforts should be made to use the vast ethno-pharmacological knowledge of our traditional practitioners to develop safer herbal preparations, for the people which will be less toxic and cheaper than the Modern day Medicaments.

In view of increasing popularity of alternative system of medicine, it is necessary to conduct research to support the therapeutic claim and also to ensure that the plants are given importance according to their therapeutic value, in modern herbal medicines.

Safety is not a matter of concern for these plants as it has been proved over the years by their traditional use. The point where more study is needed is to develop Standard Procedures for Standardization of Herbals.

Artheritic illness is still a common clinical concern in our society, affecting people of all ages.

Artheritic disease is predicted to continue to have a large global influence on health-care delivery, health economics, and patient quality of life as the prevalence of the illness rises with age. Anti Artheritic activity continues to be a problem in urban society. The majority of people who present with dyspepsia should be examined for Artheritic disease. Inflammation must be understood in order to determine which portion of the joint is most impacted by the etiologic agent of Artheritic disease.

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