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ANALYSIS OF BIOACTIVE COMPOUNDS AND IN VITRO ANTI-ARTHRITICS ACTIVITY OF Delonix elata LEAVES EXTRACT

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ABSTRACT

Plants are one of the economic sources of chemical intermediates needed for the production of a number of well-established and important drugs. A large number of medicinal plants have been tested and found to contain active principles with curative properties against arthritis. In order to investigate phytochemicals and in vitro anti-arthritics activity of *Delonix elata* leaves. Overall, it can be concluded from the present study that *Delonix elata* leaves contain a rich source of phytochemicals and exhibited the anti-arthritic activity. This study is the first scientific report that provides convincing phytochemicals and anti-arthritic activity evidence for the relevance of *Delonix elata* leaves thus providing scientific validity to its traditional consumption by the local populace of south India.

Keywords: *Delonix elata,* qualitative, quantitative and anti- arthritic.

INTRODUCTION

Arthritis is a disease condition that affects the musculoskeletal system, causing painful inflammation and stiffness around joints. In Greek “artho” means joint and “itis” means inflammation and so arthritis is a form of joint disorder that involves inflammation of joints. Arthritis is an umbrella term describing more than 100 recognized condition that collectively affect approximately 70 million adults and 3,00,000 children (Arthritis Foundation, 2005). Rheumatoid Arthritis (RA) is thought to affect approximately 1% of the population worldwide (Rajasekaran Aiyalu et al., 2016; Kelley et al., 1997), while osteoarthritis is the most common form of arthritis, affecting approximately 40 million in the US (Shaheen et al., 2021).

The medicinal value of plant lies in the phytochemical (bioactive) constituents of the plant which shows various physiological effects on human body. Therefore, through phytochemical screening one could detect the various important compounds which may be used as the bases of modern drugs for curing various diseases (Sheikh *et al*., 2013). Chemical compounds produced as a result of metabolic reaction during plant growth are known as phytochemicals. During stressful situations, the energy requirement of an organism is increased, resulting in enhanced generation of free radicals. A large number of medicinal plants have been tested and found to contain active principles with curative properties against arthritis. Keeping in view, the present study was to investigate the phytochemical and anti- arthritis activity of *Delonix elata* leaves extract.

MATERIALS AND METHODS

Collection of plant materials

The healthy leaves of Delonix elata were collected from Koradacheri, Thiruvaur district, Tamil Nadu, India.

Preparation of plant extract:

1 gram of the powder of *Delonix elata* leaves were transferred in to different conical flask (250ml). The conical flask containing 50ml of different solution (ethanol and water). The conical flask containing *Delonix elata* leaves were shaken well for 30 minutes by free hand. After 24 hrs, the extracts were filtered using Whatman filter paper No.1 and filtrate is used for further analysis.

Phytochemical screening

Chemical tests were carried out on the extract using standard procedures to identify the constituents as described by Sofowara (1993), Trease and Evans (1989) and Harborne (1973 and 1984). Total phenols estimated by the method of Edeoga *et al*., (2005). Flavonoid determine by the method of Bohm and Kocipai-Abyazan (1994).

Anti-arthritic activity

In vitro anti-arthritic activity was carried out by Sangita Chandra *et al*. (2012) using albumin method.

RESULTS AND DISCUSSION

Plants are naturally gifted at the synthesis of medicinal compounds, whose characterization has led to discovery of new, cheap drugs with high therapeutic potential (Ukwuani *et al*., 2013). In the present study was carried out on the *Delonix elata* leaves extract revealed the presence of medicinally active constituents. The phytochemical characters investigated and summarized in Table 1. The tannin, saponins, flavonoids, steroids, terpenoids, triterpenoids, polyphenol, glycoside, antroquinone and coumarins presence in both aqueous and ethanol extracts while alkaloids was absent in aqueous extract only. Table 2 shows the significant amount of flavonoids (40.00±1.24 mg/gm) and total phenol (347.00±2.86 mg/gm) were present in *Delonix elata* leaves. .

Table 1: Qualitative analysis of phytochemicals in *Delonix elata* leaves extract

S. No	Phytochemicals	Extracts	
		Aqueous	Methanol
1	Tannin	++	++
2	Saponin	++	++
3	Flavonoids	++	++
4	Steroids	++	+
5	Terpenoids	++	++
6	Triterpeniods	++	++
7	Alkaloids	-	++
8	Antroquinone	++	++
9	Polyphenol	++	++
10	Glycosides	++	++
11	Coumarins	++	++

(-) Indicates Absence; (+) Indicates Presence; (++) Moderately present

Plants are reservoir for potentially useful bioactive compounds, and owing to the rising occurrences of drug. Nowadays, in several countries of the world, traditional medicines are used as a substitute to conventional medicine (Ramawat and Mérillon, 2008). .

Table 2: Quantitaive analysis of phytochemicals in *Hemidesmus indicus* root powder

Phytochemicals	Result (mg/gm)
Flavonoids	80.00±4.19
Phenols	168.30±13.97

Value were expressed as Mean ± SD for triplicates

Anti-arthritis activity of *Delonix elata* leaves extract

There are certain problems in using animals in experimental pharmacological research, such as ethical issues and the lack of rationale for their use when other suitable methods are available or could be investigated. Hence, in the present study the protein denaturation bioassay was selected for in vitro assessment of anti-arthritic property *Delonix elata* leaves. Denaturation of tissue proteins is one of the well-documented causes of inflammatory and arthritic diseases. Production of auto antigens in arthritic diseases may be due to in vivo denaturation of proteins. The mechanism of denaturation probably involves alteration in electrostatic, hydrogen, hydrophobic and disulphide bonding (Grant et al., 1970). Agents that can prevent protein denaturation therefore, would

be worthwhile for anti-arthritic drug development. The increments in absorbance of test samples with respect to control negundoted stabilization of protein (Membrane stabilizing activity & bovine albumin) denaturation by and reference diclofenac sodium. *Delonix elata* leaves exhibited anti-arthritic activities in dose dependent manner (Table 3,4 and Figure 1 and 2).

The alcoholic *Delonix elata* leaves extract confirmed the anti-arthritic activity through inhibition of protein denaturation of Egg albumin and Bovine Serum albumin. The highest activity was 75.47±0.71 and 85.18±3.99 % for Egg albumin and Bovine Serum albumin respectively at 500µg/ml. The lowest activity was 12.59±0.24 and 12.69±3.17% for Egg albumin and Bovine Serum albumin respectively at 100µg/ml.

Table 3: *In vitro* anti-arthritic activity of *Delonix elata* leaves (Egg albumin)

Concentrations (µg/ml)	*Delonix elata* leaves	Standard (Diclofenac sodium)
100	12.59±0.24	16.94±0.26
200	35.81±0.21	39.32±0.28
300	54.92±0.53	57.53±0.62
400	64.28±0.51	73.18±0.53
500	75.47±0.71	85.24±0.58

Values are expressed as Mean ± SD for triplicates

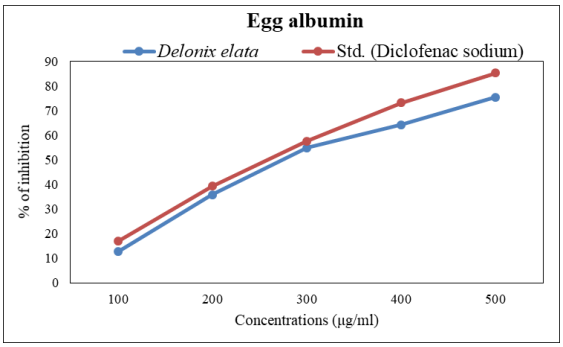

Figure 1: *In vitro* anti-arthritic activity of *Delonix elata* leaves (Egg albumin)

Table 4: *In vitro* anti-arthritic activity of *Delonix elata* leaves (Bovine Serum albumin)

Concentrations (µg/ml)	*Delonix elata* leaves	Standard (Diclofenac sodium)
100	12.69±3.17	19.74±0.34
200	41.44±4.76	44.11±0.42
300	57.14±3.17	63.57±0.40
400	76.19±3.17	81.39±0.37
500	85.18±3.99	93.77±0.55

Values are expressed as Mean ± SD for triplicates

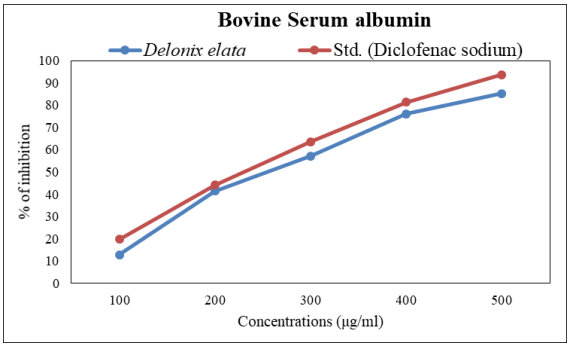

Figure 2: *In vitro* anti-arthritic activity of *Delonix elata* leaves (Bovine Serum albumin)

Amar et al (2014) reported that the in vitro anti-arthritic activity of *Cassia tora* Linn. Leaves using effect of membrane stabilization and protein denaturation using different concentration. The results are compared with standard drug. The aqueous extract of the selected medicinal plant showed significant activity. Anti- arthritic effect of *Cassia tora* Linn. Leaves were studied by testing various in vitro studies. The effect of the selected plant on inhibition of protein denaturation and effect of membrane stabilization was 87.22 % and 87.25% respectively for the aqueous extract of the selected plant leaves. He concluded that Cassia tora possessed marked in vitro anti-inflammatory effect against the denaturation of protein. Similarly our study *Ocimum sanctum* was concluded.

Susmitha Sudevan et al., (2015) investigation exposed that the extracts of *Acmella Oleracea* have potent phytochemical and anti-arthritic activity which explains its use in traditional system of medicines. The qualitative analysis of the extracts from the leaf sample of *Acmella Oleracea* showed the presence of phytochemical constituents such as tannins, saponin, flavonoids, steroid, lipids, amino acids and terpenoids. Hence, *Delonix elata* leaves can source of natural ant-arthritic that can serve as a substitute to conventional medicines.

CONCLUSION

Overall, it can be concluded from the present study that *Delonix elata* leaves contain a rich source of phytochemicals and exhibited the anti-arthritic activity. This study is the first scientific report that provides convincing phytochemicals and anti-arthritic activity evidence for the relevance of *Delonix elata* leaves thus providing scientific validity to its traditional consumption by the local populace of south India..

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