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PHARMACOLOGICAL STUDIES AND PHYTOCHEMICAL ANALYSIS OF METHANOLIC LEAF EXTRACTS OF *CYNARA SCOLYMUS*

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ABSTRACT

Cynara scolymus L. (Artichoke) is a traditionally consumed Vegetable in many countries. Both experimental and clinical effects have been verified through extensive biomedical herbal remedy research. In animal studies, liquid extracts of the leaves of artichoke have demonstrated an ability to protect the liver, and possibly even to help liver cells regenerate. The present study is an attempt to investigate the phytochemical composition and pharmacological action of *C.scolymus L.* The result reveals the presence of bioactive constituents comprising flavonoids, total phenolic compounds, saponins and total proteins, carbohydrates, lipids and vitamin C in plant parts. This article intends to review the wide ranging pharmacological effects and phytochemical activity of artichoke.

Keywords: *Cynara scolymus L.*, Pharmacological, Phytochemical activity.

INTRODUCTION

Cynara scolymus the actual artichoke plant - is one of the oldest known cultivated plants in the world with a 2000-year history. It is a tall thistle-like plant of the compositae family and is related to the better known Milk thistle-Silybum marianum. *C.scolymus* leaves extracts have long been used in folk medicine for their choleric and hepatoprotective activities, primarily for enhancing liver function and to treat chronic liver and gall bladder diseases, jaundice, hepatitis, arteriosclerosis and symptoms of diabetes, that are often related to the cynarin content [1-3]. Historically, this plant has been used in folk medicine since Roman times, for its health benefits which are mainly due to high content of polyphenols and inulin [4,5]. These substances are very important for the human nutrition since they are involved in the prevention of cancer [6]. Among the common edible plants, it is the richest source of dietary antioxidants [7] therefore it could be used in phytopharmaceutical applications.

Collection of plant material:

Fresh leaves of *cynara scolymus* was collected from the herbal garden of Tirunelveli district of Tamil Nadu during the month of December 2018. The plant material was identified and authenticated by Dr. J. Jayaraman, Director, Plant Anatomy Research Centre, West Tambaram, Chennai. Voucher specimen (No. PARC/2018/523) was preserved for future references.

Macroscopic evaluation:

Cynara scolymus is a perennial growing to 1.4 – 2 m in tall with arching, deeply lobed, silvery, glaucous-green leaves 50-80 cm in long . a flower developed in a large head from an edible bud about 8-15 cm in diameter with numerous triangular scales; the individual florets are purple. The edible portion of the buds consist primarily of the fleshy lower portions of the involucre bracts and the base, known as the “heart”; the mass of immature florets

in the center of the bud is called the “choke” (Fig 1).

Physicochemical activity:

Physicochemical parameters of the powdered drug were determined and reported as total ash, moisture content, total protein value, total carbohydrate, lipid content and vitamin c. These are determined by standard procedure(8).

Heavy metal content of artichoke:

The presence of heavy metals in various herbal ingredients and products has been reported by several researchers [9]. These reports throw light on the fact that medicinal plants which are considered harmless and are used as starting material for any herbal product may also contain toxic metals.

PHARMACOLOGICAL VALUES

Cynara scolymus is a useful medicinal plant which gave benefit in different fields of medicines. Nearly, all parts of the plant have some pharmacological properties. This review deals with the different pharmacological activity of plant.

HEPATOCURATIVE ACTIVITY

Hepatocurative effects of *C. scolymus* leaf extract on carbon tetrachloride (CCl₄)-induced oxidative stress and Hepatic injury in rats were investigated .results indicated that *C. scolymus* leaf extract has hepatocurative effects ofOn CCl₄-induced oxidative stress andhepatic injury by reducing lipid peroxidation, providing affected antioxidant systems towards the normal range.

CHOLERETIC EFFECT

The choleric effect of expressed juice from fresh artichoke was investigated in isolated perfuse rat liver. Expressed juice, undiluted and diluted 1:3 and 1:5, produced dose-dependent increase in bile flow of up to 150%, 125% and 112% respectively detectable 20 minutes after addition and reaching maximum value10 minutes later. Bile acid production remained almost unchanged. By testing fractions of the juice, it was shown that phenolic constituents were mainly responsible for the choleric action the strongest effects on both choleresis and bile acid production being exerted by mono-and dicaffeoylquinic acid.

HEPATOPROTECTIVE ACTIVITY

The hepatoprotective activity of cynarin against carbon tetrachloride (CCl₄)-induced toxicity in isolated rat

hepatocytes was compared with other phenolic compounds. Only cynarin and, to a lesser extent, caffeic acid showed a cytoprotective effect.

LIPID LOWERING AND ANTI ATHEROGENIC ACTIVITY

Powdered artichoke aerial parts, administered orally at 110 mg/kg body weight for 120 days to rats fed on an atherogenic diet, lowered increases in serum and liver cholesterol and prevented the formation of atherosclerotic After 60 days on an atherogenic diet, 110 mg/kg body weight of powdered artichoke aerial parts, administered orally to rats daily for 10 weeks, lowered serum cholesterol by 36% compared to 25% in the control group[10].

ANTIOXIDANT AND CYTOPROTECTIVE EFFECTS

Antioxidant and cytoprotective effects of an artichoke leaf aqueous dry extract (DER 4.5:1) were demonstrated in primary cultures of rat hepatocytes exposed to t-butyl hydro peroxide (t-BHP). When added simultaneously or prior to t-BHP, the extractinhibited lipid peroxidation in a concentration-dependent manner down to 0.001 mg/ml.

PHYTOCHEMICAL EVALUATIONS

Cynara scolymus contain different phytochemical compounds.The total phenolic contents in plant parts were determined by spectrophotometrically according to Folin-Ciocalteu method. Gallic acid was used to set up the standard curve. The content of phenolic compounds of the samples was expressed as gallic acid equivalents (GAE) in mg/gram dry weight. The AlCl₃ method [11] was used for quantification of the total flavonoid content of the plant parts. The absorbance was determined using spectrophotometer at λ_{max}=415 nm. Flavonoid contents were expressed as quercetin equivalents in mg/g dry material [12]. All the samples were analyzed in triplicates. Data are presented as means and standard errors of the mean.

The parts of *C.scolymus* showed either presence or absence of different phytochemicals. The preliminary phytochemical analysis showed that phenolic compounds, flavonoids and saponins were present in all parts of the plant, but absent coumarins, alkaloids and tannins.The leaves of *C. scolymus* L. have high quantity of total phenolic compound (50 GAE, mg/g).

Table 1: Physicochemical contents

Sl.no	CONTENT	VALUE
1	Ash value	7.9+0.7
2	Moisture %	5.5+0.05
3	Total protein %	12.6

4	Lipid%	0.1
5	Vitamin c,mg%	16.0
6	Total carbohydrate %	56.9

Table 2: Heavy metal content of artichoke

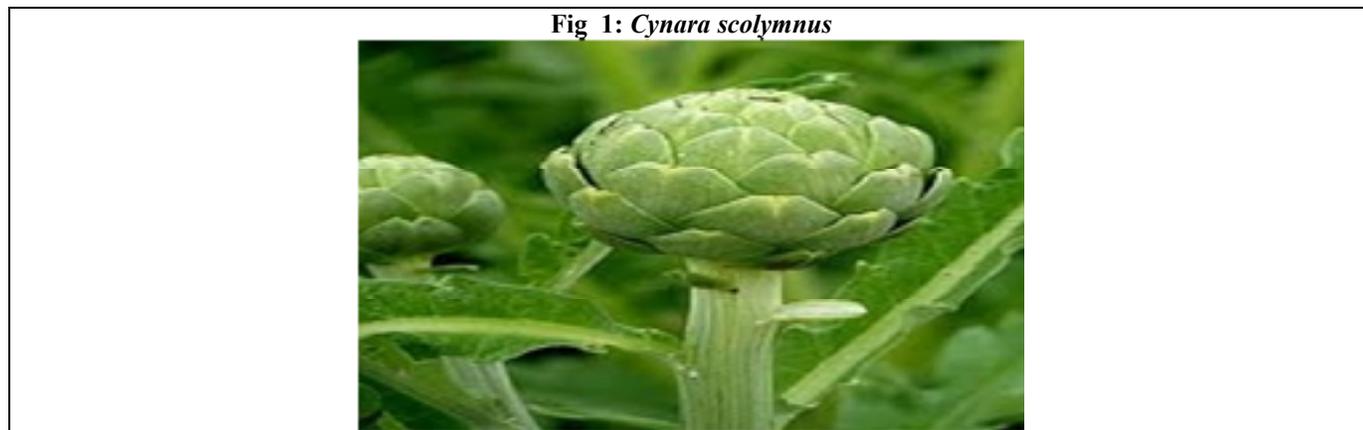
Sl.no	HEAVY METALS	CONTENT
1	Potassium	3396± mg/100g
2	Iron	0.32±0.05mg/100g
3	Lead	0.82±0.09mg/kg
4	cadmium	0.10±0.02mg/kg
5	Nitrate	1.9-17.5mg/kg
6	Nitrite	0.09-0.24mg/kg

Table 3: Phytochemical screening of *C. scolymus*

Sl.no	Phytochemical compound	In artichoke
1	Phenolic compound	+
2	flavinoids	+
3	alkaloids	-
4	Saponins	+
5	Tanins	-
6	Coumarins	-

Table 4: phytochemical analysis of *C. scolymus*

Sl.no	Phytochemical compound	Content
1	Total phenolic compound GAE,mg/gram	50
2	Flavonoids %	0.15±0.02
3	Saponins%	2.9±0.05

Fig 1: *Cynara scolymus***CONCLUSION**

The use of plant extracts to cure many diseased conditions has been the traditional method in many parts of the world. The plant extracts are found to be effective in their mode of action and do not cause any side effects to the patient treated. The above review reveals that the *C. scolymus* is a source of pharmacologically and

medicinally bio-active compounds and has wide variety of physiological and pharmacological effects; hence, this drug encourages finding its new therapeutic applications. Future directions will entail studies on its pharmacology using animal models and isolated bioactive compounds. Further studies on this plant must be carried out to explore some other important, necessary, and unknown benefits.

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