

## Artichoke, the ancient hepatic friend and the promising multifunctional therapeutic agent.

Shaimaa Ahmed Sharaf El-Deen\*

Parasitology Department, Faculty of Medicine, Menoufia University, Egypt

Accepted on September 26, 2017

### Introduction

Artichoke is an anciently used medicinal plant that proved many beneficial properties related to gastrointestinal tract especially liver and gall bladder [1]. Extracts of its parts – either leaves, roots or even the edible parts– were very effective anti-fibrotic agents in many conditions that end with liver fibrosis e.g. carbon tetrachloride toxicity, lead toxicity or alcoholic steatohepatitis. It worked effectively regardless the time of its use, either as a pre-, concurrent or post toxicity treatment [2-7]. It even worked invitro protecting the cultured hepatocytes from the oxidative stress of hydrogen peroxide [8]. Most of these studies regarded its action to the anti-oxidant role of artichoke that could protect the hepatocytes from the damaging action of those agents. Liver protection was assessed by significantly improved liver enzymes and histological structure of the liver in groups that received artichoke extracts.

The antioxidant action was not the only mechanism of action in its potential hepatoprotection. A recent study by Sharaf El-Deen et al., [9] reported an antifibrotic action of artichoke leaf extract (ALE) that extended beyond the anti-oxidant action to involve the recruitment of hepatic stellate cells (HSCs). We reported that ALE was responsible for changing the site of recruitment of HSCs from the periphery of *Schistosoma mansoni* induced liver granuloma to inhabit their whole center. This change could markedly reduce the size of hepatic granulomas preserving more surface area of a healthy liver tissue thus compensating for the main defect of the official anti-schistosomal therapy, praziquantel that lacks antifibrotic action at its antihelminthic dose.

Benefits of artichoke didn't only involve the liver but also extended to many vital metabolic processes of the body. Its use markedly improved lipid profile and glucose tolerance. These actions were regarded to the high inulin content of this plant that caused delayed gastric emptying and modulated gastric hormones e.g. glucagon like peptide-I [10]. Its role as a regulator of metabolic syndrome was also proved by Villiger et al., [11]. They reported that ALE was effective inhibitor of the blood pressure regulating enzyme, angiotensin converting enzyme (ACE). They related this effect to artichoke induced hydrolysis of ACE.

Ben Salem et al., [12] reported an antidiabetic effect of artichoke. They regarded their results to its protecting effects on pancreatic  $\beta$ - cells and enhancement of their regeneration in addition to its stimulation to insulin release from cells that survived damage by the diabetes inducing agent, alloxan.

Immune stimulating role of the Jerusalem strain of artichoke was even proved in some studies. Fish bred on artichoke

supplemented diet were significantly resistant to *Aeromonas hydrophila* than those who didn't receive that supplement [13].

This multifunctional herb also proved a role in fighting malignancy. Its apoptosis enhancing properties could decrease malignant cell viability and subsequently invasiveness and spread of colorectal and malignant pleural mesothelioma cancers [14,15]. It even worked at the genetic transcriptional level causing potent inhibitory effects on proliferation of either human K562 chronic myeloid leukemia or K562 imatinib resistant cell lines by affecting Bcr-Abl fusion gene [16]. All these data encourage more studies to reveal more secrets of this plant and introduce it to the applicable drug world. What is next? This is what the future will show.

### References

1. Kraft K. Artichoke leaf extract-Recent findings reflecting effects on lipid metabolism, liver, and gastrointestinal tracts. *Phytomedicine*. 1997;4(4):369-378.
2. Heidarian E, Rafeian-Kopaei M. Protective effect of artichoke (*Cynara scolymus*) leaf extract against lead toxicity in rat. *Pharm Biol*. 2013;51(9):1104-1109.
3. Mehmetçik G, Ozdemirler G, Koçak-Toker N, et al. Effect of pretreatment with artichoke extract on carbon tetrachloride-induced liver injury and oxidative stress. *Exp Toxicol Pathol*. 2008;60(6):475-480.
4. Abdel-Hamid NM, Nazmy MH, Wahid A, et al. Jerusalem artichoke attenuates experimental hepatic fibrosis via modulation of apoptotic signaling and fibrogenic activity. *Biochem Biotechnol Res*. 2015;3(3):43-50.
5. Abdel-Hamid NM, Wahid A, Nazmy MH, et al. Synergistic effects of Jerusalem artichoke in combination with pegylated interferon Alfa-2a and Ribavirin against hepatic fibrosis in rats. *Asian Pac J Cancer Prev*. 2016;17(4):1979-1985.
6. Colak E, Ustuner MC, Tekin N, et al. The hepatocurative effects of *Cynara scolymus* L. leaf extract on carbon tetrachloride-induced oxidative stress and hepatic injury in rats. *Springer Plus*. 2016;5(1).
7. Rangboo V, Noroozi M, Zavoshy R, et al. The effect of artichoke leaf extract on alanine aminotransferase and aspartate aminotransferase in the patients with nonalcoholic steatohepatitis. *Int J Hepatol*. 2016;2016:1-6.
8. Miccadei S, Di Venere D, Cardinali A, et al. Antioxidative and apoptotic properties of polyphenolic extracts from edible part of artichoke (*Cynara scolymus* L.) on cultured rat hepatocytes and on human hepatoma cells. *Nutr Cancer*. 2008;60(2):276-283.

9. Sharaf El-Deen SA, Brakat RM, Mohamed ASED. Artichoke leaf extract protects liver of *Schistosoma mansoni* infected mice through modulation of hepatic stellate cells recruitment. *Exp Parasitol*. 2017;178:51-59.
10. Okada N, Kobayashi S, Moriyama K, et al. Helianthus tuberosus (Jerusalem artichoke) tubers improve glucose tolerance and hepatic lipid profile in rats fed a high-fat diet. *Asian Pac J Trop Med*. 2017;10(5):439-443.
11. Villiger A, Sala F, Suter A, et al. In vitro inhibitory potential of *Cynara scolymus*, *Silybum marianum*, *Taraxacum officinale*, and *Peumus boldus* on key enzymes relevant to metabolic syndrome. *Phytomedicine*. 2015;22(1):138-44.
12. Ben Salem M, Ben Abdallah Kolsi R, Dhouibi R, et al. Protective effects of *Cynara scolymus* leaves extract on metabolic disorders and oxidative stress in alloxan-diabetic rats. *BMC Complement Altern Med*. 2017;17(1):328.
13. Syed Raffic Ali S, Ambasankar K, Saiyad Musthafa M, et al. Jerusalem artichoke enriched diet on growth performance, immuno-hematological changes and disease resistance against *Aeromonas hydrophila* in Asian seabass (*Lates calcarifer*). *Fish Shellfish Immunol*. 2017;70:335-342.
14. Simsek EN, Uysal T. In vitro investigation of cytotoxic and apoptotic effects of *Cynara L.* species in colorectal cancer cells. *Asian Pac J Cancer Prev*. 2013;14(11):6791-6795.
15. Pulito C, Mori F, Sacconi A, et al. *Cynara scolymus* affects malignant pleural mesothelioma by promoting apoptosis and restraining invasion. *Oncotarget*. 2015;6(20):18134-18150.
16. Russo A, Perri M, Cione E, et al. Biochemical and chemical characterization of *Cynara cardunculus L.* extract and its potential use as co-adjutant therapy of chronic myeloid leukemia. *J Ethnopharmacol*. 2017;202:184-191.

**\*Correspondence to:**

Shaimaa Ahmed Sharaf El-Deen  
Parasitology Department  
Faculty of Medicine  
Menoufia University  
Egypt  
E-mail: drsharaf81@yahoo.com