

## Phytotherapy for heart tonic: An ethnobotanical study in Dehloran City, Ilam Province, Western Iran

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### ABSTRACT

Cardiovascular disease (CVD) is one of the most common causes of mortality around the world. The aim of this study is to summarize using native plants in Dehloran City, Ilam Province, Western Iran in heart atonic conditions. According to the results obtained from the filled questionnaires, the sixteen effective medicinal herbs recognized in the region, the most important of them include *Astragalus glaucacanthus*, *Citrullus colocynthis* (L.) Schrad., *Crataegus pontica* C. Koch, *Crocus sativus* L., *Nerium oleander* L., and *Xanthium spinosum* L. Its optimal use is in the treatment of mild to moderate heart failure in adult patients and to increase myocardial contraction. Therefore, it is possible to produce effective herbal medicines as alternatives to synthetic drugs and improve the cardiac tone for sufficient contraction in heart failures.

**Keywords:** Cardiac, Medicinal plants, Ethnobotanical, Tone, Iran.

**Article type:** Review Article.

### INTRODUCTION

One of the most significant and overgrowing worries during the last several decades are cardiovascular diseases (CVDs) that leads to the lethal worldwide. Based on World Health Organization (WHO) report in 2022, approximately 17.9 million deaths were related with CVDs worldwide, corresponding to about 32% of all universal death. Based on the WHO report, nearly 7.4 and 6.7 million deaths are caused by coronary heart diseases and stroke, respectively (Boutayeb 2006; Peer & Kengne 2022). The highest mortality rates attributable to CVD in 2020 were in Eastern Europe and Central Asia, with higher levels also seen in Oceania, North Africa and the Middle East, Central Europe, sub-Saharan Africa, and South and South-east Asia. Rates were lowest for locations in high-income Asia Pacific and North America, Latin America, Western Europe, and Australasia. Up to 75 % CVDs deaths occurs in low- and middle-income countries (Mina *et al.* 2022). The evidence of using plants for medicinal purposes dates from 60,000 years ago, in both developed and undeveloped countries (Asadi 2016; Redouan *et al.* 2020; Obaid *et al.* 2022). Traditional medicine and ethnomedicine, are historically defined as the study of the traditional medicines practiced by various ethnic groups on natural resources as medications (Shaba 2022; Maran *et al.* 2022). Archaeologically, herbs, commonly defined as any form of plant or plant extracts designed the basis of the drugs used in traditional medicine of cultures. Plants and herbs have always been a common source of medications, either in the form of traditional extracts or as pure active ingredients. So, nature is a very important foundation for discovery new drugs that leads to the treatment of diseases. In previous decades, famous drugs had been isolated from herbal and plant sources that include aspirin from the *Salix alba* L. tree, digoxin (cardiac glycoside) from *Digitalis purpurea*, ephedrine from *Ephedra sinica*, lovastatin from *Monascus*

*purpureus* L., taxol from *Taxus brevifolia*, and reserpine from *Rauvolfia serpentina* (Napagoda & Wijesundara 2022; Sreekumar & Nisha 2022; Sreekumar & Nisha 2022; Ansari *et al.* 2022). The phytotherapy of cardiovascular diseases is continuously set with advantages and disadvantages as well as any other pharmacotherapy. Many plants have been approved by numerous drug associations and commercially marketed for treating heart and circulation diseases. Most of these drugs owe their backgrounds to the traditional and folkloric practices where they were accidentally discovered and through clinical trial have been used for centuries by physicians (Mahmood *et al.* 2010; Liu & Huang 2016). A number of herbs contain potent cardioactive glycosides, which have positive inotropic actions on the heart. The digitoxin derived from either *D. purpurea* (foxglove) or *Digitalis lanata*, and digoxin, derived from *D. lanata* alone, have been used in the treatment of congestive heart failure for many decades (Dietz *et al.* 2005; Jograna Patil & Kotwal 2020). Some common plant sources of cardiac glycosides include *D. purpurea* (foxglove, already mentioned), *Adonis microcarpa* and *Adonis vernalis* (adonis), *Apocynum cannabinum* (black Indian hemp), *Asclepias curassavica* (redheaded cotton bush), *Asclepias friticosa* (balloon cotton), *Calotropis precera* (king's crown), *Carissa spectabilis* (wintersweet), *Cerebra manghas* (sea mango), *Cheiranthus cheiri* (wallflower), *Convallaria majalis* (lily of the valley, convallaria), *Cryptostegia grandiflora* (rubber vine), *Helleborus niger* (black hellebore), *Helleborus viridus*, *Nerium oleander* (oleander), *Plumeria rubra* (frangipani), *Selenicereus grandiflorus* (cactus grandiflorus), *Strophanthus hispidus* and *S. kombe* (strophanthus), *Thevetia peruviana* (yellow oleander), and *Urginea maritima* (squill; Botelho *et al.* 2019; El-Mallakh Brar & Yeruva 2019). In this study we intended to identify the plants, local names and their usage for medicinal or other purposes by local people in the Ilam, Dehloran region located in Western Iran. In addition, a comparative analysis between previous ethnobotanic and laboratory studies of plants was attempted.

## **MATERIALS AND METHODS**

### **Study area**

The present ethnobotanical study was performed in Western Iran. Dehloran City is a region located on the Zagros Mountains, Western Iran. Its coordinates in decimal format: latitude - 32.6921969, longitude - 47.2679555. Once converted to degrees, minutes and seconds, Dehloran has the following coordinates: 32° 41' 31.91" north latitude and 47° 16' 4.64" east longitude.

### **Data Collection**

This ethnobotanical study was conducted from March 2021 to February 2022 through face-to-face visits and through interviews and questionnaires among 25 traditional healers. The questionnaires were distributed among traditional therapists and contained demographic information. The questioners personally visited the studied subjects and registered the beliefs of herbal medicine in relation to receiving medicinal and ethnobotanical information. The results obtained from the questionnaires were directly transferred to relevant tables and recorded. Finally, the data were analyzed by Excel.

## **RESULTS**

According to the obtained results, over sixteen medicinal herbs were used in Dehloran region for heart atonic conditions (Table 1).

## **DISCUSSION**

Over 2000 plants have been listed in the traditional systems of medicine and some of these are providing wide-ranging relief to the people suffering from cardio-vascular diseases, especially ischemic heart disease (Fabricant & Farnsworth 2001). Based on WHO reports, around 80% of the global population still depend on botanical drugs and several herbal medicines have advanced to clinical use in modern eras. Based on these findings, present study was carried out to identify the ethnobotanical and cardio-vascular application of sixteen commonly used plants in Dehloran, Iran. The selection of the plants in the present study is primarily based on their rout of use and pharmacological properties including native expert people reported in various regions based on filled questioners. Some very interesting findings have been observed and thus recorded and reported in this article for further *in-vivo* and *in-vitro* investigations. These are remedies that have an overall beneficial action on the heart and circulatory system. Some of the herbs included in this group are powerful cardio-active agents such as *Nerium oleander* L., while others are gentler and much safer, like *Crataegus pontica* C. Koch that prescribed for treatment of heart insufficiently (Ray & Saini 2021).

**Table 1.** Medicinal plants effective against cardiac atony.

Scientific Name		Family	Persian Name	Usable Plant	Part of	Preparation Methods
<i>Astaragalus</i> Fisch.	<i>glaucacanthus</i>	Fabaceae	Gavane Asbi	Fruit		Fresh plant
<i>Avena wiestii</i> Steud.		Poaceae	Yolaf	Leaf		Fresh plant and Boiled
<i>Cannabis sativa</i> L.		Canabinaceae	Shahdoneh	Seed		Boiled
<i>Cerasus</i> Miller.	<i>mahaleb</i>	(L.) Rosaceae	Mahlab	Fruit		Fresh plant and Boiled
<i>Citrullus</i> Schrad.	<i>colocynthis</i>	(L.) Cucurbitaceae	Hendevaneh Aboljahl	Fruit		Boiled
<i>Crataegus pontica</i> C. Koch.		Rosaceae	Zalzalak	Fruit		Fresh plant
<i>Crocus sativus</i> L.		Iridaceae	Zaferan	Flower		Fresh plant and Boiled
<i>Gundelia tournefortii</i> L.		Asteraceae	Kangar	Root		Fresh plant and Boiled
<i>Medicago sativa</i> L.		Fabaceae	Alpha Alpha	Leaf		Boiled
<i>Nerium oleander</i> L.		Apocynaceae	Hertil	Leaf & Flower		Boiled
<i>Paliurus spina-christi</i> Miller		Rhamnaceae	Siah Talou	Fruit		Fresh plant
<i>Quercus brantii</i> Lindl. Var. <i>persica</i> (Jaub. & Spach) Zohary		Fagaceae	Balout	Fruit		Fresh plant and Boiled
<i>Rheum ribes</i> L.		Polygonaceae	Rivas	Stem		Fresh plant and Boiled
<i>Stachys lavandulifolia</i> Vahl.		Lamiaceae	Sonbole	Leaf & Flower		Boiled
<i>Ulmus glabra</i> Hudson		Ulmaceae	Narvan	Leaf		Boiled
<i>Xanthium spinosum</i> L.		Asteraceae	Zardineh	Leaf & Fruit		Boiled

The ingredients of abovementioned plants have the effect of increasing the efficiency of the muscles of the heart without increasing their need for oxygen. Active pharmaceutical ingredients enable the heart to pump enough blood around the body and ensure that there is not a build-up of fluid in the lungs or extremities. Other plants with cardiac tonic effects have an observable beneficial action on heart and blood vessels, but how they work is either completely unclear, or an area of great pharmacological debate (Baharvand-Ahmadi *et al.* 2015; Ray & Saini 2021). Cardiac glycosides, including digitalis and digoxin, have ancient use in clinical practice but superior treatments such as beta-blockers and calcium-channel blockers with milder adverse effects and better safety profiles have now replaced it. In the current study, native practitioners are reserved the natural plants as a first-line therapeutic agents. Its auxiliary use is in the treatment of mild heart failure in adult patients to increase myocardial contraction (Patel 2016; Morsy 2017). In South Africa, *Acokanthera oppositifolia* (bushman poison bush, boesmansgif) sap contains cardenolides and has been used by the San people for applying to the tips of their hunting arrows. Oleandrin and neriine are two potent cardiac glycosides found in all parts of oleander (Adedapo *et al.* 2008; Van Der Bijl & Van Der Bijl 2012). In lily of the valley, the cardiac glycosides convallerin and convallamarin are among at least 15 others found throughout the plant and they have similar cardiac effects to digitalis glycosides. Some outlandish plants used for ornamental, which originated from Africa and are now found in other parts of the world, e.g., *Adonis microcarpa* also contain cardiac glycosides. The potent cardiac glycosides, thevitin A and B and thevetoxin are found in all parts of *Thevetia peruviana* and *Thevetia thevetioides* (yellow oleander; Patel 2016; Morsy 2017). *Crocus sativus* extract has an anti-arrhythmic effect, vascular smooth muscle relaxant, blood pressure decreasing effect and protective role on ischemic heart disease. Also, it can play a significant role in stopping ischemic heart damage and be used as a new protective tool for ischemic heart disease (Joukar *et al.* 2013; Kalantari Meybodi 2018). Based on previous published articles, Astragalus can relieve the calcium overload-induced myocardial damage and improve both systolic and diastolic functions of heart in patients with CHF (Yang Lu & Sun 2010). According to the holistic and traditional approach, *Crataegus pontica* C. Koch (hawthorn) leaves and flowers are used to prepare infusions that can be used to control tachycardia and nervousness. Away from meals, hawthorn has been used against hypertension and, before sleeping, for its relaxing and sedative actions. The berries of *Crataegus pontica* C. Koch stimulate cardiovascular health, protecting from angina, hypertension, heart failure, cardiac arrhythmias, myocarditis, arteriosclerosis, sleeplessness, and anxiety

(Rigelsky & Sweet 2002; Long *et al.* 2006). *Crocus sativus* L. have medicinal property with the potential to treat different heart disease type-hypertension, heart attack, reduction in blood fat, anti-oxidant, and cardiac tonic. Role of this herb against cardiovascular diseases is related to their antioxidant, anti-inflammation, and cardiac tone enhancement effects (Ghaffari & Roshanravan 2019).

## CONCLUSION

To the best of the authors' knowledge, natural plants compound for enhancement cardiac tone is reported in the Dehloran region in Iran for the first time. These data suggest that the aforementioned plants have valuable tone effects on cardiac myocardia or blood pressure. Further investigations are required to explore how the plants can improve the cardiac tone in animal models and human.

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## CONFLICT OF INTEREST

No conflict of interest declared

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## DATA AVAILABILITY

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

## AUTHORS CONTRIBUTION

B.B.A formed the presented idea. F.K.N developed the theory, performed the computations, and was a major contributor in writing the manuscript. Z.E., B.B.A., and S.P. performed and verified the analytical methods. All authors discussed the results and contributed to the final manuscript.

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