

Phytochemical and Pharmacological Properties of *Hertia* L. Genus

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Abstract

The genus *Hertia* L. contains 12 species distributed all over south and North Africa and Southwest Asia. Some species of these plants are used traditionally for pain of stomach and to reduce hyperglycemia. It has been found that the species belonging to this genus possesses a rich phytochemical content and a wide range of pharmacological activities such as acaricidal, spasmolytic, anti-inflammatory, cytotoxic, anthelmintic, antibacterial, antioxidant effects and α -glucosidase inhibition. In an aim to highlight the importance of *Hertia*, this study evaluated its phytochemical and pharmacological properties.

Keywords: *Hertia*; Phytochemistry; Pharmacology

Introduction

Natural products, especially those of vegetable origin, have always been an important source of therapeutic agents. About 25-30% of all medicines available for the treatment of diseases are derived from natural products such as plants, animals, bacteria and fungi [1].

Due to the advance of synthetic chemistry, research on natural products in the pharmaceutical industry has experienced a decline. However, recent data from this industry show that, for some complex diseases, these natural products represent an extremely valuable source for the production of new chemical molecules because they represent privileged structures chosen by evolutionary mechanisms [2-4]. Medicinal plants have always had an important place in the therapeutic arsenal of humanity. According to the World Health Organization (WHO), about 65-80% of the world's population in developing countries, due to poverty and lack of access to modern medicine, rely heavily on traditional medicinal plants for their primary health care. Despite remarkable advances in synthetic organic chemistry in the twentieth century, more than 25% of the drugs prescribed in industrialized countries derive directly or indirectly their origins from the plants [5, 6].

In this context, and in view of the rapid disappearance of tropical forests and other important areas of vegetation, further research in the field of plants is desirable. Urgent attention should be given to as many species to determine their potential phytochemical and pharmacological properties and to evaluate their qualities. So, this green heritage represents an enormous reservoir of compounds waiting to be discovered [7].

Today, many studies carried out in the field of ethno pharmacology show that plants used in traditional medicine and which have been tested are often efficient plants in pharmacological models [8-10]. As a result, the chemical and biological studies are essential to characterize a medicinal plant.

This manuscript reviews the phytochemical, traditional use and pharmacological studies of the species belonging to the genus *Hertia*.

Presentation of the genus *Hertia*

In his "Elementa botanica," published in 1791, Necker divided the genus *Othonna* of Linnseus into two genres: *Othonna* and *Hertia*. According to this author, the *Othonna* has the naked clinanthe, the egret simple or null, and the periclin divided only at the summit, while *Hertia* has the clinanthe bristling with fimbrials, almost feathery egret and pericline deeply divided. But Necker found that the disc of calathide is also maleiflorous in both genres [11]. Jussieu et al. proposed another division of *Othonna* of Linnaeus into two genera, named *Othonna* and *Euryops*. This new division is based on the nature of the disc of calathide; it is masculiflora in *Othonna* and androgyniflora in *Euryops*. These authors have confirmed that *Hertia* is not really distinct from *Othonna* and that the characters exclusively attributed to each of them by Necker are inaccurate, because the characters of the one are often united in the same species with the Characters on the other.

The genus *Hertia* contains 12 species from Africa and Southwest Asia [12]. In Tunisia, there is only one species of this genus namely *Hertia cheirifolia* L.

Phytochemical and pharmacological study of the genus *Hertia*

Phytochemical study of the genus *Hertia*

Previous chemical studies have been carried out on species of the genus *Hertia* and allowed the isolation of several chemical compounds. Indeed, five sesquiterpenes were isolated from the essential oils of the aerial part of the species *Hertia intermedia* namely, β -pinene, α -pinene, α -thujene, β -phellandrene and germacrene D [12]. Another similar study by Afsharypuor et al. [13] on the chemical composition of the aerial part of *Hertia angustifolia* showed that the same compounds were isolated from this plant.

Jakupovic et al. [14] carried out a study on the methanolic and chloroform extracts of the aerial part of *H. pallens* and the results showed that these extracts contained several sesquiterpenes, such as furoeremophilanes, eremophilanoides and germacrene D. The triterpenes were revealed in these extracts by the presence of oleanolic acid. Thus, the use of different polarity of solvents, followed by fractionation steps and the use of different chromatography techniques make it possible to separate and identify several chemical compounds present in the extracts of the plant *H. cheirifolia*. Indeed, previous chemical studies have revealed that the aerial part of this species is rich in eremophilanoides and steroids [15-18].

Traditional use and pharmacological study of the genus *Hertia*

Several species of the genus *Hertia* have been used in traditional medicine. In fact, women in Pakistan use the decoction of the leaves from *H. intermedia* to prevent abortion. Thus, regular consumption of this decoction is useful for all kinds of menstrual cycle problems. This decoction is also used for pain in the stomach. A pulp of ground leaves of *H. intermedia* is also used as an external remedy for severe fever and for treating headaches [19].

In Tunisia, we investigated the traditional use of *H. cheirifolia* plant. The survey was conducted from August to October 2011 in the Haidra and Thala area, with 20 people aged 63 to 98, with the aim of obtaining information on the parts, the method and the amounts used. In fact, old people use the infusion of the vegetative part (stems and leaves) of this plant to reduce hyperglycemia. Also, the pulp of crushed leaves is used against rheumatic pains and arthritis of the knee.

In order, to confirm the pharmacological effect of species of the genus *Hertia*, different activities have been demonstrated. Indeed, the essential oils of the aerial part of *H. cheirifolia* can provide a significant acaricidal activity with a concentration of 3.43 mg/L [20]. The chloroform extract of the aerial part from this species showed significant spasmolytic and anti-inflammatory effects [18].

Acetonic extracts of leaves from *H. intermedia* and *H. pallens* are endowed with cytotoxic activity (LC50= 0.54 mg/mL) [21, 22]. An anthelmintic activity is recorded which 1 mg/mL of acetone

extract from the leaves of *H. pallens* can kill 20% of nematodes [22].

Conclusion

The phytochemical investigation of the genus *Hertia* shows that the species of *Hertia* are rich in terpenic compounds and endowed with important pharmacological properties. These species have variable phytochemical profiles which can possibly justify their bioactive potentials.

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