Phytochemical Investigation of Gynandriris Sisyrinchium (Kuwait Medicinal Plants)

HADI A. AL-NAJJAR, Ph.D.
The Department of Pharmacy, College of Health Sciences, Public Authority for Applied Education and Training (PAAET), Kuwait

Abstract

Background: Gynandriris sisyrinchium is a traditionally used medicinal plant, yet there is no enough information about its phytochemical profile. In this endeavour.

Aim of Study: We aimed to carry out a detailed phytochemical screening of the active constituents in the bulbs, stems, leaves and flowers of Gynandriris sisyrinchium growing wild in Kuwait.

Material and Methods: Phytochemical screening were done for plant after collection from Kabd Area in Kuwait during March 2005.

Results: The present study results reported moderate presence of cardiac glycosides, carbohydrates and saponins in the bulbs, while Flavonoids are more in the aerial parts. Triterpenes and sterols are present in slight quantities. Also it's clear that the plant is devoid of Alkaloids and Anthraquinones.

Conclusion: The results of the current paper could serve as a starting point for further future investigation of the contents of the Gynandriris syrinchium plant.

Key Words: Gynandriris sisyrinchium – Iridaceae – Flavonoids – Cardiac glycosides.

Introduction

PEOPLE usually use plants to help them in many tasks such as shelter, clothing, food, flavours and fragrances and most importantly, medicines [1].

Nowadays, knowledge and information about the ancient botanical medicinal plants practices with their application of modern phytochemical techniques have been proved to be considered excellent powerful tools for the purification and structural elucidation of the different various phyto-compounds providing a highlighted insights into their way of action on the human body [2].

In fact, 11 % of the 252 drugs which are reported as basic and essential by the World Health Organ-isation (WHO), are exclusively of plant origin and not a little number of synthetic drugs are obtained from natural sources [3].

The Iridaceae is considered a large and interesting plant family with diverse floral structures. Most representatives of that family can be usefully used as ornamental plants because of their beautiful flowers [4].

That family contains about 1750 species in 82 genera [5]. Iridaceae plants are found with wide spread worldwide including different tropical and temperate regions [6].

Plants belonging to that family can be used in traditional medicine for the purpose of different diseases treatment such as cold, flu, malaria, toothache, bruises and also used for burns [7].

Infusions of C. majalis in small doses can be used for strengthening heart muscles and also as a diuretic [8,9].

In Jordan, the Iridaceae family is including four genera with the names of Crocus L., Gladuolus L., Gynandriris (L.) Parl., and Iris L. In Jordan, G. sisyrinchium is the only species belonging to the Gynandriris genus that grows wild there [10]. In Spain, the plant corm is edible with great caution [11].

Gynandriris sisyrinchium (syn: Iris sisyrinchium and Moraea sisyrinchium) is a perennial herb with a corm, 15-30cm in diameter and 10-30cm in height, containing pale or dark bluish, violet or purple flower with usually a solitary leaf, (sometimes two) often lying-coiled on the ground. It is native to the southern parts of Europe (Spain, Portugal, Italy, Balearic Islands, Malta, and Greece) and northern of Africa (Egypt and Libya). It is also widespread in south-west Asia especially Pakistan.
and Himalaya. This species mostly prefers clayey loamy textured soil and is commonly found in poor or dry sandy and rocky places in garigue, rocky valleys, rocky steppe, paths, and other open grounds [12].

Also known as Iris Syrinchium, one of the most beautiful wild flowers that grows in Kuwait during the short spring season in the shallow concave sandy grounds where rain water collects in pounds for a short while. Figs. (1,2,3).

With a violet and white flower and long soared like green leaves with a fibrous fleshy brown bulb that remains hidden 10 centimeters deep below the ground tell the next season [13,14,15]. Flowers and bulbs resemble those found in the liliaceae like lily of the valley Convallaria majalis where more than 20 cardioactive glycosides like convallotoxin, convallatoxol and convallosid were discovered [16].

The ethnomedicinal uses of G. sisyrinchium have been reported in Pakistan 17 and Egypt [18]. It is reported that decoction of its corms is used two times per day as a diuretic in Khyber Pakhtunkhwa, north-west of Pakistan [19].

Although, many plants belonging to the Iris genus have been investigated for their chemical constituents, the phytochemical analysis of the plants belonging to the Gynandriris genus are however rarely reported in the previous literature.

To the best of our knowledge, no previous research studies (at least in Kuwait) were concerned with phytochemical screening of G. sisyrinchium. Therefore, the objective of this study is to design the first attempt to explore the in-depth phytochemical analysis of G. sisyrinchium.

Patients and Methods

Plant material and extracts preparation:

Gagea sisyrinchium was collected during the flowering period. Fresh whole flowering plants of G. sisyrinchium were collected from kabd Area of Kuwait during March 2005. Samples were naturally dried in the shade and sent for experimental analysis.

Phytochemical screening:

Phytochemical screening tests were performed on the different parts of the plant according to standard procedures [14]. The results are given in Table (1).

Table (1): Phytochemical screening tests.

<table>
<thead>
<tr>
<th>Tests for</th>
<th>Bulb</th>
<th>Leaf</th>
<th>Flower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterols &amp; Triterpenes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Libermanns Test</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
</tr>
<tr>
<td>Salkwiski Test</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
</tr>
<tr>
<td>Alkaloids &amp; Nitrogenous Bases:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dragendorffs reagent</td>
<td>–ve</td>
<td>–ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Mayers reagent</td>
<td>–ve</td>
<td>–ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Wagners reagent</td>
<td>–ve</td>
<td>–ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Cardiac Glycosides:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keller Kiliani test</td>
<td>++ve</td>
<td>++ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Baljet Reaction</td>
<td>++ve</td>
<td>++ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Flavonoids:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NaOH test</td>
<td>+ve</td>
<td>++ve</td>
<td>+ve</td>
</tr>
<tr>
<td>NH4OH Test</td>
<td>+ve</td>
<td>++ve</td>
<td>+ve</td>
</tr>
<tr>
<td>AlCl3/UV Test</td>
<td>+ve</td>
<td>++ve</td>
<td>+ve</td>
</tr>
<tr>
<td>Anthraquinones:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borntragers Test</td>
<td>–ve</td>
<td>–ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Tannins:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(FeCl3) Test</td>
<td>–ve</td>
<td>++ve</td>
<td>+ve</td>
</tr>
<tr>
<td>Saponnins:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Froth Test</td>
<td>++ve</td>
<td>–ve</td>
<td>–ve</td>
</tr>
<tr>
<td>Carbohydrates:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molish Test</td>
<td>++ve</td>
<td>++ve</td>
<td>+ve</td>
</tr>
</tbody>
</table>

Results and Discussion

From the table one can notice the Moderate presence of cardiac glycosides, carbohydrates and saponins in the bulbs, while Flavonoids are more in the aerial parts. Triterpenes and sterols are present in slight quantities.

Also it's clear that the plant is devoid of Alkaloids and Anthraquinones.

Gynandriris sisyrinchium (syn: Iris sisyrinchium) is native to the Mediterranean area and flowers during the time extending from the middle to the end of the spring season [7].

Although, as reported by that the non-volatile chemical constituents of G. sisyrinchium have never been investigated before their study. Recently, the chemical constituents of the essential oils get from both the leaves and bulbs of G. sisyrinchium are investigated and reported to have powerful antimicrobial properties [20].

Essential oils produced from Gynandriris sisyrinchium plants have been shown to be used traditionally in many countries for the purpose of respiratory tract infections and colds management [20].

The extract of G. sisyrinchium was investigated to report its antifungal property and to examine its applicape use as a preservative for wood [4].

These natural products are reported to have an antimicrobial as well as anti-inflammatory effect [21].

In Kuwait, this species is seldom grazed by livestock [22]. Recently, studies have proved its pharmacological validation reporting antibacterial [20] and antifungal activities [23].

Furthermore, the isolation and characterization of isoflavones from G. sisyrinchium reported significant antioxidant and cytotoxic activity against human promyelocytic leukemia cells HL-60 [4].

Previous phytochemical screening studies in Gynandriris belonging to the Iridaceae family revealed the presence of various secondary metabolites including flavonoids, biflavonoids, quinones and also xanthones [20].

A review by Komiasarenko and Stupakova revealed Cardiotonics, flavonoids and steroids isolated and synthesized from the genus convallaria [24].

Tittel, G. used photodiode-array-detection (DAD) in HPLC for the detection of biological values of cardiac glycosides in convallaria herb and the results were well correlated with the guinea pig phytochemical assays [25].

Isoflavonoid glycosids on the other hand were isolated from Iris germanica (germanianism A, Germananism B, irilion and iridin) by Atturahman et al. [26] who in a different study isolated and assayed the anti-inflammatory activities of more isoflavonoids from Iris germanica a member of the family Iridaceae [27].

Iristictorone K a monocyclic triterpene was isolated and its structure elucidated using HMOC, HMBC, DEPT, COSY, AND NOESY combined experiments from the rhizomes of Iris germanica in Turkey by Orhan et al. [28].

In the present report, a preliminary phytochemical investigation is carried out on the different parts of Gynandriris sisyrinchium with the hope of proving the presence of active constituents. A voucher specimen was deposited at Kuwait University Herbanium.

Conclusion:

In this preliminary report G. syrinchium, a wild flower that grows in Kuwait during a very short rainy season has proven to contain an appreciable amount of cardiac glycosides, flavonoids and to a lesser extent triterpenes by experiment that correlates with the literature findings especially flavonoids and glycosides mentioned above in the literature survey.

This plant is considered to be one of the rare species in Kuwait and it’s worth looking into its constituents for further investigations.

Conflict of interest:

The authors declare that there is no conflict of interest regarding the publication of this paper.

References


12- ÖZDEMIR C., ALÇITEPE E. and SEPET H.: Morpho-
logical, anatomical and ecological studies of Gynandririssisyrinchium (L.) Parl in Turkey Thaiszja J. Bot., 21: 1-
9, 2011.

13- DEEB M. and ALSALEM K.: Wild plants of Kuwait, Al-
Jallal publications, Kuwait, 1974.


16- TYLER V.E., BRADY L.R. and ROBERTS J.E.: Pharma-
فحص نباتي كيميائي لنبات

(نباتات الكويت الطبية)

هو نبات طبيعي يستخدم بشكل تقليدي، ولكن لا توجد معلومات كافية حول طفيلة الكيميائي النباتي. الهدف من الدراسة: تم تصميم هذه الدراسة لإجراء مسح كيميائي للمكونات الفعالة في البصيلات والسقان والأراص والزهر لنبات Gynandriris Sisirinchium.

خطة البحث: كان هدفنا إجراء مسح كيميائي للمكونات الفعالة في البصيلات والسقان والأراص والزهر لنبات Gynandriris Sisirinchium، والذي تنمو بريا في الكويت.

نتائج البحث: أشارت نتائج الدراسة الحالية إلى وجود معتدل للجليكوسيدات والكربوهيدرات في البصيلات، في حين أن الفلفوينات أكثر Anthraquinones و Alkaloids و vitamins في الأجزاء الهوائية للنبات. توجد Sterols و Triterpenes و كيمياء تلقية إلا أن النبات خال من Gynandriris Sisirinchium نبات.

الخلاصة: وأخيرا يمكن أن تكون نتائج هذه الدراسة مثيرة نقطة بداية لإطلاق المزيد من الفحص الكيميائي في المستقبل في محتويات Gynandriris Sisirinchium نبات.