Acta Scientific MEDICAL SCIENCES (ISSN: 2582-0931)

Volume 5 Issue 4 April 2021

Mini Review

Herbal Medicinal Effectiveness: Potential Risks and Health Gained without Collateral Damage: A Review of *Drimia maritime*

Salem Mohamed Edrah*

Professor, Chemistry Department, Sciences College, El-Mergib University, Al-Khums, Libya

***Corresponding Author:** Salem Mohamed Edrah, Professor, Chemistry Department, Sciences College, El-Mergib University, Al-Khums, Libya.

Received: February 16, 2021

Published: March 19, 2021

Abstract

Drimia maritima (L) is a perennial plant, with fibrous roots proceeding from the base of a large, tunicate, nearly globular bulb, the outer scales of which are thin and papery, red or orange-brown. It is one of the plants that grow in North Africa and the Mediterranean Basin. The plant owns a large bulb which can be about 20 cm wide and weigh may reach to 1 kg, leaves are dark green in colour and leathery in texture, flowers are white and may reach 2 m in height, and approximately1.5 cm wide. From ancient time, this plant is used in treating diseases, combating agricultural pests, and killing rats to preserve crops. The plant has toxicity may lead to death when it is used excessively and without paying attention to the dosages needed for treatment, It is of great importance due to the fact that it contains many very effective biochemical composites such as Bufadienolides..

Keywords: *Drimia maritima* (L); Chemical Constituents; Toxicity; Bufadienolides Compounds

Abbreviation

D. maritima: Drimia maritima (L).

Introduction

Medicinal plants are distinguished from other plants by the presence of effective medicinal ingredients and those contents are varying from one plant to another. These medically active substances exist in plants whose presence varies according to the place and environment in which it lives in. Merely as human benefits from these chemical components found in medicinal plants, for nurture, prevention, and treatment against diseases, thus the plant itself has great benefits from it also for protection, growth, and other needs. *Drimia maritima* (L) (*D. maritima*) is a plant that grows in the Mediterranean countries [1,2]. It is known by name *Urginea maritima*, further is a species of flowering plant that belongs to the family "Asparagaceae", subfamily Scilloideae which was previously within the family of Hyacinthaceae [2]. Where, the *Drimia* genus includes ninety-nine species [3]. This species is also known by several common names, including squill, sea squill, sea onion, and maritime squill [4], it may also be called red squill, particularly a form which produces red-tinged flowers instead of white [4], and also, it is native to Southern Europe, Western Asia, and Northern Africa [3]. *D. maritima* is a poison plant moreover utilized as a popular rodenticide against rats and for its high-toxicity was used as a rats poison in the agriculture crops during the 20th century [5]. And perhaps this plant contains natural substances and biological compounds that have an active influence on insects and rats, and it is used to control agricultural pests. The green leaves of the plant dry up during the summer and the bulbs remain dormant until the spring to start growing again. Previous studies reported that this plant has an effective therapeutic against many diseases [9,10], like antifungal activity [7], rodenticide [8], as well as Insecticidal and Nematicidal activities [9,10].

Methodology

Traditional treatment and effect of phytochemical constituents

On Account of the medicinal benefit of the *D. maritima* plant, there are researches on phytochemicals of Drimia species were focalized. Cardiac Glycosides are considered as the main components isolated from this genus. Moreover, phenolic compounds, phytosterols, and other phytochemical constituents were identified in these plants. Despite the toxicity of this plant, it is locally in Libya used against many diseases, used externally as an analgesic for treating back pain, and bones, particularly the spine, where the layers of bulbs are separated from each other and placed on a piece of cloth then fixed on the site of pain for ten minutes and then removed, With the caveat that this treatment is used only once, it may be due to the toxicity and risk of repeating the treatment. In the face of the poisoning of this plant, it is used since ancient in the treatment of many diseases, and currently, many studies have given results that increase the importance of this plant because it contains an vital therapeutic benefit, therefore, it is gained that significant as the ingredients extracted from it have therapeutic potentials that are a source of secondary metabolites. Among the cancerous diseases, breast cancer, which is one of the diseases of utmost importance, as the female's failure to realize that is infected with it may lead to severe consequences and consequences that cause death. Breast cancer is cancer that occurs in the cells of the breasts, while, is considered the most common cancer diagnosed in women after skin cancer in the United States. However, men can also be infected with it, but it is more common in women. Dead cells or apoptosis due to cancer can be detected by their staining methods and by using flow cytometry analysis after that [11,12]. Moghadam, Fallahian., *et al*. reported that the effective doses of *D. maritima* on the breast cancer cell lines was inhibited 50% of growth significantly lower cytotoxicity against normal fibroblast cell line, in a healthy human, correspondingly, from the experiment data result from this indicated that the rate of apoptosis as the sum of early and late apoptotic cells increased in the breast cancer cell lines was 75.8% and more, after treatment with dose *D. maritima*.

Plant toxicity and importance of included ingredients

The advantage of comprehending the chemical compounds that the plant contains leads to proper use to avoid health complications arising during or after use for them, as some plants contain compounds that may be dangerous or cause harm when used in excess or as drug doses exceeding more than required limit for treatment. Amongst the plants that may be toxic is *D. maritima*, which may contain compounds that are toxic and harmful to humans if it is used in large quantities and without any precaution. There are two types of *D. maritima* are with the same morphology and bulbs in red or white colours, the white type is usually utilized for medicinal purposes [13]. As a conventional remedy, the *D. maritima* is used for treatments of Joint Complications and Bones, Cancer, Respiratory ailments, Epilepsy, Dropsy, and Jaundice [13-16]. The main phytochemical composites were identified are Bufadienolides compounds, in the *D. maritima* plant. Stoll, Sutter., *et al*. isolated Scillaren A, the first compound to be isolated from Bufadienolides compounds [17]. Methanol is regarded as the best in the extraction and more than other solvents such as chloroform, acetone, and ethanol solvents used for the extraction of Bufadienolides which considered as the principal compound in the *Drimia* genus. Bufadienolides Proscillaridin A is a type of Bufadienolides cardiac glycosides are produced from enzymatic hydrolysis in the *Urginea* species [18]. In the case of the treatment of Cardiac Arrhythmias or Congestive Heart Failure (CHF), cardiac glycosides are used, as they are as secondary metabolites existing in many plants, where their benefit is by increasing the Cardiac Output Strength of the heart contraction and thus by increasing intracellular calcium [19]. Additionally, and concerning the extraction, practically, by ultrasonic radiation, the methanol extraction procedure for Proscillaridin A was resulted in the best method than by reflux and maceration extractions [20]. The cardiac glycosides are composed of two structural characteristics, the glycoside sugar, and the aglycone-steroid which is a nonsugar's parts. And the two-class were recognized in nature, the Cardenolides and the Bufadienolides. Besides the Proscillaridin A (Figure 1) considered the most important ingredient distinguished in *D. maritima* which clinically used for the medication of Cardiac Disorders [21], also, this composite investigated on various cell lines like antitumor activity of this composite has been breast cancer [22,23], human multiple myeloma [24], and human lymphoma [9].

Proscillaridin (Figure 1) is a cardiac glycoside, a type of drug

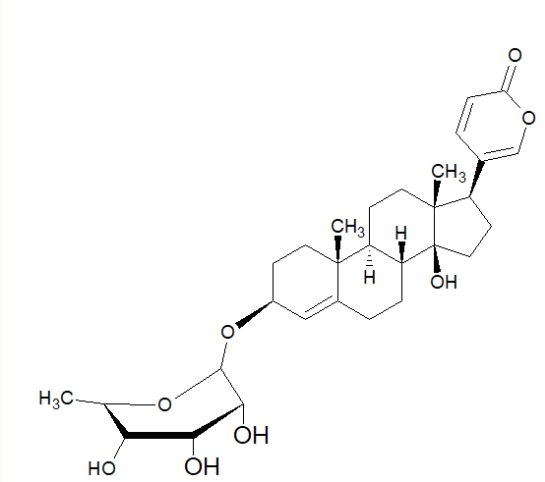

Figure 1: Chemical structure of proscillaridin.

that could use principally in the treatment of irregular heartbeat or cardiac arrhythmia, and congestive heart failure. This was revealed before is the Bufanolide type which and could obtain from *D. maritima* plants. While an aglycone of proscillaridin is Scillarenin. The additional name of the Proscillaridin is 14 β-Hydroxy-3β-[α- L-rhamnopyranosyl) oxy] bufa - 4, 20, 22-trienolide, with the Formula $C_{30}H_{42}O_8$, and Molar mass 530.650 g·mol^{-1} [25]. The bulb *D. maritima* bulb includes a high concentration of chemical constituents as steroidal cardio-active glycosides, which also, contains compounds such as Scillaren A and Proscillaridin A, and the aglycone of these is Scillarenin. Moreover, in some studied reported that existing mixture of compounds of squill glycosides in the plant's bulbs, while the most and prevailing components were Scillaren A, Scilliroside, Proscillaridin A, and Scillaren B [26-28]. In additions, the cardiac glycosides have cardiotonic characteristics, therefore, the components of this plant are absorbed poorly in the digestive system, and accordingly, its effectiveness is less compares it with the digitalis plant [29]. Besides, this plant contains other chemical components in the bulb, such as Fructan Sinistrin, an antifungal glycoprotein, carbohydrates, and flavonoids [30-34].

Conclusion

Despite the toxicity of the *D. maritima* plant, it was used in the past and is still used today in treatment such as treating bone pain, and in some other uses, such as protecting agricultural crops from pests and rodents such as rats, and with the increase in knowledge of this plant, should be cautious from it particularly during medical use. It is among the important medicinal plants, and researches must be done to detect chemical compounds in it to determine its exact toxicity and make use of those chemical composites in the pharmaceutical industries and the manufacture of fertilizers for agricultural crops.

Conflict of Interest

The Author Declare that there is no financial interest or any conflict of interest exists.

Acknowledgment

The author offers his full thanks, appreciation, and gratitude to Mr. Ali Faraj Al-Ammari for his advice and information that has been included in this research work..

Bibliography

1. The Euro-Med Plant Base - the information resource for Euro-Mediterranean plant diversity (2018).
2. Chase MW., *et al*. "A subfamilial classification for the expanded asparagalean families; Amaryllidaceae, Asparagaceae; and Xanthorrhoeaceae". *Botanical Journal of the Linnean Society* 161.2 (2009): 132-136.
3. The Plant List; Version 1.1 (2013).
4. Drimia maritima (maritime squill); Archived, October. 29. 2013, at the Way back Machine Royal Botanic Gardens, Kew (2013).
5. HS Gentry., *et al*. "Red squill (Urginea Maritima , Liliaceae), Red Squill". *Economic Botany* 41.2 (1987): 267-282.
6. Khan IA and Abourashed EA. "Leung's Encyclopedia of Common Natural Ingredients Used in Food, Drug, and Cosmetics". 3rd Eds., John Wiley and Sons, New Jersey, United States of America, (2009): 810.

7. Hammiche V., *et al*. "Plantes toxiques à usage médicinal du pourtour méditerranéen". Eds. Springer-Verlag, Paris, France, (2013), 367.

8. Anonymous. "Les plantes médicinales des régions arides". Eds UNESCO; Paris, France (1960): 397.

9. El-Seedi HR., *et al*. "The traditional medical uses and cytotoxic activities of sixty-one Egyptian plants: Discovery of an active cardiac glycoside from Urginea maritime". *Journal of Ethnopharmacology* 145 (2013): 746-757.

10. Maati MME., *et al*. "Novel Biological Activities of Libyan Urginea maritime L. Baker aqueous extract: Differentiation-Induction Ability on Human Malignant Neuroblastoma SH-SY5Y Cell Line". *New Biotechnology* 295 (2013): 142.

11. Fallahian F., *et al*. "Molecular mechanism of apoptosis induction by Gaillardin, a sesquiterpene lactone, in breast cancer cell lines: Gaillardininduced apoptosis in breast cancer cell lines". *Cell Biology and Toxicology* 31.6 (2015): 295-305.

12. MH Moghadam., *et al*. "Cytotoxic effect of Drimia maritima bulb extract and induction of mitochondrial apoptotic signaling in human breast cancer cells, McF-7 and MDA-MB-468". *OncoTargets and Therapy* 11 (2018): 7669-7677.

13. Bozorgi M., *et al*. "Medicinal plants of the genus Drimia: a review on traditional uses, phytochemistry, pharmacology and toxicology". *Journal of Traditional Chinese Medicine* (2016).

14. Aliotta G., *et al*. "The diuretic use of scilla, from Dioscorides to the end of the 18th century". *Journal of Nephrology* 17.2 (2004): 342-347.

15. Avicenna. The canon; Translated by Sharafkandi A; Tehran: Soroush Press (2008).

16. Jorjani SE. "Zakhire Kharazmshahi". Tehran: Tehran University of Medical Sciences, (2013).

17. Stoll A., *et al*. "Die herzaktivenSubstanzen der Meerzwiebel Scillaren A". *Helvetica Chimica Acta* 16.1 (1933): 703-733.

18. VAN WYK B., *et al*. "Medicinal Plants of South Africa". Briza Puhheatiolls. Pretoria (1997).

19. Schönfeld W., *et al*. "The lead structure in cardiac glycosides is 5 beta, 14 beta-androstane-3 beta 14-diol. Naunyn Schmiedebergs". *Archives of Pharmacology* 329 (1985): 414-426.

20. M Bozorgi., *et al*. "Development and validation of an HPLC-UV method for determination of Proscillaridin A in Drimia maritima". *Research Journal of Pharmacognosy (RJP)* 3.3 (2016): 1-7.

21. Gould L., *et al*. "Clinical studies on proscillaridin A, a new squill glycoside". *Journal of Clinical Pharmacology* 11.2 (1971): 135-145.

22. Bielawski K., *et al*. "Inhibition of DNA topoisomerases I and II, and growth inhibition of breast cancer MCF- 7 cells by ouabain, digoxin and proscillaridin A". *Biological and Pharmaceutical Bulletin* 29.7 (2006): 1493-1497.

23. Winnicka K., *et al*. "Apoptosis-mediated cytotoxicity of ouabain, digoxin and proscillaridin A in the estrogen-independent MDA-MB-231 Breast cancer cells". *Archives of Pharmacal Research* 30.10 (2007): 1216-1224.

24. Feng R., *et al*. "Cell-based and cytokine-directed chemical screen to identify potential anti-multiple myeloma agents". *Leukemia Research* 34.7 (2010): 917-924.

25. Kedra M., *et al*. "Clinical evaluation of Proscillaridin A, a glycoside of Scilla maritima". *Polski Tygodnik Lekarski* 23.19 (1968): 714-716.

26. Balbaa SI., *et al*. "TLC-spectrophotometric assay of the main glycosides of red squill, a specific rodenticide". *Journal of Natural Products* 42 (1979): 522-524.

27. Garcia Casado P., *et al*. "Proscillaridin A yield from squill bulbs". *Pharmaceutica Acta Helvetiae* 52 (1977): 218-221.

28. Leung AY. "Encyclopedia of Common Natural Ingredients Used In Food, Drugs, and Cosmetics". New York, NY: J. Wiley and Sons (1980).

29. Duke JA. "CRC Handbook of Medicinal Herbs". Boca Raton, FL: CRC Press (1985).

30. Fernandez M., *et al*. "C-Glycosylflavones in the bulbs of squill". *Phytochemistry* 14 (1975): 586.

31. Deepak AV., *et al*. "Isolation and characterization of a 29-kDa glycoprotein with antifungal activity from bulbs of Urginea indica". *Biochemical and Biophysical Research Communications* 311 (2003): 735-742.

32. Praznik W and Spies T. "Fructo-oligosaccharides from Urginea maritima". *Carbohydrate Research* 243 (1993): 91-97.

33. Fernandez M., *et al*. "Flavonoids of squill, Urginea maritima". *Phytochemistry* 11 (1972): 1534.

34. Spies T., *et al*. "The structure of the fructan sinistrin from Urginea maritime". *Carbohydrate Research* 235 (1992): 221-230.