World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

ETHNOPHARMACOLOGICAL EVALUATION OF HALOPHYTIC PLANTS GROWN ON THE RED SEA COASTAL AREAS: A REVIEW PAPER

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Article Received on 21/05/2023 **Article Revised on 11/06/2023** **Article Accepted on 01/07/2023**

ABSTRACT

High salinity tolerant plants known as Halophytes, have been in the center of attention for researchers from many different perspectives. Their ability to cope with saline soil indicates many ecological and pharmacological potentials. This study amied to establish an assessment of the phytochemical content as well as the pharmacological potentials of some halophytic plants, growning in the red sea coastal areas and validate the traditional uses claims relying on secondary sources that had documented these informations. 8 plants from 5 families were reviewed depending on previously reported data that recomonded them as promising medicinal plants with various phytoconstituents to be more researched.

1. INTRODUCTION

Halophytes are plants that are naturally adapted to salinity and are considered as models to understand stress tolerance in plants. They grow in water with high salinity, such as in mangrove swamps,marshes, seashores, and saline semi deserts. Review of literature indicates an increase in research interest in halophytes which reflects recognition of their immense potential as a valuable resource and cash crop (Khan et al., 2009; Hussain et al., 2003).

Many phytochemical classes extracted from halophytes showed various bioactivities. Phenolic compounds including phenolic acid, flavonoids and tannins confer various biological activities; for example: anti-carcinogenic, anti-inflammatory and anti-atherosclerotic activities. It is their antioxidant activity that explains such activities (Chung et al., 1998).

The extreme salinity motivates plants to synthesis significant amounts of secondary metabolites. A comparative study on phytochemical constituents of *Zygophyllum coccineum L.* in coastal verses inland desert of Egypt, Proved that the specious growing in coastal areas had more quantity of the active phytochemicals (Laith & Leina, 2016). Not only the phytochemical content of these plants is what enriching their medicinal value. It's also their microbiological profile. According to (Fatima & Muhammed, 2017), six different entophytic bacteria have been isolated from pneumatophores and roots of three halophytes (*Salsola imbricata*, *Avicennia marina* and *Haplopeplis perfoliata*) collected from western coastal area of Jeddah, Saudi Arabia. After testing against five fungal pathogens, all were active against fungal pathogens, *Phytophthora capsici* and *Pythium ultimum.*

2- Collection of data: Related literature from 1992-2021 was gotten and compiled from academic search databases, Google Scholar and Web of Sciences. The articles were searched for with the aid of keywords (Halophytes growing on Red Sea coastal areas, phytochemical constituents, pharmacogonasy, ethnobotany, pharmacology, bioactivitry, medicinal plants….etc).

The data was summarized and analyzed.

3- Inlights in the reported pharmacological propreties of some halophytes grown on Red Sea coastal areas

3-1 Aeluropus lagopoides

Aeluropus lagopoides (L.) Trin. ex Thw.(Poaceae) is a salt-secreting, rhizomatous halophyte which dominates inundated coastal areas as wellas inland saline arid flats all over Saudi Arabia (Basahi, 2018) secreting habit and small leaves help the species to survive both in coastal and inland stressful habitats (Mohsenzadeh et al., 2006). Due to its elevated protein content, it can be used for forage production on highly saline wastelands (Gulzar et al., 2003). According to (Amina & Hassan 2020), phytochemicals identified in *A. lagopoides* extracts contained 10 terpenoids, 8 alkaloids, 7 fatty acids, alkanes, 4 steroids, 3 phenols, 2 flavonoid, 2 alcohols,2 esters, and 2 organic acid. The most abundant terpenoids in *A. lagopoides* include: 9-

Desoxo-9-xacetoxy-3,8,12-tri-O-acetylingol and carotene . It is importanat to mention here that the root extract in the previous study showed extra compounds with extra amounts compared to the areal parts *A.lagopoides* reported grown in Adaleed coastal areas in Eygept, was highly recognized as a medicinal plant with nutritive values containing fats and carbohaydrates (Fatima&Rehab2015).

2-2 Zygophyllum coccineum

Zygophyllum coccineum (Zygophyllaceae), is the most widespread Zygophyllum species in Egypt and Saudi Arabia, where it occupies diverse habitats and wide soil range.Phytochemical investigation of the flowering aerial parts of *Z. simplex* in Jeddah led to the isolation of five major metabolites that were identified based on comparison of their spectral data with previously published data and confirmed through co-chromatography with authentic samples. They were identified as isorhamnetin-3-*O*-β-D-rutinoside (Hassanean and Desoky, 1992), myricitrin (Abdou et al., 2013), Luteolin-7-*O*-β-D-glucoside (Ezzat et al., 2012).

The chromatographic separation of extracts of Zygophyllum coccineum L. (Caltrop family) gave 5,6,7 ,8,4'-pentahydroxy flavone-7-O-β-D- glycopyronosid, β-sitosteol and stigmasterol in addition to the identification of many known compounds from the extract fractions by the GC/MS analysis (Mamdouh & Laith2015).

2- 3Tamarix aphylla L

Tamarix aphylla L.,(Tamaricaceae) is on of the most important flora growing in the K.S.A The plant has its traditional importance (for fever, skin diseases, wound healing, swellings, diuretics, etc.) in many provinces in Saudi Arabia. but the scientific validations are yet to be established because of the previous negligence. Recently somebioactivities were carried out to vindicate the traditional claims to establish the scientific protocols. Hypolipidemic and antidiabetic activities were found in various fractions of the extracts. As a major component, tannins are present in considerable amounts.

***Sarcocornia* A. J. Scott**

A new flavonol triglycoside was isolated along with known flavonols from the aqueous methanol extract of *Sarcocornia fruticosa* leaves. Spectral analyses (UV, MS, and NMR) and acid hydrolysis were used to determine the structures. 5 of 6 of these compounds were reported for the first time from the genus *Sarcocornia*. The extract and the five flavonol glycosides were evaluated for antioxidant and inhibition of HCV protease enzyme. Rhamnazin triglycoside .One of them was shown to have a potent HCV protease inhibitor with IC_{50} value of 8.9 μM, while two compounds were effectively scavenged DPPH radicals with IC_{50} values of 3.8 and 4.3 μM, respectively, (Usama&Lamia2019).

Arthrocnemum indicum Not much but really interesting literature data about the halophyte *Arthrocnemum indicum*, a member of Arthrocnemum family.growing in the coastal Swia in Eygept . According to (Zaina, 2020), *Arthrocnemum indicum* methanolic extract showed an activity against Ehrlich solid tumor. This effect could be mediated through induction of apoptosis (as revealed by upregulation of p53, Bax, caspase3, Cdc2 and connexin 26, and reduction of Bcl2 gene/protein expression), and inhibition of inflammation (as evidenced by the reduction of TNFα levels), which supports the use of *A. machrostachyum* extract in the treatment of cancer after the application of further confirmatory clinical trials.

Suaeda monoica

Suaeda monica is one of the most well known halophytic plants in folklore medicine with many different uses such as wounds healing. According to (Nogoud,2018), the antidermatophytic activity for active compounds extracted from some marine plants (Avicennia marina and Suaeda monoica) and the isolated fungi (Aspergillus terreus and Cladosporium cladosporioides) from marine soil obtained from the Red Sea coast in Yanbu- Saudi Arabia. Also, showed the high efficacy of plant extracts, fungal filtrates and dried fungal mycelia extracts on pathogenic fungi and yeasts respectively (M. gallinea, M. gypseum, M. canis, T. mentagrophyts, T. verrucosum, E. floccosum, C. albicans and C. tropicalis) by using various solvents and media. The results showed a highly effective of plant extracts (hot aqueous, methanol of (A. marina), acetone of (S. monoica), as well as the fungal filtrate and dried fungal mycelia extracts of (A. terreus) by using ethanol and acetone, it was cultured on (SDB or PDB). These extracts and filtrates were characterized by high antioxidant activity and high total of phenolic contents. In addition, some bioactive compounds from plant extracts and fungal filtrates separated and estimated by using High Performance Liquid Chromatography (HPLC). Based on the previous results, the minimum inhibitory concentration of the most potent extracts and filtrates on the biological activities of pathogenic fungi and yeasts was determined. Then, new products (Monocin) was prepared from the hot aqueous extract of (S. monoica) and (Terreucin) from filtrate of (A. trreus), which was cultured on (PDB), these product have been proven to be highly effective against pathogenic fungi. Moreover, the toxicity test was conducted for the best product (Monocin), characterized by the least toxicity against the human skin cells. The effect of new proudcts was also investigated by using Scanning Electron Microscopy (SEM) of the dermatophytes.

3- CONCLUSION AND DISCUSSION

This literature review has revealed interesting and promising facts about phytochemicals growing on coastal areas The majority of them do contain different phytochemicals and they have revealed bioactivites.

It is observable that these plants still need more focusing from researches.

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