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Ethnobotanical magnitude towards sustainable utilization of wild foliage in Arabian Desert

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ABSTRACT

The present investigation was deals with identifying traditional uses of medicinal plants for curing a variety of ailments and degree of religious conservation for retention of ethnobotanical knowledge. The study was carried out in the State of Qatar to document the ethnobotanical uses of 58 medicinally important plant species including identification, botanical name, Arabic name, family, habit, habitat, distribution pattern, and the plant parts used for curing variety of ailments. The documented species belong to 54 plant genera and 30 botanical families. They have been used to cure more than 38 different kinds of human ailments. A majority of ethnobotanical plant species belonging to shrubs (41.38%) followed by perennial herbs (31.04%), annual herbs (18.96%) and trees (8.62%) respectively. The frequency of ethnobotanical plant species were recorded maximum in fabaceae (13.79%), followed by lamiaceae, chenopodiaceae (6.89% each), asteraceae, capparaceae, polygonaceae, boraginaceae, aizooaceae (5.17% each), brassicaceae, asclepiadaceae, convolvulaceae, zygophyllaceae, solanaceae (3.44% each) while, remaining 17 families had one (1.72%) species each. Perception of stakeholders concerning prioritization and categorization of potential native plants and 25 ethnobotanical species were prioritized and ranked on the basis of their multipurpose use value, feasibility climatic conditions and Global Sustainability Assessment System (GSAS) criteria measures i.e. drought resistant, low water requirement, growth performance, survival rate, canopy size, adaptation potential, low maintenance and use value for sustainability and landscaping. The analysis emphasized the potentials of ethnomedicinal research, sustainable utilization, conservation initiatives, and urgent need to document ethnobotanical knowledge for sustainability and scientific validation to prevent their losses.

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1. Introduction

Millions of plants constitute the floristic treasure on the planet and are integral part of life and potential curative agents for various health related disorders both of human and animals. Medicinal preparations derived from natural sources especially from plants, have been widely used in various cultures since time immemorial.¹ The tradition of herbal medicine is becoming more accepted globally for conventional medicine as clinical research, analysis and quality control are capable of demonstrating the treatment value of herbal medicine.^{2,3} Furthermore,

traditional plant based medicine is rapidly growing economic importance.⁴ In developing countries, traditional plant based system of medicine is often the only accessible and affordable.⁵ Herbal therapy has come of age and today, medicinal plants play a significant role in human health care globally.⁶ About 64% of the total world population remains dependent on traditional medicine for their healthcare needs.⁷ Plant resources provide humans with materials that have economic, medicinal and forage values.⁸ However, habitat loss, urbanization, industrialization, migration of rural populations to urban areas for livelihood and cultural changes in indigenous communities are threatening this knowledge.^{9–11} During the last decade, considerable attention has been focused not only on how plants are used, but also on how they are perceived and managed, as well as the mutual relationships between societies and the plants on which they depend.¹²

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Herbal medicine is widespread in the Gulf region and medicinal plants can be found in many souqs (local markets). The number of healers practicing folk or traditional medicine in the Arabian Gulf is unknown, but is probably substantial based on the number of published case studies and reports from hospitals that have treated patients with complications from improperly carried out folk medical practices. The practice is dying out (which is mostly unwritten), due to less interest or ignorance of young generation. Besides this, some plants are facing extinction from habitat loss due to impact of global warming, climate change, urbanization and overgrazing of animals. The *Quran* and *Hadith* mention a great number of wild plants that are still used in folk medicine.¹³ Despite some undesirable side-effects, Gulf folk medical practices certainly merit further study in the framework of modern evidence based medicine and randomised controlled clinical trials. Prejudices of scientists and physicians against traditional health care practices, however, are hampering efforts to test traditional plant based medicines for efficacy and safety. The present study is an attempt to (i) document the ethnobotanical knowledge about the medicinal plants being used for traditional health care system (ii) identify and prioritization of medicinally valuable plant species for landscaping and conservation in their natural habitat.

2. Material and methods

2.1. Study area

The State of Qatar is a peninsula extending from Arabian Desert as outcrop in the Western Arabian Gulf, its land is arid or semi-arid and highly saline. It is surrounded by Saudi Arabia, Bahrain, United Arab Emirates and Iran. The country is situated midway along the western coast of the Arabian Gulf between latitudes 24.27°–26.10° North and longitudes 50.45°–51.40° East. It covers approximately 11,437 square kilometres on a low-lying limestone peninsula projecting northward about 160 km into the Gulf. The coastline is approximately 550 km long and bounds the country to the west, north and east. This region is - among the warmest parts of the world; the temperature during summer is as high as 50 °C or more. The rain is scarce and does not exceed 152 mm per year.¹⁴ The vegetation of Qatar comprises herbaceous plants, grasses, dwarf shrubs and a few tree species.

2.2. Methodology

2.2.1. Extensive literature review approach

An extensive literature review was carried out to gather information on locality, Arabic name, botanical name, family and ethnobotanical efficacy of native plants in a desert climate.^{1,3,15–23}

2.2.2. Frequent field survey approach

A preliminary survey of the diversity of the native plants in Qatar has been made and lead to the identification of the plant species which are used for medicinal purposes with the help of local and non-local informants. Regular field surveys were conducted to collect information on habit, habitat, distribution pattern, collection season, use of plant parts and status in their natural habitat.

2.2.3. Interview based approach

During the surveys, attempts were made to collect all possible information regarding the traditional use of medicinal plants. A semi-structured questionnaire, personal interviews, and consultation with local and non-local informants were conducted.¹¹

2.2.4. Learning-sharing approach

Subsequent interviews were conducted with 70 different stakeholders (local and non-local people, traditional healers, shepherds, camel owners, field labourers, plant nursery owners, researchers, architecturists and academicians) having knowledge about the native plants and their uses for different purposes i.e., medicinal, economical and ecological.³ Perception of different stakeholders concerning prioritization, categorization and ranking of suitable native plant species based on their use value and criteria measures of global sustainability assessment system i.e. drought resistant, low water requirement, growth performance, survival rate, canopy size, adaptation potential, low maintenance and use value for urban landscaping and also sharing our experiences with the informants.^{1,24}

2.2.5. Specimen display approach

In this approach, we showed the collected plant specimens to the informants in order to elicit information. Later, we also showed photo of these plants to the people to confirm the identity. The same plant specimens were shown to different people to confirm the accuracy of the results.²⁵

2.2.6. Interactive discussions approach

Meetings and group discussions held with different stakeholders about the different uses of plants, their conservation strategies, prioritization and categorization of reported plant species and the fate of traditional knowledge systems. Cross-checking of collected information was done during field visit and interaction with stakeholders.

3. Results and discussion

The results showed that herbal medicine is still playing a significant role in meeting fundamental traditional healthcare needs of inhabitants in the region of the Arabian Gulf. During the survey, the reported 58 native plants species, distributed among 54 plant genera and 30 botanical families and they were used for curing 38 different kinds of human ailments. A majority of ethnobotanical plant species belonging to shrubs (41.38%) followed by perennial herbs (31.04%), annual herbs (18.96%) and trees (8.62%) respectively (Table 1). The major plant families, which contributed the native plants in folk medicine with maximum frequency were recorded in Fabaceae (13.79%), followed by Lamiaceae, Chenopodiaceae (6.89% each), Asteraceae, Capparaceae, Polygonaceae, Boraginaceae, Aizoaceae (5.17% each), Brassicaceae, Asclepiadaceae, Convolvulaceae, Zygophyllaceae, Solanaceae (3.44% each) while, remaining 17 families had one (1.72%) species each (Fig. 1).

Initially few native plant species were tried by local people, professional plant nursery owners, researchers and experts for urban landscaping, however subsequent investigation showed that out of 58 recorded ethnobotanical plant species, 25 (*Tecomella undulata*, *Dodonaea viscosa*, *Nerium oleander*, *Capparis cartilaginea*, *Aerva javanica*, *Aeluropus lagopoides*, *Suaeda vermiculata*, *Lavandula subnuda*, *Arnebia hispidissima*, *Leptadenia pyrotechnica*, *Lycium shawii*, *Blepharis ciliaris*, *Alhagi graecorum*, *Aizoon canariense*, *Rhanterium epapposum*, *Calotropis procera*, *Calligonum comosum*, *Senna italica*, *Citrullus colocynthis* (check the spelling), *Cleome brachycarpa*, *Gisekia pharnacioides*, *Grewia erythraea*, *Haloxylon salicornicum*, *Convolvulus glomeratus* and *Zaleya pentandra*) were prioritized, categorized and ranked based on their use value, feasibility to local climatic conditions and fulfil the criteria measures of global sustainability assessment system. Based on perception of experts, their use value (ecological, economical, and medicinal) and suitability to climatic conditions *Tecomella undulata*

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