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REVIEW

Saudi medicinal plants for the treatment of scorpion sting envenomation

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Abstract Scorpion sting envenoming poses major public health problems. The treatment modalities include antivenoms, chemical antidotes and phytotherapy, with varying degrees of effectiveness and side effects. In this investigation, we reviewed the use of Saudi medicinal plants for the treatment of scorpion sting patients. The relevant literature was collected using the online search engines including Science Direct, Google and PubMed with the help of specific keywords. We also used the printed and online resources at our institutional library to gather the relevant information on the use of medicinal plants for the treatment of scorpion sting patients. A descriptive statistics was used for data compilation and presentation. The results of this survey showed the use of at least 92 medicinal plants with beneficial effects for treating victims of stings of different scorpion species. These commonly used herbs spanned to 37 families whilst different parts of these plants were employed therapeutically for alleviation of envenomation symptoms. The application of leaves (41%) was preferred followed by roots (19%), whole plant (14%) and seeds (9%). The use of latex (4%), stem (3%), flowers (3%) and bark (3%) was also reported. In some cases, tannin (2%), rhizome (1%) and shoot (1%) were also used. In conclusion, herbal medicines are effectively used for the treatment of patients with scorpion envenomation. This type of medication is free from side effects as observed with chemical antidotes or antivenom therapy. It is important to identify the active ingredients of herbal drugs for improving their therapeutic potential in traditional medicine. © 2016 Production and hosting by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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1. Introduction

Scorpions are widely distributed throughout the world and pose serious health hazard due to their poisonous venoms (Uawonggul et al., 2006; Al Asmari et al., 2012, 2015, 2016). The scorpion venom is a heterogeneous mixture of various neurotoxins, cardiotoxins, nephrotoxins and haemolytic that exert acute toxicological effects in humans (Bawaskar and Bawaskar, 2012). The degree of envenomation is associated with several factors including scorpion species, venom lethality, dose of venom injected at the time of sting and the victim's physiological response to venom (Karnad, 2009). The common symptoms in scorpion sting victims are severe pain and inflammatory reactions whereas mortality may happen in rare cases (Uawonggul et al., 2006). The synergistic impact of cardiac, respiratory, autonomic and metabolic abnormalities in scorpion sting patients may lead to multisystem failure and death (Murthy et al., 1991; Yugandhar et al., 1999; Bawaskar and Bawaskar, 2007).

The current therapeutic regimens for alleviation of scorpion venom-induced symptoms include prazosin, angiotensin-converting enzyme inhibitors, insulin and antivenoms (Murthy et al., 1991; Bagchi and Deshpande, 1998; Yugandhar et al., 1999; Bawaskar and Bawaskar, 2007; Krishnan et al., 2007; Deshpande et al., 2008). Sodium channel blockers (Fatani et al., 2000) and β 1-adrenergic agonist dobutamine (Gupta et al., 2010) have also served as antidotes to neutralize the toxic effects of scorpion venom. The use of herbal sources in traditional medicine is not a new concept but was in practice for more than 5000 years (Sher and Hussain, 2009). It is important to note that more than 25% of drugs are of plant origin and more than 100 active compounds and synthetically produced drug analogues come from natural precursors (Shinwari, 2010).

Two thirds of the Arabian peninsula are occupied by the Kingdom of Saudi Arabia, covering a wide range of natural sites with great biodiversity and synergistic framework of associated ecosystems (Ahmad and Ghazanfar, 1991; Ghazanfar, 2007). Although there are many reports on barcoding of medicinal and wild plants of Saudi Arabia (Arif et al., 2010a,b; Bafeel et al., 2011, 2012a,b) a comprehensive survey of the use of medicinal plants for the treatment of scorpion sting victims is lacking. In the present study, efforts have been made to document important medicinal plants used for the treatment of scorpion sting patients as an alternative medicine.

2. Methods

This research survey was conducted using the electronic search engines pertaining to scientific research data including

PubMed and Science Direct. We also approached the libraries of biological and chemical abstracts. The key words used for the literature search of this study were "Saudi Arabian medicinal plants, ethnobotanical evidences in scorpion sting and natural products". Selection of plants was focused on their therapeutic potentials as anti-venom in folklore remedies. Specific searches were also made to enlist already reported anti-venom constituents with possible mechanism to support the anti-venom characteristics of medicinal plants of Saudi Arabia. The outcome of the results were rechecked and compared with literature of current drugs that are employed in combating signs and symptoms of envenoming by scorpions.

3. Results

The findings of this survey identified 92 medicinal plants distributed at various places in Saudi Arabia, and have been enlisted in alphabetical order of family, scientific name and the plant portion used for the treatment of scorpion sting victims (Table 1). These species are distributed in 37 families among which Leguminosae and Apocynaceae have maximum representation with 11 and 10 plants. The families Amaranthaceae and Compositae represented 8 and 6 plants respectively whereas the families Euphorbiaceae, Poaceae and Solanaceae had 5 plants each. Three plants each were belonged to families Apiaceae and Convolvulaceae, whereas 2 plants each belonged to families Boraginaceae, Cucurbitaceae, Cyperaceae, Moraceae, Nyctaginaceae, Plantaginaceae, Portulacaceae and Rutaceae. The remaining families including Acanthaceae, Aizoaceae, Annonaceae, Araceae, Aristolochiaceae, Burseraceae, Capparidaceae, Ceratophyllaceae, Comelinaceae, Lauraceae, Lythraceae, Malvaceae, Myrtaceae, Oxalidaceae, Papaveraceae, Plumbaginaceae, Rhamnaceae, Salvadoraceae, Verbenaceae and Zygophyllaceae represented only single medicinal plant per family, with anti-venom potential (Table 1). All the plants mentioned in this study are distributed at various places throughout the Kingdom of Saudi Arabia (Flora of Saudi Arabia, 2014). The data showed that several parts of the medicinal plants were used for their anti-venom potentials. Of these, the use of leaves predominated (41%) followed by roots (19%), whole plant (14%) and seeds (9%) as shown in Fig. 1. Plant latex was used in 4% cases whereas stem, flower and bark were applied in 3% of the scorpion envenoming victims. Fewer cases were treated with tannin (2%), rhizome (1%) or shoot (1%) (Fig. 1).

4. Discussion

The ethnobotanical resources of Saudi Arabia can be broadly classified into fibre yielding plants, oil-producing plants,

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