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Ethno-botanical remedies used by pastoralists for the treatment of livestock diseases in Cholistan desert, Pakistan

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ABSTRACT

Ethnopharmacological relevance: Account of the traditional plant based *viz.* ethno-botanical remedies used by the pastoralists of Cholistan desert, Pakistan, for the control and treatment of livestock diseases and ailments.

Materials and methods: The study was conducted across five locations in Cholistan desert, Pakistan, using a structured questionnaire to collect data from 100 livestock farmers (LF) and 20 livestock healers (LH). From correlation analyses 3 least correlated variables were identified among 5, which were representative of LFs. Cluster analysis was performed on the basis of these 3 variables and LFs were grouped into 3 logically different clusters. Kruskal–Wallis test and crosstab analyses were used to detect significant differences between clusters and effects of various variables on their use of ethno-botanical remedies.

Results: Most of the male only interviewees (LF 78%; LH 70%) were married and illiterate (LF 66%; LH 70%). LH had larger herds (average 109 animals) than LF (average 85 animals) and were more experienced in livestock husbandry and management. LF spent about 162.5 Euros annually on the treatment of their livestock, but there was great variability in expenditures. Average animal treatment experience of LH was 29 years; all were experts in treatment of all types of diseases (100%) and animal species (70%).

Eighty-six traditional remedies based on 64 plants belonging to 43 families were used. Capparaceae was the botanical family with the largest number of used species (4), followed by Chenopodiaceae, Poaceae, Solanaceae and Zygophyllaceae (3). Aerial parts (43%), leaves (26%), fruits (9%), seeds and seed oils (9%) were frequently used parts, while flowers, roots, bulbs and pods were less frequently used ($<5\%$). Common preparations were decoction, jaggery and ball drench; oral drug administration was very common and doses were estimated using lids, spoons, cups and handfuls. Doses used for different animal species varied depending on animal age, size and physical condition and severity of the disease.

Conclusions: Pastoralists are practicing traditional plant-based livestock medication without scientific validation as they cannot afford allopathic drugs due to their livelihood conditions. Therefore, efficacy of documented medicinal plants against the most prevalent livestock diseases should be evaluated, in order to recommend effective preparations and treatments to this poor population group.

1. Introduction

In many rural areas of developing countries the use of medicinal plants is the mainstay of primary healthcare. The World Health Organization estimated that 60% of the global population uses traditional medicine for the control and treatment of various diseases (World Health Organization, 2010). Reasons for the still important use of traditional plant-based remedies by rural communities are (i) the strong relation of communities with local flora, (ii) the easy accessibility of local plants and (iii) their lack of side effects, (iv) the simple mode of their use, and (v) poor access of rural dwellers to allopathic drugs and their high costs. Ethno-veterinary medicine (EVM) is a specialized area of ethno-botany that deals with the study of traditional knowledge, methods, practices and beliefs of people about health care, remedies and clinical practices for disease treatment and prevention, husbandry and production of livestock (McCorkle, 1986). EVM knowledge, like other traditional knowledge systems, is transmitted orally from generation to generation (McCorkle, 1986; McCorkle, 1995), and is being lost due to absence of verbal transmission, rapid socio-economic, environmental and technological changes (Longuefosse

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and Nossin, 1996; Martin, 1996). However, in developing as well as in developed countries, the use of traditional plant-based remedies is regaining attention (Uprety et al., 2012; Monigatti et al., 2013; Motlhanka and Nthoiwa, 2013).

In Pakistan, rural dwellers are using a large variety of plants for various therapeutic purposes. Yet, only a few studies investigated usage and effectiveness of traditional remedies for treating livestock diseases in district Muzaffar Garh (Jabbar et al., 2006) and of helminth infestations in Sahiwal and Bhakkar districts of the Punjab, respectively (Hussain et al., 2008; Babar et al., 2012). The plant species documented in these studies are region-specific and knowledge gained in one region cannot be transferred in all cases to another one. The present study concentrated on a quite poor and remote area of Pakistan, Cholistan desert, which in terms of geography and climate is quite different from the above-mentioned regions. The Cholistan desert region, with its northern border located about 270 km south of Lahore in the eastern part of Punjab Province, covers an area of 2.6 million hectares (Food and Agriculture Organization, 1993). It is one of the least developed areas of the province, inhabited by livestock nomads of different ethnic groups (Khan, 1992; Akhter and Arshad, 2006). These groups have their distinct ways of life, beliefs and tradition, and have been utilizing local plants for various purposes over generations. In 2006, the region hosted about 1.3 Mio head of livestock, more than twice as much as the local human population (Livestock Census of Pakistan, 2006). Ceremonies like weddings, funerals and tribal celebrations include slaughtering and exchange of animals, and traditionally wealth is assessed from the number of animals, especially cattle, sheep and goats owned by the individual (Farooq et al., 2008). Although a significant surface of Cholistan is covered with sand dunes, about 60% is inhabited by highly adapted grasses, shrubs and trees. These plants survive extended drought periods and provide nutritious fodder during favorable seasons (Khan, 1992); they are furthermore used as vegetables, fruits, fuels, and to fabricate agricultural implements. Due to their poverty and remoteness, livestock keepers cannot easily contact veterinary personnel; therefore they use local plant species to treat their animals, but also their own ailments (Arshad et al., 2003).

In view of the above, we discussed, with pastoralists and local animal healers in the Cholistan region, their general livestock husbandry practices, recurrent livestock diseases and traditional plant-based disease treatments, thereby aiming at identifying those remedies that are considered most effective.

2. Material and methods

2.1. Study area

Cholistan desert is about 480 km long and 32–192 km wide, located between latitudes 27°42′–29°45′ N and longitudes 69°52′–75°24′ E (Food and Agriculture Organization, 1993; Akbar et al., 1996). Average annual rainfall is only 128–175 mm; the ground water is brackish and 25–90 m deep (Akbar et al., 1996). Mean summer temperatures range from 34–37 °C and maxima reach 50 °C in May and June; mean winter temperatures range between 14–16 °C with minima below zero during December and January (Khan, 1992; Arshad et al., 2007).

The people of Cholistan lead a semi-nomadic life, moving from one place to another in search of water and fodder for their animals. The local tribes store rain water in man-made ponds called *tobas,* dug in the ground or between sand hills. This water serves the consumption of men and livestock alike. Habitations are small and sometimes extremely scattered around the *tobas*. Various locations within the desert are named after the owners of *tobas* or historical forts. For this study, 5 locations were selected based on information concerning number of inhabitants, animal species kept and route maps that were obtained from Cholistan Development Authority Bahawalpur. Each location represented an administrative unit consisting of 3–9 villages, *tobas* or both, and was at least 30 km apart from the other locations (Fig. 1).

2.2. Data collection

From July 2010 until January 2011 a structured questionnaire with open-ended and closed questions was used for face-to-face interviews of 100 livestock farmers (LF) plus 20 livestock healers (LH), all keeping flocks dominated by sheep and goats. The questionnaire was pre-tested with 12 farmers and modified as required; it covered the following major areas:

1- Demographic household aspects (age, education, marital status);
2- Livestock herd size and composition, feeding aspects;
3- Detailed animal health care practices;
4- Detailed use of traditional remedies and medicinal plants; respondents were asked to show the plant species (except in the case of commonly known species) in the field and describe in detail their use.

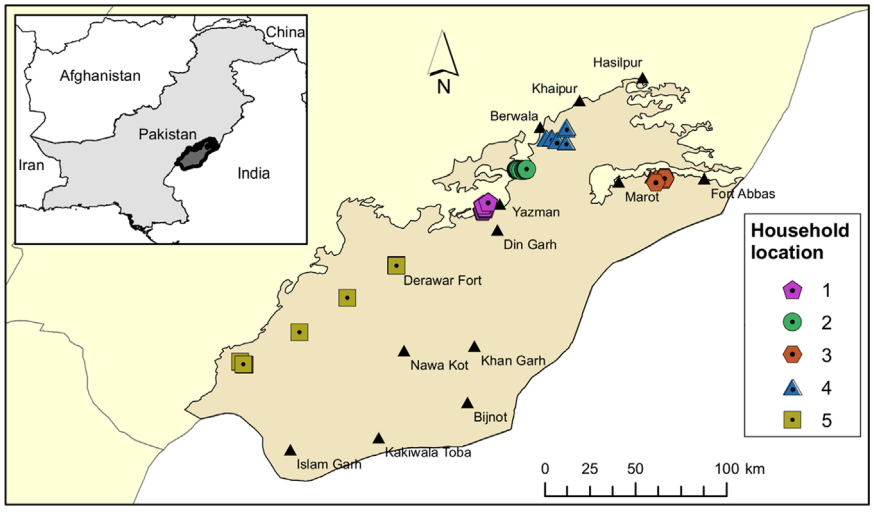

Fig. 1. Map of the study area in the Cholistan desert, Pakistan, with the homesteads of interviewed pastoralists and the boundaries of the five locations.