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A survey on medicinal materials used in traditional systems of medicine in Sri Lanka



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ABSTRACT

Ethnopharmacological relevance: Sri Lanka has rich traditional systems of medicine, which cater to 60–70% of the rural population's primary health care needs. However, development of existing systems has been hindered by the unavailability of up-to-date information on medicinal materials and other related issues. For streamlining purposes, we investigated the present-day scenario of country's medicinal plant industry by gathering up-to-date information on the types of raw materials required, their aggregate quantities, heavily used and rare materials, family wise distribution, challenges faced by stakeholders as well as other pertinent issues.

Materials and methods: The present survey covered the selected government Ayurveda hospitals, traditional and Ayurveda practitioners, large and small-scale herbal drug and cosmetic manufactures, importers, collectors and Ayurveda commissioners throughout the country. A systematic questionnaire was distributed and face-to-face interviews were conducted. Collected data were tabulated and analyzed.

Results: A diverse range of medicinal materials, including 290 species (64.73%) from dried plants, 59 (13.17%) from fresh plants, 69 (15.40%) from minerals, 18 (4.02%) from animal sources and 12 (2.68%) from other sources were recorded. A total of 302 plant species belonging to 95 families, dominated by Leguminosae family, was listed. Out of these, 46 species belonging to 35 families were used intensively. A large portion of herbal materials was of completely local origin (71.13%) while 26% were imported and the rest (2.87%) can be obtained by both routes. Leaves were the most highly used part of the plant (22.2%). High price, poor quality, insufficient or totally absence of continuous supply and adulteration were the main constraints faced by the stakeholders. The unavailability of systematic cultivation and processing protocols, incorrect identification, and lack of proper quality control methodologies were identified as major challenges of the industry.

Conclusion: The present study revealed a currently bleak scenario of the medicinal material industry in Sri Lanka. The results clearly demonstrated the need to implement a national strategy to address the major challenges faced by different stakeholders. Information generated through this study could be effectively incorporated for the formulation of a sustainable development strategy for this industry.

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1. Introduction

According to the World Health Organization, about 80% of the population in developing countries is still dependent on traditional systems of medicine for their primary health care needs (WHO, 2008). Sri Lanka has rich traditional systems of medicine (Ayurveda, Siddha, Unani and Deshiya Chikitsa), which play a

significant role by fulfilling 60–70% of the rural population's primary health care needs (Perera, 2012). There are 20,353 registered Ayurvedic physicians and more than 8000 traditional practitioners, who are engaged in public health care, in which herbal products and materials are largely employed (Anon, 2011).

Further, Sri Lanka is considered as one of the most biologically diverse countries in Asia, consisting of 29.66% forest cover in 2010 (World Bank, 2012). There are 3771 flowering plant species, out of which about 927 (24%) are endemic to the country (Gunatilleke et al., 2008). It has been reported that 1430 species representing 838 genera belonging to 181 families are considered medicinal. Out of the total number of medicinal plant species, 174 (12%) are endemic

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to Sri Lanka (Sugathadasa et al., 2008). Moreover, around 250 species are commonly used in traditional medicine, out of which 50 are heavily used (Pushpakumara et al., 2002).

Medicinal plant materials surveys play an important role in the documentation of medicinal materials used by different systems of medicine. According to the survey conducted by IUCN in 2001, the demand for herbal materials in Sri Lanka in the year 2000 was 3,864,760 kg, valued at an estimated SLRs of 386 million. Out of this, approximately 1.5 million kilograms were imported annually, at a cost of around SLRs of 125 million due to lack of systematic production. Further, available literature on the current situation of medicinal material usage and related issues are scarce or too old. Therefore, the survey was carried out to provide a present-day scenario for streamlining the medicinal materials industry of Sri Lanka. This work has gathered up-to-date information on the types of raw materials required, their aggregate quantities as well as the problems faced by stakeholders. The collected information will have important implications for formulating a national strategy in order to ensure the sustainability of this important industry.

2. Materials and methods

This survey was conducted from September 2012 to April 2013 and different stakeholders of the medicinal material industry in Sri Lanka were targeted. A total of 111 stakeholders were selected based on the registry maintained at Department of Ayurveda. However, due to the diverse nature of the stakeholders, they were grouped into the 6 major categories listed below. Fig. 1 shows the distribution of the study group in the different provinces while Table 1 shows the number of respondents for each category.

1. Nine commissioners from the Provincial Departments of Indigenous Medicine (Western, Southern, North Western, Sabaragamuwa, Uva, Central, North Central, Eastern and Northern provinces), who are in-charge of 69 Ayurveda hospitals and 208 central dispensaries.
2. Two directors from both the central Ayurveda teaching and research hospitals.
3. Fifteen large scale drug and cosmetic manufactures, distributors and exporters.
4. Thirty five small and medium scale drug and cosmetic manufactures and distributors.
5. Forty traditional and Ayurveda practitioners.
6. Ten importers and distributors.

A systematic questionnaire was prepared and pre-tested by 5–10 representative respondents prior to the formal survey. The major information gathered included: 1) types of raw materials used; 2) their annual requirements; 3) the value expended for individual materials; 4) accessibility of materials; 5) the most required parts of the medicinal plants; 6) material source [whether obtained locally (cultivated/wild collected) or imported]; 7) quality of materials; 8) constraints and challenges faced, and 9) suggestions for the improvement of the industry. The final questionnaire was then distributed among the stakeholders. In addition, face-to-face interviews of 30 randomly selected representatives from the above focus groups were scheduled and conducted using a semi-structured questionnaire in order to obtain more detailed information particularly regarding questions 7 and 8. Collected data were tabulated, and analyzed using descriptive statistics. Regarding the information on the types of materials, these were scientifically identified with the assistance of a systematic botanist, mineralogist or chemist. In some cases, they were compared with available samples deposited at the institute. Vernacular (Sinhala) names with scientific names were validated using available text books,

(Bandaranayake et al., 1974; Jayaweera, 1981; Senaratne, 2001; Abeywardhana, 2013) and other classical texts in the National Herbarium in Sri Lanka.

3. Results and discussion

3.1. Types of raw materials

The present study surveyed different medicinal materials, which have been widely used in Sri Lankan traditional, and Ayurveda systems of medicine since ancient times. Results showed that, plant materials (both dry and fresh) play an important role by contributing around 78% of the total raw materials utilized by different medical systems (Table 2). This is consistent with a previous pharmacological survey conducted by Lev and Amar (2000), who reported a contribution of 85.1% from plant materials for the Israel drug market. Moreover, 71.13% of the medicinal plants/herbal material was obtained from local sources, 26% was imported, while 2.87% was obtained by either direct importation or from local collection. Our results are in close agreement with the IUCN (2001) data, which reported that 68% came from local sources while 32% was imported in year 2000. Although the use of animal materials was more prominent in earlier days, it is not currently flourishing. The reason may be due to changes in patterns of thinking brought about by people's recent increased sympathy towards animals.

3.2. Use of medicinal plants/plant materials

There are around 302 medicinal plant species that are being utilized in traditional and Ayurveda systems of medicine in Sri Lanka. The plant species/materials were categorized into the specific groups with the aim of elucidating their demand, monetary values and sources. Table 3 lists these pertinent data.

3.2.1. Heavily used materials

Heavily used materials were identified based on the total respondents' (excluding Cat. no. 6) annual requirement. Data yielded 46 heavily used (more than 10,000 kg/year) medicinal plant species belonging to 35 families (Table 3). These are almost in accordance with Pushpakumara et al. (2002), who reported 50 heavily used species. Of the 46 species, 45 belong to 35 families, which are considered as easily cultivable in Sri Lanka's prevailing soil and climatic conditions (IUCN, 2004). Only one species, *Glycyrrhiza glabra* L. is not locally available. Commencement of commercial cultivation of these plants would ensure a continuous supply of good quality and authentic raw materials to the medicinal plant industry. Furthermore, it will create work opportunities for the unemployed youths and at the same time save considerable amount of foreign exchange annually.

3.2.2. Most demanded plant materials

Out of the heavily used plant materials, 12 have a huge demand that is in excess of 50,000 kg per year. These include *Centella asiatica* (L.) Urb. (366,795 kg), *Zingiber officinale* Roscoe (350,561 kg), *Sesamum indicum* L. (136,971 kg), *Terminalia chebula* Retz. (123,397 kg), *Terminalia bellirica* (Gaertn.) Roxb. (100,218 kg), *Phyllanthus emblica* L. (81,488 kg), *Vitex negundo* L. (67,770 kg) *Asparagus racemosus* Willd. (74,040 kg), *Trachyspermum roxburghianum* (DC.) H. Wolff (59,893 kg), *Azadirachta indica* A. Juss. (60,161 kg), *Pavetta indica* L. (56,021 kg) and *Indigofera tinctoria* L. (50,512 kg). Higher demand for these materials may be due to their diverse usage in many medicinal formulae. According to the Sri Lankan Pharmacopoeia, they are major ingredients of more than 50 formulas (Anon, 1979).

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