Abstract

This Ph.D. study is on the plant raw drug markets in southern India with particular reference to adulterants and substitutes of the traded medicinal plant species. The main two objectives are:

1. to explore the major raw drug markets in Tamil Nadu and Kerala, identify and enlist range of botanical raw drugs traded.
2. to identify the plant sources of these raw drugs including substitutes, adulterants.

A systematic market survey was undertaken in the selected 6 unregulated plant raw drug markets of two states: i) Tamil Nadu (Madurai, Virudhunagar, Thoothukodi and Dindigul) and ii) Kerala (Palakkad and Thrissur). In the field survey, interviews were conducted with Knowledge Partners (KP) such as primary collectors, traders, pharmacy individuals and ISM practitioners. Frequent market visits were undertaken to collect specimen sold as botanicals, recorded the dynamics of trading system including trade route, regional specificity of raw materials, business as usual practices that affects the Quality Assurance (QA), Good Manufacturing Practices (GMP) and Resource Augmentation (RA) processes of medicinal plants.

Key message of this study: Medicinal plants trade is complex, dynamic and influences the making of commodities that go by the same name.

Key learnings:

1. During the study period 2010 to 2016, an extensive field survey was conducted in two states comprising of six plant raw drug markets viz. 1. Tamil Nadu (Madurai, Virudhunagar, Thoothukodi and Dindigul) and 2. Kerala (Palakkad and Thrissur). Interviews were conducted with identified primary collectors, traders, pharmacy individuals, ISM practitioners related to trade of medicinal plants. Alongside this effort, go downs/ retailers/wholesalers/collection points, cultivation trail plots were visited to get better understanding of the trade scenario. The plant raw drug specimen (dried/and fresh forms) were collected from markets, macroscopic
characters were examined to identify the species. Authentication was carried out by the senior taxonomist in FRLHT. The trade names and corresponding scientific names were correlated to each of the botanicals collected during the study. These authenticated materials were deposited in the FRLH herbarium and raw drug repository, FRLHT, Bangalore. Further these materials were compared with the existing collections in the herbarium.

2. The survey generated an exhaustive list of 779 plant raw drugs corroborated to 298 botanical species traded in the select markets. A ‘ready reckoner of raw drug traded from the study area’ or a ‘catalogue’ with botanical names, trade names, striking features and accession numbers was prepared (Suma et al. 2017).

3. In continuation with the market survey, a special case study was taken up to understand the dynamics and diversity of medicinal plants resources sold in the weekly local market, the Sunday Market (Tilagar tidal) market in Madurai, Tamil Nadu. An ethno-botanical investigation was carried out to document ‘fresh herbs’ dispensed by the Valaiyar communities, who are chiefly folk healers-cum-traders. About 132 plant species was inventoried with their preparation methods and medical uses. These medical uses were subjected to assessment as per Traditional Systems of Medicine (TSM) such as Ayurveda, Siddha and Unani. The study revealed that these local market (Shanties) serve as a Traditional Medicine Service Point (TMSP) similar to Primary Health Care dispensaries. TMSPs not only manage community health at affordable price but also easily adaptable by the community (Suma et al. 2018).

4. Subsequent to the market survey, analysis of the ‘raw drug catalogue’, comprising of 779 botanicals resulted in shortlisting a range of 65 trade names with multiple botanical sources. These botanicals were further classified into categories such as: Originals (accepted sources, officinal parts as per AFI, API or Scholarly works); Alternatives (accepted alternative species as per AFI, API or Scholarly works or belonging to the same family of the originals); Substitutes (species beyond the purview of AFI/API or Scholarly work); Replacements (a different species as a make shift arrangement); Deceptive (look alike/bio mimics from different
families); Spurious (unrelated entities, falsified); Context Based Aberrations/false naming (CBA): originals with all parts as admixture of the same species/originals with others species as admixture (this includes those plant parts mixed together belonging to cousin species/members of unrelated botanical families) as blending materials/inert/bulk make up materials/inert materials.

5. During the study, one of the highly traded plant raw drug entity namely Balaa (Sanskrit name) was chosen for pharmacognosy study, due to the multiple plant species being sold in the market. This has resulted in commoditization, controversial identity thus affecting the QA. Approximately 14 species are recorded to be used as Balaa. Study of trichomes (hairs) was undertaken for these species thus leading to development of a simple diagnostic key.

6. In continuation with the pharmacognosy studies, additionally DNA barcoding study with specific ITS2 and MatK markers were taken up for the select commercial products claiming to have Sida cordifolia L. correlating to Balaa ingredient. Popular selected products such as Balaa kwatha, Balaa choorna, Rasanadi choorna, Kachoradi choorna were chosen for the study. None of the samples showed presence of Sida cordifolia. The study warrants for the Next Generation Sequencing (NGS) of the popular all the Balaa candidate plant species, thus helping in pharmaco-vigilence and QA of the raw materials used at production level.

The Ph.D. work is presented as chapters divided into (1) Introduction (2) Review of literature on the trade aspects of botanicals (3) Overall methodology (4) Complexities in the select plant raw drug markets of Tamil Nadu and Kerala (5) A case study of the ‘Fresh Plant Drugs’ dispensed in the Tilagar tidal market of Madurai, Tamil Nadu, as a Traditional Medicine Service Points for managing Primary Health Care (6) Many Modes of Making a Plant Drug Commodity (7) Application of pharmacognostic tools that will ease in identification of Balaa group of resources using anatomy (8) Application of ITS2 and matK barcode markers to authenticate presence of Balaa in select traditional formulations (9) Conclusions.