



TRADITIONAL AND MODERN COLLECTING METHODS OF RAW MATERIAL IN HERBAL DRUG UTILIZATION: A REVIEW

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ABSTRACT

Traditional system of medicine in Sri Lanka included Indigenous medicine, Ayurveda Medicine, Unani Medicine and Siddha Medicine. In this system of medicine utilization of herb plants are considerably higher than mineral and animal product. Hence adulteration and substitution are frequent in raw material trade of medicinal plant; determine adulteration and substitution as well as collecting method of medicinal plants through morphologically and organoleptic is essential. Therefor the objective of this study is to find out the detail literature review of the conceptual evidences based on collecting and authentication of the herbal material according to traditional and modern methods. According to traditional medicine there are pharmaceutical procedures for any drug, involves various steps starting from identification and collection of authentic raw materials, application and standardized processing techniques and production of quality drug to packing and storage of the produce drug. According to Studies regarding modern methods of raw material collection was comparatively similar to traditional methods. In this study method of collecting of raw material according to traditional and modern view is discusses rationally. Therefor further research is acquired to study about the chemical validity of relationship between traditional and modern collection methods of raw material.

KEY WORDS: *traditional Medicine, Raw material collection, Herbal Drug utilization*

1. INTRODUCTION

Since ancient times, medical plants and simpler herbal remedies have been used in all parts of the world for the treatment and alleviation of various disease conditions. Even though the use of medicinal plants is as old as mankind itself, their controlled application, the isolation, and characterization of the active ingredient started only near the past. Nowadays physicians depend on a third person for collection, primary processing of the drug, so getting genuine and pure drug material is a matter of chance. Herbal materials are being used abundantly, in the market it is sold in the form of various methods. So chances of adulteration with herbal plant raw materials are highly increasing.

“Yat sadhayati tat pahalam”

The ultimate pryojana of chikitsa is to get expected Phala. Chikitsa chatushpada happens to be the base of that. The Dravya is given the next important role after Bhishak. Hence to have all four abilities like Bahukalpa, Bahuguna, Sampanna, Yogya, the dravya should be honest and unadulterated. In the ancient period, vaidyas used to stay amidst medicinal plants and them themselves used to collect medicinal herbs, prepare medicine,

and administer to the patients, so there were no chances of adulteration (Pujari, 2011).

According to the World Health Organization presently 90 % of the world population still relies completely on raw herbs and unrefined extracts as medicines. About 80% of the populations in developing countries are still dependent on traditional systems of medicine for their primary health care needs (Masand, Madan, & Balian, 2014). Demand for herbal products worldwide has increased at an annual rate of 8% and it is estimated that the global herbal market would be worth US\$5 trillion by the year 2050 (Kankanamalage, Dharmadasa, Abeyasinghe, & Wijesekara, 2014). Sri Lanka has rich traditional systems of medicine which play a significant role by fulfilling 60-70% of the rural populations' primary health care needs.

There are 20,353 registered Ayurveda physicians and more than 8,000 traditional practitioners, who engage with public health care, which herbal products and materials are mostly employed. Sri Lanka is considered one of the most biologically diverse countries in Asia, with about 16.5% of forest density in 2019. There are 3,771 flowering plant species, out of which about 927 (24%) of them are endemic to the country (Perera, 2012). About 250 species of medicinal plants are



commonly used in the traditional medicine of which 50 species are heavily used. Ethno pharmacological/botanical surveys play an important role in the documentation of medicinal materials used by different systems of medicine. However, in Sri Lanka, available data on the national demand for herbal materials are scarce or too old.

Due to the worldwide acceptance of Ayurveda, there is a continuous increase in request for herbal drugs in the last few decades thus exerting huge pressure on natural resources. Today many of the manufacturers are doing more production of medicines by using raw materials from the market. Procurement of genuine and pure drug is the need of the day. Ayurveda mentions many drugs having multi facilities activity which are utilized as medicine, food, spice, cosmetics, etc. So to meet such a countless demand quite visibly it is unfairly adulterated.

In medicinal plants, the secondary metabolites or active compound are made available through appropriately performed harvesting techniques. The scientificity behind ancient Ayurveda harvesting techniques and the standardization narrated by Acharya Charaka, Sushruta, Chakradatta, Yoga Ratnakara, Rasa Ratna Samucchaya, Bhaishajya Ratnavali, Rasatarangini, etc. are also proven by modern scientific methods. To achieve a good mandatory therapeutic result it is obligatory to collect the drug bestowed with optimum Rasaveeryadi qualities. In Ayurveda literature, drug collection has been stated according to various parts of the plant in respective seasons, Nakshatras, Veeryas on the basis of therapeutic uses.

According to Modern science, drugs retain the uppermost potentiality during its collection period. The climate, temperature, rainfall, duration of daylight, altitude, methods of cultivation, the effect of a lunar cycle, collection from the wild area, soil condition, and methods of collection, processing, and storage have an impact on the secondary metabolites of the plant ultimately which affect the therapeutic efficiency of the drug.

2. METHODS OF RAW MATERIAL COLLECTION

2.1. Traditional Method

The collection of herbs plays major role in herbal drug preparation process. Herbs are gifts of Mother Nature. Ancestors utterly depended upon this nature only. They established a way of life in which they described the maintenance of health by using nature only. In this, the ancients explained some of the secrets of life, and also how one could live without ill-health. Many herbal preparations were used to maintain health.

In India herbal preparation practice exists in two major forms. The first one is the preparation of the

herbal medicine according to classical texts, e.g. Ayurveda, Siddha, Unani, Homeopathy, etc. The second is in accordance with folk medicine practices. The latter one is more popular in villages and exists in some of the families only. In nature we can get abundant raw materials. We can select proper food and herbs to maintain health. There is a strong link between man, herbs, food and nature.

Sharngdhara quotes the Sharad as the best period to collect the drug for all therapeutics uses and also drugs intended for Shodhana karma. In case of Vamana and Virechana drugs can be preferably collected at the end of Vasant rutu (B. Tripathi, 2007). Bhavprakash and Nighanturatnakara quoted the same opinion and specified the collection on auspicious day that to in the early morning (Krushnachand). Ashtanghrudya, quoted about the collection of drugs in their fully matured condition on Pushya, Mrugshira and Ashwini Nakshatra and on auspicious time in a day.

Nature and our bodies are linked by six tastes: sweet, sour, salt, pungent, bitter, and astringent. The body is maintained by food using the six tastes (Shad Rasa). Generally we can divide people into three categories: the lean (Vata); the medium (Pitta), and the stout (Kapha). Keeping in mind the nature of the body, one should use herbs and food containing these six tastes. The lean person; a person with Vata body constitution should use sweet sour and salty food, and regulate the arrangements to preserve health. The medium person should use sweet, astringent and bitter tastes. The stout person should use herbs and food containing more pungent, bitter, astringent tastes. Thus the taste; *shad rasa* is also very important during the collection of the herbs in order to preserve its quality. Although the whole plant is beneficial, in some of the plants, the following parts are more useful: the root, stem, bark, latex, leaves, flowers and fruit.

2.1.1. Limitations for Collecting Raw Materials

There are some boundaries concerning the collection of herbs. The main problem is that of identification of herbal plant correctly. This is mainly because of their ethno botanical and ethnopharmacological variations as well as names in different places. Additionally it makes trouble is unavailability of skilled persons for taxonomic documentations. Furthermore the herbs do not exist in all the seasons, and are also of inadequate amount. Therefor cultivation is very important. There are also some seasonal standards for collecting herbal parts. Basically the root should be collected in summer, the leaves should be collected in the rainy or spring season; and the latex in winter.

Table 1: Specific Useful parts and plant material Harvesting mentioned in Ayurvedi Literature (Sharma, 2009)



Collection performs of some significant medicinal plants have been identified recent research

and confirmed that the active ingredient content and it differs depending upon the period of collection.

| Common Name | Scientific Name | material Harvesting mentioned in Ayurveda Literature |
|--------------------|---------------------------------------|--|
| Madanaphala | <i>Randia dumetorum</i> | Collect mature fruits of Madanapala commonly known as emetic nut in between Vasanta (spring) and Greeshma (summer) season on Pushya, Ashwini or Mrigashira Nakshatra. |
| Ikshwaku | <i>Lagenaria cicerea</i> | The tender leaves should be collected before flowers seem on the climber |
| Trivrutta | <i>Operculina turpethum</i> | Trivruta should be collected for purgative therapy during the lunar cycle of full moon phase. |
| Snuhi | <i>Euphorbia species</i> | Latex of should be collected at the end of Shishira Ritu (winter season) and plant should be two or three years old. |
| Ashwagandha | <i>Withaniasomnifera (Linn.)Dunal</i> | Harvesting of Ashwagandha root starts from January and continues till March .The ripeness of crops is judged by the drying out of the leaves and berries turning red. |
| Kumari | <i>Aloe vera</i> | Kumari plant takes about 3 years to reach harvestable size and then leaves can be harvested for 7 years. Leaves less than 25cm size are not suitable for collection due to less gel content. |
| Kebuka | <i>Costus species</i> | The plant should be collected when it is about 16-17 months old and its Dysgenic content is concentrated during this period. |
| Dhattura | <i>Datura metel</i> | The plant attains highest percentage of alkaloids after 5 months of sowing. It is recommended to collect the leaves in early morning or late afternoon. Mature leaves of about the middle of the stem of D. metal had the maximum alkaloid content. |
| Vidanga | <i>Embelia ribes</i> | the immature fruits collected in October contain an average of 1.67% embelin whereas mature fruits collected in December has average contain 4.64% embelin |
| Pippali | <i>Piper longum Linn</i> | The spikes will be ready for collection 2 months after their formation on plants. The spikes should be picked when they are blackish-green and most pungent. The thick parts of stem and roots which have medicinal value should be harvested 18 months after planting |
| Nimba | <i>Azadirachta indica</i> | The trees shed their leaves during Feb-March and fully grown trees produces 350kg of leaves. The fruit matures in June-July. |
| Ahiphena | <i>Papaver somniferum Linn</i> | The lancing operation is performed by skilled labour, usually on bright sunny days between noon and 4pm. |
| Sarpagandha | <i>Rauwolfia serpentina Linn</i> | roots dug out in winter (December), when plants shed out their leaves are rich in total alkaloid content |
| Tulsi | <i>Ocimum sanctum Linn</i> | The oil and eugenol content is maximum at flower initiation and seed setting stage |



2.1.2. Collection of raw Material

According to Kala/ Period (Singhal, 2007)

Ayurveda classics denote the ethics of collection of medicinal plants according to their used part. Susrutha is not approving with Charaka's perception of seasonal collection of medicinal plants. He has quoted the modern principles of drug

collection and has finally concluded that these principles are not relevant and suggested that drugs of Shita virya (cold Potency) should be collected in Soumya ritu and those of Ushna virya (Hot Potency) in agneya kala. Susrutha proposes to collect the drug basing on virya (potency) as a replacement for part used of the plant.

Table 2: Dravyasamgrahan kala (collection period) according to part of plant used (I. Tripathi)

| Prayojyanga (Useful part) | Charak | Sushruta | Ashtang sangraha |
|---------------------------|--------------------|------------|------------------|
| Kanda (tuber) | Sharad | - | Sharad |
| Ksheera (latex) | Sharad | - | Sharad |
| Moola (root) | Greeshama Shishira | Pravrutta | Greeshma |
| Patra (leaves) | Varsha | Vasant | - |
| Phala (fruit) | Yatha ritu | Greeshma | Yatha ritu |
| Pushpa (flower) | Yatha ritu | Yatha ritu | Vasanta |
| Shakha(branches) | Varsha | Vasant | - |
| Sara(heartwood) | Hemant | Vasant | Hemant |
| Twak (bark) | Sharad | Sharad | Sharad |

2.1.3. Collection of Raw Materials

According To Bhumi / Soil

According to Susrutha samhitha the importance of bhumi/ soil for the collecting of raw material for

different beneficial purposes can give bellow (Dutta, 2005).

Table 3: Collection of Raw Materials According To Bhumi / Soil

| Pharmacological-Property | Quality of the Soil Type According to Ayurveda |
|---|--|
| Veerachandrava/ purgatives | Prithvi and Jalmahabhuta |
| Vamandrava/ emetics | Agni, Vayu & Akashmahabhuta |
| Ubhayabhag-haradravya dravya/ purgative & emetics | All The Five Mix Mahabhuta |
| Samanyadravya/palliative | Akashmahabhuta |

2.1.4. Collection of Raw Materials

According to Desha (Area)

Sharangdhara believe collection of agneyadravas (Ushnaveeryadravya) from vindhya region and Soumyaoushadha (Seetaveeryadravya) from Himalayan region (Shrivastav, 1996).

2.1.5. Collection of Raw Material According to Pharmacological Properties

Sharangdhara clarified the association between the collection of raw materials in a specific season and for specific therapeutic effect depending upon their respective pharmacological properties (Shaileja, 1996).

Table 4: Collection of Raw Materials According to Pharmacological Properties

| Pharmacological-property | Season |
|--------------------------|--------------|
| Veerachan/purgation | Vasanta-ritu |
| Vaman/emesis | Vasanta-ritu |
| For all other purposes | Sarad-ritu |

2.2. Modern Methods

In recent Pharmacognosy texts books, one can find a considerable importance given for the season during collection of different parts of economical plants as it governs not only the total quantity of active constituents produced but also the relative proportions of the components of the active mixture.

2.2.1.1. Physiological and phytochemical basis of collection (Shah)

Flowering period of plants are highly active period and Leaves are collected from the plants during the flowering period. When the photosynthetic activities are maximum and leave contain a maximum percentage of active constituents is the optimum time for collecting raw materials. As the moisture reductions their constituents, they are



collected in dry weather. The bark is collected in spring or early summer as the cambium is very active and due to the thin cell wall bark gets easily separated. In some other cases, the bark is collected in other seasons. As an example, Wild cherry bark is collected in autumn as it contains a maximum percentage of active constituents at this season while Chincona bark is collected in rainy as it gets easily separated. The usual time for the collection of leaves is when flowers are beginning to expand. At this time it is rational to assume that the leaves are in the healthiest state and contain optimum of the product of plant metabolism to produce desirable therapeutic action. Collection of flower must always be done in dry weather because the petals which are damp when gathered become badly discolored during drying. Roots and rhizome are usually collected when their tissue is fully stored with reserve food being assumed that the phyto constituents will be high during this season. In the temperate regions, autumn is therefore the season of collection. The bark should be collected in spring or early summer when the sap is rising in the stem and the cambium is active therefore more easily torn than at another seasons.

A study of a traditional Chinese medicine exposed seasonal variation in overall isoflavonoid content, as well as variation among different compounds. This is an extremely valuable finding if roots are being grown for individual compounds or if industrial products are collected at different times and standardized to a specific compound that varies from month to month, week to week, or even day to day.

Daily variations were also seen in the essential oil of wild basil herb, or *Ocimum gratissimum* (Lamiaceae), where levels of eugenol in the essential oil were observed to drop from 98% at 12 a.m. to 11% at 5 p.m. Circadian rhythms are also known to control stomata opening, gene expression, transcription, timing of photoperiodism, and to drive growth and development, although the control mechanisms remain unknown. Studies have found that disruption of normal circadian function in *Arabidopsis thaliana* (Brassicaceae) has led to reduced leaf chlorophyll levels, reduced growth, and increased mortality (Shah; T.C.Denston).

2.1.2. Seasons for the Collection of Specific Parts According to Modern Botany (Shah; T.C.Denston)

The season and time at which each drug is collected is usually a matter of consideration, since the amount and sometimes nature of active constituents varies throughout the year. There is aggregate evidence that structure of number of secondary plant metabolites varies considerably throughout day and night. During September - November can be considered as the best period for collection of herbaceous species, but in August-October in the area above 3000m. March-May can be consider as best period for collection of trees and shrubs In evergreen forest, as most of the species are in flowering condition during this period. Winter season in deciduous forest the collection should be avoided because of falling of leaves is common during this season.

Table 6: 2.2.2.Seasons for the collection of specific parts according to modern botany

| Plant part | Season/ Time of collection | |
|-----------------------------|---|---|
| | Dr.C.S.Shah | T.C.Dunston |
| 1 Leaf and flowering | Top When they reached flowering (maturity). | During the flowering time of the plant, in the morning time and Dry weather. |
| 2 Flower | a) Just before pollination b) Before their full expansion c) Dry weather d) Morning hour | During its season, petals just expanded middle of the day and in Dry weather. |
| 3 Bark | a) Spring b) Early summer when cambium is active | Autumn-After leaf fall / Spring-Before the development of leaves. |
| 4 Fruit | As per season, ripe fruit | Fully grown and ripe or nearly ripe. |
| 5 Root | In Spring, before vegetative process stops | a) From annuals :- Shortly before flowering b) From biennials: - |



| | | |
|--|---|---|
| | | Autumn/Winter following the first year growth. c) From perennials: - Autumn/Winter following the second year growth. |
| 6 Unorganized part(resin, gum, latex) | As they ooze out of the plant | In dry weather. |
| 7 Rhizome | When their tissue are fully stored with reserve | a) From annuals :- Shortly before flowering b) From biennials: - Autumn/Winter following the first year growth. c) From perennials: - Autumn/Winter following the second year growth. |
| 8 Herb | -- | When the plant attains its flowering stage |

2.1.3. Collection of Root Parts According to Modern Botany

The roots of an annual plant along with aerial part of the plant are collected. In case where the whole plant is used; roots of annuals are usually collected. In autumn of the first year growth or in spring before the beginning of the second year growth the biennials and perennials are generally collected. Accumulate active principles during the summer and the roots are storage organ for the plant. As an exception the roots of *withania somnifera* are normally collected when the plants are 6-8 months old. Similarly some root parts should be collected when the plants are of 3-5 years old the roots. As an example *Innula racemosa*, *Glycirrhizia glabra* (Geneva, 2003).

2.1.4. Collection of Leaves Parts According to Modern Botany

Leaves parts are collected throughout the whole growing period. Young leaves are normally consider as contain highest quality of active principle, but they must be free from diseases, insect etc. (Geneva, 2003).

2.1.5. Collection of Tubers/Bulb Parts According to Modern Botany

Tuber/Bulb part of the plant should be collected during flowering period because this support in proof of identity of the species. It is remarkable that the deep excavating should be avoided during the collection of underground parts (Geneva, 2003).

2.1.6. Collection of Herbage Parts According to Modern Botany

Collection of the aerial or top parts of the plant should be done with flower or fruit bearing stem. In case of herbage, seasonal studies must be conducted to locate the period when ideal active ingredients are present in the plant. The mature branches of the stem must be harvested and never remove all the branches of the plant (Geneva, 2003).

2.1.7. Collection of Flower Parts According to Modern Botany

Flowers or whole inflorescences are collected at the start of the flowering period and leave some floral parts on the plants to help natural pollination (Geneva, 2003).

2.1.8. Collection of Fruits and the seeds Parts According to Modern

Fruits and the seeds are collected when they are fully matured. In the case of cultivated crops which are harvested by machine, this is done just before they are fully ripe so that fruits do not crumble or the seeds fallout in the field (Geneva, 2003).

2.1.9. Collection of Bark Parts According to Modern Botany

Bark should be collected in spring when the trees and shrubs begin to bud or in autumn after they have shed their leaves. During this period the flow of sap is at its maximum and bark radially separate from the wood. The collection period of every separate plant or part of the plant varies depending upon the climate and altitude. The bark should be collected from the branches instead of main trunk and do not peel whole bark of the plant. It is also



important to strip the bark longitudinally and not all over the circumference to the trunk/ branches (Geneva, 2003).

3. CONCLUSION

Traditional cultures have been educated the collecting methods of raw materials through many generations. Harvesting methods of herbal plant can significantly affect the characteristics and qualities of herbal products. The effectiveness of the medicinal plants is subject to the availability of secondary metabolites. According to ancient philosophizers, medicinal plants were not just resources for treatment protocols. If an appropriate care is not taken during the harvesting; it may result in loss of therapeutic action. The data analyzed in this paper highlights the requirement of application of scientific techniques to make phytomedicines as potent as any other modern agent. The herbs without therapeutic efficacy become useless in combating the disease condition. Therefore the effective raw material collecting method is highly demand on preparation of high quality products as well as the treatment.

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