Innovation of multi curative herbal powder: Dasapatrachurnam

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**Abstract**
The foods we eat have the potential to nourish each and every cell in our body and help us to live longer, feel energized and perform at our optimum best. No matter how healthy our diets are, we are still surrounded by toxins such as pollution, household cleaning products, plastics and second hand smokes. Hence, green leaf powders are excellent at safely removing toxins from our body. The aim of our study is to prepare such powder from the leaves of 10 medicinal plants and named it as dasapatrachurnam which literally means “ten leaves powder”. For the first time, we report a compound herbal dietary supplement that is expected to have high nutraceutical values. The present paper deals with the identification of plants by constructing an indented type of dichotomous key, preparation of powder and their therapeutic uses. As all the ingredients used in this preparation are highly nutritive and have reported medicinal properties, we strongly believe that dasapatrachurnam will be the best herbal dietary supplement with high nutraceutical values and can be used as a diet or nutrient therapy. This paper could be of great interest to the researchers in the fields of folk medicine, Naturopathy, Ayurveda, Nutraceuticals and Pharmacology.

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1. Introduction

1.1 Herbal medicine
Plants have played a significant role in providing the human race, particularly tribes, with remedies. More than 80\% of the world’s population relies on traditional herbal medicine (Ayurveda, Siddha, Unani and Homeopathy) for their primary healthcare (Arun et al., 2006). However over population, urbanization and continuous exploitation of herbal reserves depleted traditional herbal knowledge. Pronounced cumulative and irreversible reactions of modern drugs shifted the people towards the usage of herbal products. Various parts of plants attract researchers to find out newer chemicals that could continue to serve as possible sources for drugs. Apart from medicinal uses, ecofriendly phytochemical components are also used as biofuels (Khyade, 2012; Mishra, 2012).

Herbal medicine is a triumph of popular therapeutic diversity from times immemorial. The usage of herbs has been hierarchical for thousands of years as they have best fitted the immediate personal need, are easily accessible and inexpensive. There has been a tremendous increase in the usage of herbal products worldwide resulting in global exponential growth. Potentiality, safety and effectiveness of herbal medicines established an upward trend in research that directed towards therapies and for this, plants with higher therapeutic efficacies are always in demand.

1.2 Research objective
Consumption of herbal products fresh, cooked or dried serves as an excellent nutritional supplement. For the physical well-being of an individual,
sufficient uptake of certain amounts of vitamins, minerals, proteins and other nutrients is necessary. In the present study, leaves from ten nutrient rich medicinal plants with high therapeutic uses were selected, identified by indented dichotomous key and used for our preparation. Dasapatrachurnam (dasa-ten, patra-leaves and churnam-powder) can be a valuable source for many people as the preparation of this enriched herbal health powder is done considering a healthy body. Among the 10 selected herbal plants, leaves from 5 plants are consumed as leafy vegetables, 3 are the best weedy medicinal plants and leaves from 2 plants are used as spices. Hence almost all the plants selected in this preparation are not only rich in nutrients, vitamins, etc., but are also therapeutically effective, as shown in Table 1.

1.3 Justification of Research
Good nutrition is the fundamental building block for a healthy body. In the present generation of fast foods, usage of packaged foods have become very common everywhere. These packaged and preserved foods contain lot of toxins and can cause damage to our health on prolonged usage. Our preparation, dasapatrachurnam, is made of super foods in the form of green leaves. Dasapatrachurnam give us whooping doses of antioxidants and fiber to boost the immune system and help fight illness such as cardiovascular disease, diabetes, insulin sensitivity and obesity, as well as causing no damage to the body even on prolonged usage as all the leaves selected for this preparation have reported to have therapeutic roles. Hence, green leaf powders, such as dasapatrachurnam, are excellent at safely removing toxins from our body, keeping us feeling great and looking good.

2. Materials and Methods

2.1 Plant collection from the field
All the 10 plants are easy to grow and are readily available all through the year. Achyranthes aspera, Aerva lanata, Alternanthera sessilis, Amaranthus viridis, Boerhavia diffusa, Eclipta alba, Coriandrum sativum, Moringa pterygosperma, Murraya koenigii and Trigonella foenum-graecum were grown in loam soiled pots at suitable environment with continuous supply of air, water and sunlight. Before flowering, leaves from all the 10 plants are large in size due to the high presence of nutrients in them. So, leaves must be collected only before flowering.

2.2 Construction of Indented type of Taxonomic Dichotomous key
A taxonomic dichotomous key is an elimination approach of identification by single-access key. It includes the logical arrangement of the distinguishing features of all the members of a taxonomic group, designed to assist in the naming of unidentified members of that group. Currently, conventional and most acceptable type of key is the dichotomous key. Dichotomous (di-two, chotomy-forked) key is most common that consist of a series of paired statements, termed couplets, which describe some feature of the plant. The two characters of the couplets are known as leads, which are mutually exclusive. Dichotomous keys are of two types depending on the method by which couplets are organized and how the user is directed to successive choices. Bracketed or Parallel key provides both choices side-by-side whereas Indented or yoked keys indents the leads of the couplet an equal distance from the left margin. We began with the first couplet and selected the statement that best fits our specimen, which then directed us to another couplet and ultimately helped us in generating the key and the final identification of our plants.

2.3 Powder preparation
The steps involved in the preparation of our powder, dasapatrachurnam are as follows:

2.3.1 Collection and Washing the leaves
Leaves from all the ten plants were collected and washed with clean portable/running tap water to remove dirt. The leaves were then soaked in salt water (or 1% saline solution) for 30 minutes to remove the microbes. A final wash was done with clean water thoroughly several times.

2.3.2 Draining and drying the leaves
Strain water from the leaves by placing them in perforated vessels or in trays made with food-grade mesh and leave to drain for 15-30 minutes. Drained leaves were spread on a clean cotton cloth and shadow dried (or in an area protected from light) to prevent the loss of vitamins and also preferably protected from dust and pests to prevent contamination. The drying process should be completed as quickly as possible to prevent the growth of molds. When leaves become brittle and crush easily, the drying process was terminated.

2.3.3 Powdering
Powder preparation was done by frying the dried leaves using a little amount of oil. In another pan, one cup of Bengal gram (cotyledons), one cup of Black gram (cotyledons), one cup of Coriander/Cilantro seeds (cremocarps), one table spoon of Black Pepper (seeds) and one cup of Red dried chillies (dried fruits) were fried in little amount of oil until they change color. All the fried materials were powdered with adequate salt and tamarind (pulp from fruits) using a mixer grinder, mortar & pestle, local grain grinders or burr mills.

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Table 1: Medicinal plants used in the preparation of dasapatrachurnam

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Botanical name</th>
<th>Common name</th>
<th>Family</th>
<th>Image</th>
<th>Therapeutic role of leaves</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Achyranthes aspera L.</td>
<td>devil’s horsewhip</td>
<td>Amaranthaceae</td>
<td></td>
<td>anticarcinogenic, anti-inflammatory, antioxidant, antifungal, antidepressant, antineoplastic, analgesic, antioxidative, antiparasitic, antifungal, antitumor, antipyretic, antimicrobial, antiparasitic, antibacterial</td>
<td>(Narayan and Kumar, 2014; Saurabh et al., 2011; Talukder et al., 2012)</td>
</tr>
<tr>
<td>2</td>
<td>Aerva lanata L.</td>
<td>mountain knotgrass</td>
<td>Amaranthaceae</td>
<td></td>
<td>anthelmintic, antiparasitic</td>
<td>(Adeyeye and Omoyeni, 2009; Goyal et al., 2011)</td>
</tr>
<tr>
<td>3</td>
<td>Alternanthera sessilis L.</td>
<td>dwarf copperleaf</td>
<td>Amaranthaceae</td>
<td></td>
<td>antihyperglycemic, analgesic, antiallergic</td>
<td>(Hossain et al., 2014; Rayees et al., 2013)</td>
</tr>
<tr>
<td>4</td>
<td>Amaranthus viridis L.</td>
<td>Slender / green amaranth</td>
<td>Amaranthaceae</td>
<td></td>
<td>antihyperglycemic, hypolipidemic, cardio protective</td>
<td>(Krishnamurthy et al., 2011; Saravanan and Ponmurugan, 2012)</td>
</tr>
<tr>
<td>5</td>
<td><em>Boerhavia diffusa</em> L.</td>
<td>Punarnava</td>
<td>Nyctaginaceae</td>
<td>antibacterial, antinociceptive, anti-inflammatory, expectorant</td>
<td>(AR Mahesh et al., 2012; Hiruma-Lima et al., 2000; Krishna Murthi et al., 2010)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><em>Coriandrum sativum</em> L.</td>
<td>cilantro</td>
<td>Apiaceae</td>
<td>antioxidant, anticancer, antidiabetic</td>
<td>(Brindis et al., 2014; Tang et al., 2013)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><em>Eclipta alba</em> L.</td>
<td>bhringaraj / false daisy</td>
<td>Asteraceae</td>
<td>antihyperglycemic, anticancer, antiaging, analgesic, antioxidant, antimitotoxic, antihepatotoxic, anti-inflammatory, anticonvulsant, antihaemorrhagic, immunomodulatory</td>
<td>(Ananthi et al., 2003; Chaudhary et al., 2014; Shaikh et al., 2013; Sidra et al., 2013; Thakur and Mengi., 2005)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Murraya koenigii</strong> L.</td>
<td>curry leaf tree</td>
<td>Rutaceae</td>
<td>Treats piles, headache, stomach ache, influenza, rheumatism, traumatic injury, insect and snake bites, anti-vomiting, antioxidant, anti-inflammatory, anticarcinogenic, antihyperglycemic, antidiabetic</td>
<td>(Arulselvan and Subramanian, 2007; El-Amin et al., 2013; Khan et al., 1996a; Khan et al., 1996b; Tachibana et al., 2001; Tachibana et al., 2003)</td>
<td></td>
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<tr>
<td>9</td>
<td><strong>Trigonella foenum-graecum</strong> L.</td>
<td>fenugreek</td>
<td>Fabaceae</td>
<td>antioxidant, geno protective, hepato protective, antiplasmoidal, antifungal</td>
<td>(Haouala et al., 2008; Meera et al., 2009; Mekki, 2014; Palaniswamy et al., 2010; Singh et al., 2014)</td>
<td></td>
</tr>
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Figure 1: Indented type of dichotomous key for the identification of medicinal plants of dasapatrachurnam.

1. Leaves simple; plants herbs, erect or prostrate
2. Herbs erect, flowers in spikes
3. Spikes terminal, spinous
4. Leaves alternate, ovate-lanceolate with long petiole; flowers greenish or reddish in compound paniculate spikes – *Amaranthus viridis*
5. Leaves opposite, obovate, pubescent; spikes simple elongate – *Achyranthes aspera*
6. Plants prostrate; leaves opposite with equal pairs; flowers white in axillary heads, 1 or 2 on long unequal peduncles – *Eclipta alba*
7. Leaves opposite, ovate-suborbicular, pale beneath, arranged in unequal pairs; flowers in paniculate umbels – *Boerhavia diffusa*
8. Plants trees, not tendril
9. Leaves unipinnate, imparipinnate, gland dotted and aromatic; inflorescence terminal, short peduncled corymbose cymes – *Murraya koenigii*
10. Leaves tripinnate, leaflets elliptic-obovate; flowers white in compound racemes – *Moringa pterygosperma*
Figure 2: Pictorial representation of the steps involved in the preparation of dasapatrachurnam.
(hand crank or motor driven). If necessary, the powder can be shifted to remove any remnants.

2.3.4 Packing and Storage
The resultant powder was stored in dry and airtight container for prolonged storage. Inadequate drying or storage of the powder could encourage the growth of molds or mildews.

3. Results
3.1 Identification of plants
Indented type of dichotomous key is commonly based on gross morphological features and characteristics that are readily observable in the field. For the proper identification of 10 medicinal plants, we used 9 couplets and 18 leads that could separate into 6 simple leaved weedy plants Achyranthes aspera, Aerva lanata, Alternanthera sessilis, Amaranthus viridis, Boerhavia diffusa and Eclipta alba and 4 compound leaved cultivated medicinal plants Coriandrum sativum, Moringa pterygosperma, Murraya koenigii and Trigonella foenum-graecum (Figure 1).

3.2 Preparation of dasapatrachurnam
After the identification, we collected the fresh and healthy leaves from those identified plants and followed the steps, as mentioned in materials and methods, to prepare our nutritional herbal powder, dasapatrachurnam (Figure 2). Leaves from the selected 10 medicinal plants are herbaceous, highly nutritious and can retain their nutrient content even when dried; favoring the long-term storage of the powder without losing the freshness. The preparation of this powder is inexpensive, therapeutically effective and can be added to any dish.

4. Discussion
4.1 Leafy vegetables
Green leafy vegetables are an important component of a healthy diet, providing vitamins, minerals and phytoneutrients. There is an international increase in their consumption in order to promote better nutrition. Moderate daily consumption of leafy vegetables is neuroprotective, prevents cardiovascular diseases and certain cancers (Oboh et al., 2014). Considering these, about 50% of our herbal preparation is made of leafy vegetables like Aerva lanata, Alternanthera sessilis, Amaranthus viridis, Moringa pterygosperma and Trigonella foenum-graecum. All these are rich in iron, vitamins and most importantly, all are good for eye sight.

4.2 Weedy plants
Beneficial weeds play a number of roles like fertilizing the soil, increasing moisture or serving as food and medical sources for human beings. Due to their multiple roles in many fields, they rarely cause economic damage and also attract a lot of scientific attention. Keeping these in mind, about 30% of our herbal preparation includes weedy medicinal plants like Achyranthes aspera, Boerhavia diffusa and Eclipta alba. Among these three, the first two are renowned medicinal plants (Mahesh et al., 2012; Saurabh et al., 2011) while leaves from Eclipta alba are commonly used in hair oil for healthy, black and long hair (Roy et al., 2008).

4.3 Spices
Plant products that are primarily used for flavoring, coloring or preserving food are known as spices and any preparation is incomplete without spices. Similarly, presence of Coriandrum sativum and Murraya koenigii (as mentioned in Table 1) and black pepper (as mentioned in materials and methods) make our herbal powder complete as black pepper is a preservative and it tends to have strong flavor (Meghwal and Goswami 2013).

4.4 Nutraceuticals
Nearly one-third of Americans use herbal medicine. A study in the New England Journal of Medicine found that most of the people taking herbal medicines were well educated and had a higher-than-average income. This clearly shows that the herbal product usage is not restricted to illiterates or tribes. Group of plants or plant products that have wide range of medical and therapeutic values are used for health promotion in Nutraceuticals. One among such product was made with five plants consisting of Achyranthes aspera, Boerhavia diffusa, Mukia madraspatana, Scoparia dulcis and Phyllanthus madaraspatensis (Nithya devi et al., 2012). Recently, Madhushoonya churna, made from different parts of 9 plants, was standardized from commercially available Ayurvedic powder to treat only diabetes (Chamoli et al., 2013). To the best of our knowledge, more than nine plant products were not used for a single preparation and we, for the first time, used ten herbal products, only leaves from all plants, as a curative for several diseases.

4.5 Statistical approach and pre-clinical studies
84 out of 100 people, who used dasapatrachurnam powder daily in their breakfast, mentioned that they are energetic and absolutely have no side effects. However, further research has to be done; this preparation could be of great interest to the scientists in the fields of Folk medicine, Naturopathy, Ayurveda, Nutraceuticals and Pharmacology.
Conclusion

Preparation of dasapatrachurnam is simple, cost effective, eco-friendly and is expected to have its remarkable activity for curing many diseases. However, further in depth studies coupled with nutraceutical evaluations, biochemical, preclinical and clinical trials are to be done. Till date, this is the first report showing the right blend of taxonomy and medicinal plants for the preparation of dasapatrachurnam.

Research Highlights

This paper reflects the best combination of taxonomy with herbal drugs and pharmacology that opens new avenues in the field of nutraceuticals. This is the first scientific report to show the indented type of dichotomous key in the preparation of an enriched herbal powder, dasapatrachurnam. This powder is easy to prepare, cost effective (around 50 INR / kg) and can be made all through the year.

Limitations

Side effects of herbal medicine arise when used alone and also depends on dosage and any other pharmaceutical medications taken by the patient. In our preparation, usage of raw Aerva lanata alone for prolonged periods causes dissolution of bone apart from curing urolithiasis. So, the best part is to be cooked or dried and prepared in combination with other leaves and in our dasapatrachurnam, Aerva lanata is one among 10 herbal ingredients and is safe for human consumption.

Recommendations

Pharmacovigilance studies have to be done intensively and also chemicals and active ingredients from the leaves of above mentioned plants have to be identified. Calorific values and composition of various macro and micronutrients present in our dasapatrachurnam also has to be found out.

Funding and Policy aspects

Usage of food supplements has been increasing worldwide. Around 50 billion USD is spent every year for food supplements. Indian nutraceutical market is also increasing and is now at 97 billion INR. Our herbal preparation is easy and cost effective to prepare but when combined with pharmaceuticals and marketing can be a very good business. Thus the Government of Andhra Pradesh must encourage young scientists and entrepreneurs in the fields of nutraceuticals to increase the country’s economy.

Authors Contributions

GBVA selected, collected the plants and identified them by constructing indented keys. NR prepared the powder, contributed in experimental design and drafted the manuscript. All authors commented, read and approved the final manuscript.

Competing Interests

The authors have had no financial, personal or other relationships with other people or organizations within five years of the beginning of the submitted work that could inappropriately influence, or be perceived to influence, their work. The authors declared that no competing interests exist.

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