

Valuable Assessment of Quality of PatoladiLepa: An Ayurvedic Paste

Kumaradharmasena LSP^{1*}, Fernando PIPK², Arawwawala LDAM², Kamal S¹ and Peiris KPP³

¹Department of Shalya Shalakya, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka

²Industrial Technology Institute, Baudhaloka Mawatha, Colombo 07, Sri Lanka

³Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Sri Lanka

Abstract

More than one fourth of world population is suffering from dental caries. It is a burden to governments of both developed and developing countries as they have to spend lot of money on treatments for dental caries. PatoladiLepa is an Ayurvedic paste used for dental caries and it consists of 7 plant ingredients, rock salt and honey. The objective of the current research was to determine the organoleptic properties, pH value, total ash, water soluble ash, acid insoluble ash and heavy metals such as Arsenic (As) and Lead (Pb) in PatoladiLepa using standard protocols. Moreover, Thin Layer Chromatography (TLC) fingerprint was developed for the paste using dichloromethane, cyclohexane and methanol in a ratio of 20:6:0.4 v/v. According to the results, PatoladiLepa appeared to be semi solid, blackish brown with pungent taste. In addition, pH value, total ash, water soluble ash, acid insoluble ash were 5.8 ± 1 at 29°C, $12.1 \pm 0.0\%$ w/w, $1.8 \pm 0.0\%$ w/w and $0.24 \pm 0.0\%$ w/w respectively. As and Pb were not present in PatoladiLepa. In conclusion, quality control parameters were established for PatoladiLepa for the first time.

Keywords: PatoladiLepa; Physico-chemical parameters; TLC fingerprint

Introduction

The craniofacial complex allows us to speak, smile, kiss, touch, smell, taste, chew, and swallow and to cry out in pain. It provides protection against microbial infections and environmental threats. Oral diseases restrict activities at school, work and home causing millions of school and work hours to be lost each year the world over. Moreover, the psychosocial impact of these diseases significantly diminishes quality of life [1]. An awareness of dental diseases and their treatments are reveal under medical topics in historical records. Dental diseases include dental caries, developmental defects of enamel, dental erosion and periodontal disease. The main cause of tooth loss is dental caries and it is commonly known as cavities or tooth decay [2,3]. In the presence of sweet and sticky foods, acid-producing bacteria living in the oral environment and thereby caused dental caries [3]. More than one fourth of world population is suffering from dental caries. It is a burden to governments of both developed and developing countries as they have to spend lot of money on treatments for dental caries [4]. Dental caries affects both men and women in all races, socio-economic status and every age group and it leading to pain and discomfort [5,6].

Medicinal plants have considerable potential against dental diseases including dental caries [7]. Since time immortal, Ayurvedic physicians have successfully treated dental caries by using herbal based treatments. PatoladiLepa, is one of the medicated pastes prescribed in Datta [8] as a remedy for dental caries. It consists of 7 medicinal plants, rock salt and honey (Table 1). In this study, we have made an attempt to assess the quality of the PatoladiLepa according to standard protocols.

Materials and Methods

Herbarium sheets were prepared for plant ingredients listed in Table 1, and authenticated by the Senior Scientist, Botany Division and Quality Assurance and Standardization Division at Bandaranayaks Memorial Ayurvedic Research Institute, Nawinna, Maharagama, Sri Lanka.

Preparation of PatoladiLepa

PatoladiLepa was prepared according to the method described in Sharangadhara Samhita. Preparation of PatoladiLepa was carried out at Pharmacy, Institute of Indigenous Medicine, University of Colombo,

and Rajagiriya, Sri Lanka. In brief, all the purified raw materials of PatoladiLepa, except honey, were grounded individually by using the pulverizer. The powder was passed through the No. 180 size sieve and fine powder was obtained. Equal amount of each ingredient was mixed and ground on a grinding stone with a little quantity of honey, till it gets soft and spreads evenly. The manufactured paste was stored in an air tight sterilized containers.

Establishment of quality control parameters for PatoladiLepa

Organoleptic properties and physico-chemical parameters of PatoladiLepa were evaluated. In addition, confirmation of raw materials in PatoladiLepa and phytochemical screening were done.

Organoleptic properties

Color, smell and appearance of PatoladiLepa were evaluated.

Physico-chemical parameters

Parameters such as pH, total ash, water soluble ash, acid insoluble ash, heavy metals of PatoladiLepa were investigated using standard techniques.

pH value

Paste (5 g) was mixed with water (45 ml) by using magnetic stir (IKA C-MAG HS10 Digital) for 1 h and observed the pH at 29°C by using a pH meter (Consort C533).

Total ash, acid insoluble ash and water soluble ash

Amounts of total ash, acid insoluble ash and water soluble ash in the PatoladiLepa was determined according to WHO [9] guidelines.

***Corresponding author:** Dr. Kumaradharmasena LSP, Department of Shalya Shalakya, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka, Tel: +94 11 2 581835; E-mail: menuka@iti.lk

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Heavy Metals

Presence or absence of Arsenic (As) and Lead (Pb) in the PatoladiLepa were determined according to the method described in AOAC guidelines [10].

Thin Layer Chromatography (TLC)

For ingredients: Ingredients of the drug in a ratio of 1:1 w/w were mixed, extracted into dichloromethane (20 ml) and filtered. This was repeated thrice and concentrated by using the rotavapor under vacuum pressure at 40°C.

PatoladiLepa: Paste (5.0 g) was dissolved in water (25 ml) and extracted into dichloromethane (20 ml) and filtered. This was repeated thrice and concentrated by using the rotavapor under vacuum pressure at 40°C.

Concentrated dichloromethane extracts of both ingredients and PatoladiLepa were spotted (5 µL from each) on a TLC plate (Silica gel GF254 pre-coated). TLC fingerprint was developed using dichloromethane, cyclohexane and methanol in a ratio of 20: 6: 0.4 v/v and observed under UV light (at both 254 nm and 366 nm). Finally, vanillin sulphate was sprayed on the TLC plate and heated at 110°C for 5 min.

Phytochemical screening: Presence or absence of alkaloids, polyphenols, flavonoids, steroids, saponins and tannins in PatoladiLepa was carried out as described by Yadav and Agarwala [11].

Results and Discussion

Plant based medicines are used for wide range of disease conditions in both humans and animals [12]. Non-availability of proper standards for herbal medicine is the major drawback in herbal medicine industry. Since the synthetic drugs are subjected to severe quality control, the plant products must also comply with the same quality standards [13]. This affects both physicians and patients and also face difficulties when promoting herbal medicine to Western countries [14].

However, in Sri Lanka, attempts have been taken to assess and establish the quality control parameters for herbal medicines such as Vipadikahara Grita Taila [15], Sarasvatha Choorna [16], Haridradi Ashcyotana [17], Dhanyamla [18] and Mustadi Taila [19]. In the present study, quality control parameters were established for PatoladiLepa which used as a remedy for dental caries. Organoleptic properties and physico-chemical parameters of PatoladiLepa were shown in Table 2.

The ash value was determined by 3 different methods, which measured total ash, acid insoluble ash, and water soluble ash. Acid insoluble ash measures the amount of silica or acid insoluble matter in the paste. Water soluble ash is the water soluble portion of the total ash. These ash values are important quantitative standards [20]. R_f values of standard mixture of raw materials and PatoladiLepa are shown in Table 3. According to the R_f values, it was revealed that all the plant ingredients which should be present in PatoladiLepa were present in the paste.

Phytochemical screening revealed the presence of polyphenols, flavonoids, steroids and tannins in PatoladiLepa. Secondary metabolites such as polyphenols, flavonoids, steroids and tannins have shown potent antimicrobial activity [21]. Therefore, presence of secondary metabolites in PatoladiLepa may play a key role when it is used as a remedy for dental caries. In addition, these secondary metabolites are act as nutraceuticals and may help to prevent diseases such as diabetes, cardiovascular diseases, etc. [22,23].

Ingredients	Parts of the plant
<i>Trichosanthes cucumerina</i> Linn.	Whole plant
<i>Picrorrhiza kurrooa</i> Benth.	Rhizome
<i>Zingiber officinale</i> Linn.	Rhizome
<i>Piper nigrum</i> Linn.	Fruit
<i>Piper longum</i> Linn.	Fruit
<i>Cissampelos pareira</i> Linn.	Whole plant
<i>Clerodendrum serratum</i> Linn.	Root
Rock salt	N/A
Honey	N/A

Table 1: Ingredients of PatoladiLepa.

Organoleptic properties	
Colour	Blackish brown colour
Appearance	Semi solid
Taste	Pungent taste
Physico-chemical parameters	
pH value	5.8 ± 1 at 29°C
Colouring matter	Synthetic dyes were not present
Total ash	12.1 ± 0.0% w/w
Water soluble ash	1.8 ± 0.0% w/w
Acid insoluble ash	0.24 ± 0.0% w/w
Heavy metals (Pb, As)	Not detected

Table 2: Organoleptic properties and Physico-chemical parameters of PatoladiLepa.

PatoladiLepa	Before spraying	0.02, 0.08, 0.30, 0.33, 0.38, 0.42, 0.47, 0.57, 0.82, 0.93
	After spraying	0.12, 0.29, 0.38, 0.42, 0.44, 0.57, 0.83, 0.92
Standard mixture of raw materials	Before spraying	0.12, 0.19, 0.29, 0.33, 0.38, 0.42, 0.47, 0.56, 0.82, 0.93
	After spraying	0.12, 0.29, 0.38, 0.42, 0.44, 0.57, 0.83, 0.92

Table 3: R_f values of PatoladiLepa and its standard mixture of plant ingredients.

Conclusion

Present study established the quality control parameters of PatoladiLepa for the first time and can be used as a reference.

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