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## Multidimensional Approach on *Medhya Rasāyana Chathushkaya* in Ayurveda-A Review

Madhumalika L P C<sup>1\*</sup> and Kulatunga R D H<sup>2</sup>

<sup>1</sup>Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka

<sup>2</sup>Department of Kaya Chikithsa, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, Sri Lanka

### ABSTRACT

*Medhya Rasāyana*, a unique concept of Āyurveda is believed to be used as a solution for major issues i.e., loss of memory, cognitive deficits, impaired mental function and also age related neurological and mental disorders. *Charaka Saṁhitā* has mentioned *Medhya Rasāyana Chathushkaya* as *Maṇḍūkaparnī*, *Yaṣṭīmadhu*, *Gudūcī* and *Śaṅkhaṣṣpī*. This study was focused to compile Pharmacodynamics, Pharmacokinetic and Pharmacological potentials of *Medhya Rasāyana Chathushkaya* for further identification of their noble approaches. The contents were collected from authentic Ayurvedic texts, dictionaries, monographs, websites, online and printed journals. Results of the study revealed that *Tikta* (75%), *Kashaya*(75%), *Madhura*(50%) in *Rasa*, *Guru*(50%), *Laghu*(50%) *Guna*, *Sheeta*(50%), *Ushna*(50%) *Veerya*, *Madhura*(100%) *vipaka*, *Medhya*(100%) *Prabhava* and *Tridosha hara* (75%) were present as prominent Āyurvedic pharmacodynamic properties of *Medhya Rasāyana Chathushkaya*. Further, *Medhya*, *Rasayana*, *Raktha shodhaka*, *Vishaghna*, *Vayah sthapana*, *Kushthaghna*, *Mehaghna*, *Jwaraghna*, *Deepana*, *Balya*, *Chardighna*, *Trshna Nigrahana* were show as pharmacokinetic properties while memory enhancing effect & effect on cognitive function , anti-ulcer activity, immunomodulatory, anti-oxidant activity, anti-microbial activity, hepatoprotective, anti-inflammatory and anti-fibrotic activity, anti-cancer activity, cardio protective, anti-diabetic property, anti-toxic effect were observed as Pharmacological potentials. In view of the above it is seen that *Medhya Rasāyana Chathushkaya* has *Tikta*, *Kashaya Rasa*, *Sama sheetoshna in veerya*, *Madhura vipaka*, *Medhya in prabhava* and *Thidosha hara* potential for unique; wide spreading curing and preventive capability with multidimensional approaches.

**KEYWORDS** *Medhya Rasāyana Chathushkaya*, *Pharmacodynamics*, *Pharmacokinetic*, *Pharmacological potentials*



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## INTRODUCTION

Today the percentage of the elder population of the world is increasing and most of them are over 60-65 years. Out of them a high proportion suffer from insomnia, loss of strength or immunity, cognitive and memory impairment, loss of perception, helplessness, fear, anxiety and much other senile diseases. Statistically the prevalence of overall mental illnesses is 12.5% among children and young generation in consequence of overloading of stress, tension, anxiety and lack of sleep which adversely affective to the mental, social functions and learning capacity.

Āyurveda is knowledge of living. Perfect health does not mean only an absence of diseases. True health is experienced when a person is established with balanced states of the three *Doshas*, normal digestion and metabolism, normal condition of tissue and excretory process, spirit freed from bondage and clear and bright mind and senses.

For maintaining of the mental health *pragna* is the prime factor and it is composed of

*Dhee* (promote the intellect)

*Dhrthi* (Retention of information)

*Smriti* (The ability of recall)

These three mental abilities get imbalanced when people get old and due to other issues

in children and young generation. For solving this health detriment 3000 years ago scholars (Rishi and Āchāryas) gathered knowledge on *Rasāyana*; specifically *Medhya Rasāyana*. While going through the concept of *Medhya Rasayan*; there is a significant classification in *Charaka samhitta* called *Medhya Rasāyana Chathushkaya*<sup>1</sup> which is a group of four potent plants. In modern view; it is referred under Nootropics.

## AIMS AND OBJECTIVES

To identify the Pharmacodynamics properties of the *Medhya Rasāyana Chathushkaya*

To find out the Pharmacokinetic properties of the *Medhya Rasāyana Chathushkaya*

To review the Pharmacological potentials of the *Medhya Rasāyana Chathushkaya*

### Rasāyana

Āyurveda has given birth to new way to discover oneself with compromising eight branches called as *Ashtānāgāyurveda*. *Rasāyana Tantra* is one aspect of *Ashtānāgāyurveda*.

Literally, the word *Rasāyana* is derived from “*Rasa+Ayanam*” which finally gives the meaning of all the approaches and measures which ensure improved circulation of *Rasa*.

Based on points in modern view it is corre-



-lated as an Immunomodulator, Anti-oxidants, Adoptogenic & Nootropic.

### Medhya Rasāyana

The term *Medhya Rasāyana*, is derived from the Sanskrit words “*Medha*”, meaning intellect or cognition. While explaining *Medhya Rasāyana* Āchārya Charaka has emphasized on four special medicinal plants (Figure 1) called *Medhya Rasāyana Chathushkaya*<sup>1</sup>. It comprises of;

- The juice of *Maṇḍūkarnī* (*Centella asiatica* Linn.)
- The powder of *Yaṣṭīmadhu* (*Glycyrrhiza glabra* Linn.) with milk
- The juice of *Gudūcī* (*Tinospora cordifolia* Miers) along with its root and flowers
- The paste of *Śāṅkhapusṭī* (*Convolvulus pluricaulis* Chois)

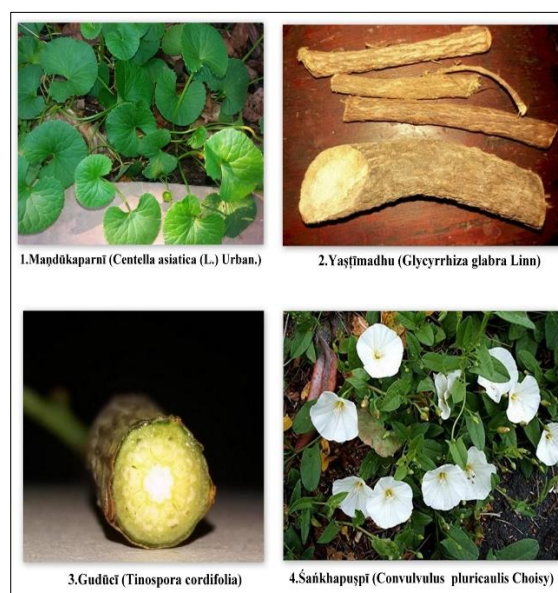
Āchārya Charaka has further explained the effectiveness of *Medhya Rasāyana*

### Pharmacodynamic properties of *Medhya Rasāyana Chathushkaya*.

**Table 1** Pharmacodynamics properties of *Medhya Rasāyana Chathushkaya*

Name of the plant	Rasa	Guna	Veerya	Vipaka	Prabhava	Dosha hara action
Maṇḍūkarnī	Tiktha Madhura Kashaya	Laghu Sara	Sheeta	Madhura	Medhya	Tridosha hara
Yaṣṭīmadhu	Madhura	Guru Snigda	Sheeta	Madhura	Medhya	Pitta vata hara
Gudūcī	Tiktha Kashaya	Guru	Ushna	Madhura	Medhya	Tridosha hara
Śāṅkhapusṭī	Tiktha Kashaya Katu	Laghu	Ushna	Madhura	Medhya	Tridosha hara

Pharmacodynamic properties in Ayurveda are described based on *Rasa Panchaka*. Its descriptions are available in *samhitha* and *nigantus* with separate discussions on each plant. *Rasa panchaka* and *dosha karma* of plants including in *Medhya Rasāyana Chathushkaya* are given there separately (Table 1).



**Fig 1** Ingredients of *Medhya Rasāyana Chathushkaya*

(1, 2 & 3 are original photographs and 4 is Quoted by: <http://www.theayurveda.org/ayurveda/herbs/5-health-benefits-of-brain-tonic-herb-shankhpushpi/>)



## Pharmacokinetic properties and Pharmacological potentials of *Medhya Rasāyana Chathushkaya*.

A pharmacokinetic property is a description of mechanism by which a physical and chemical changes in effected inside or outside the body. *Karma* of plants has been

broadly described in Ayurveda; within modern studies they have been well proven (Table 2).

### *Evidence based approach*

Generation of free radicals and toxicity through monosodiumglutamate (MSG) can affect the nervous system. *Mandukaparni*

**Table 2** Pharmacokinetics properties and Pharmacological potentials of *Medhya Rasāyana Chathushkaya*

Name of the plant	Pharmacokinetics Properties	Pharmacological potentials
<b>Mañḍūkarnī</b>	Medhya, Rasayana, Vayah Sthapana, Swarya, Smrthi Pradha, Kushthaghna, Mehaghna, Raktha Shodhaka, Raktha Vardhaka, Kasaghna, Vishaghna, Shothahara, Jwaraghna, Balya, Deepana, Ama, Hrdhya	Neuroprotective, Effect on cognitive function, Anti- epileptic effect, Effects on skin care, Anti-ulcer activity, Anti-inflammatory and anti-fibrotic activity, Wound healing, Immunomodulator, Anti-cancer activity, Anti-oxidant activity, Radiation protection, Anti-microbial Activity, Cardio protective, Hepatoprotective, Anti-diabetic affect.
<b>Yaṣṭimadhu</b>	Medhya, Rasayana, Vayah Sthapana, Swarya, Raktha Shodhaka, Vishaghna, Shothahara, Vruna Shothahara, Balya, Vrshya, Deepana, Chakshushya, Varnya, Shukrala, Keshya, Chardighna, Trshna Nigrahana	Memory enhancing effect, Effect on skin care, Anti-ulcer activity, Anti-inflammatory and Anti-fibrotic activity, Anti-cancer activity, Anti-oxidant activity, Immunomodulator, Anti-microbial activity, Anti-bacterial activity, Anti-toxic effect, Anti-toxic effect, Anti-tussive activity, Hepatoprotective, Cardioprotective, Nephroprotective
<b>Gudūcī</b>	Medhya, Rasayana, Vayah sthapana, Kushtaghna, Mehaghna, Raktha shodhaka, Vishaghna, Jwaraghna, Balya, Deepana, Chardighna, Trshna Nigrahana, Sangrahi, Krimighna, Daha Prashamana, Panduhara, Kamalahara, Kandughna	Effect on cognitive function, Memory enhancing effect, Anti-ulcer Activity, Anti-inflammatory activity, Wound Healing Activity, Anti-cancer activity, Anti-oxidant activity, Immunomodulator, Radiation protection, Anti-Microbial Activity, Anti-toxic effect, Hepatoprotective, Anti-diabetes property.
<b>Śāṅkhaṣṭī</b>	Medhya, Rasayana, Vayah sthapana, Kushthaghna, Mehaghna, Raktha shodhaka, Kasaghna, Vishaghna,	Neuroprotective, Memory enhancing effect, Anticonvulsant Activity, Anti-depressant activity, Anxiolytic activity, Anti-stress



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Jwaraghna, Balya, Deepana, Chardighna, Trshna Nigrahana, Sangrahi, Krimighna, Daha Prashamana, Panduhara, Kamalahara, Kandughna	activity, Anti-ulcer activity and Ant-catatonic activity, Immunomodulation, Anti-oxidant activity, Antimicrobial activity, Anti-toxic effect, Cardio protective, Hepatoprotective, Antidiabetic activity
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has an ability to protect neurons including the region of Hippocampus and protect general behaviour and locomotor activities<sup>2</sup>. Neuro-protective action of *Mandukaparni* has significant effect on cognitive enhancement among school children and Albino mice<sup>3</sup>. Another study on *Centella asiatica*; it's effectiveness in management of epileptic seizures was proved<sup>4</sup>. *Mandukaparni* is a well-known remedy for skin lesions and it has determined its effectiveness on psoriasis<sup>5</sup>. Hence in the study with chloroform and methanol extracts, *Mandukaparni* was reported as anti-inflammatory and analgesic in Swiss Albino rats<sup>6</sup>. In addition to that the ulcer healing effect of *Mandukaparni* was demonstrated in the study on ethanol-induced gastric ulcers in rats. Strengthening of gastric mucosal barrier and reducing free radicals resulted in this preventive action<sup>7</sup>. Wound healing effect was another potential showed by in *Mandukaparni*<sup>8</sup>. Further, water extract of *Centella asiatica* gives an effect of immunostimulation<sup>9</sup>. Anti-proliferative effect is another marked effect which showed the efficacy of Asiatic acid of

*Centella asiatica* against growth of lung cancer cells<sup>10</sup>. The study proved the beneficial effect on *Mandukaparni* against arsenic-induced oxidative stress<sup>11</sup> and also it has radio-protective action<sup>12</sup>. Furthermore, Asiatic acid in *Mandukaparni* possess inhibitory effect in mechanism of heart failure<sup>13</sup> and hepatitis B virus<sup>14</sup>. *Mandukaparni* has already been used as a traditional remedy for treating Diabetes mellitus<sup>15</sup>.

*Yastimadhu* is *Glycyrrhiza glabra*, a perennial herb with a thick rootstock, slightly branched roots of about 1.2 cm diameters, red or orange brownish in colour. The study was conducted to investigate the improvement in learning and memory enhancement of *Glycyrrhiza glabra* (GA) by using mice species. A result of another clinical study has proven beneficial effect of *Glycyrrhiza glabra* on skin indicating ability of UV protection, anti-inflammatory and anti-oxidant properties<sup>17</sup>. Further, anti-proliferative action is a significant in *Yastimadhu* and marked in reduction of breast cancer cells growth<sup>18</sup>. *Glycyrrhiza glabra* also has an immune modulating action<sup>19</sup>. In broth



microdilution method study, extracts of GA indicated anti-microbial action<sup>20</sup> therefore, in a study on *Yastimadhu* against *Plasmodium yoelii*, anti-malarial action was investigated<sup>21</sup>. Researchers also found evidence of nephroprotective effect against Cisplatin<sup>22</sup> and hepatoprotective activity<sup>23</sup> of *Yastimadhu* by various experiments. And also cardioprotective effect of *Glycyrrhiza glabra* against myocardial infarction was markedly proved<sup>24</sup>. *Yastimadhu* has significant effect on cough relief<sup>25</sup> and it has already been used traditionally in Ayurveda.

*Guduci* is *Tinospora cordifolia*, a perennial climbing plant growing on very high top of trees sending down very long thread-like aerial roots. *Tinospora cordifolia* is a significant memory enhancing agent<sup>26</sup> and another study also evaluated its learning and memory enhancing effect<sup>27</sup>. *Tinospora cordifolia*, possess anti-ulcer activity<sup>28</sup> and its strong analgesic, anti-inflammatory and anti-pyretic actions were observed<sup>29</sup>. Wound healing activity was another effect shown in a study which was conducted with methanolic extract of *Guduci*<sup>30</sup>. *Tinospora cordifolia* has significant anti-oxidant action which was present in all *Ethanol*, *Methanol* and water extractions<sup>31</sup>. In a study; anti-cancer and immune-modulatory action of *Tinospora cordifolia* extractions was revealed<sup>32</sup>. Another study was implied

protective action against radiation exposure<sup>33</sup> and microbial strains<sup>34</sup>. Leaf and stem extract of *Tinospora cordifolia* was reported as a hepatoprotective<sup>35</sup> and extract of stem had an effect of reducing plasma glucose level<sup>36</sup>. *Tinospora cordifolia* provided relief in some nasal disorders such as sneezing, nasal discharge, nasal obstruction and nasal pruritus<sup>37</sup>.

*Sankapushpi* is a perennial herb like morning glory and is a fulvous hairy herb. *Convolvulus pluricaulis* Choisy exhibited Neuro-protective and anti-oxidant effects in a study which was conducted with treated mice<sup>38</sup>. *Sankapushpi* has elevated memory enhancing effect<sup>39</sup> and has a protective role in epilepsy<sup>40</sup>. *Convolvulus pluricaulis* (CP) showed antiulcerogenic effect<sup>41</sup> and has ability in curing of abscesses<sup>42</sup>. Antifungal action is another effect which was shown in a study of alcohol extraction of *Convolvulus pluricaulis*<sup>43</sup>. In prolonged hypotension *Sankapushpi* has significant action<sup>44</sup>. And also Hepatoprotective activity is present in *Convolvulus pluricaulis*<sup>45</sup>. CP was shown to be an effective remedy for treatment of diabetes<sup>46</sup>. Potent effect was also found in CP for management of thyrotoxicosis<sup>47</sup>.

## MATERIALS AND METHODS

The study was designed as a Literature survey which collected data from authentic



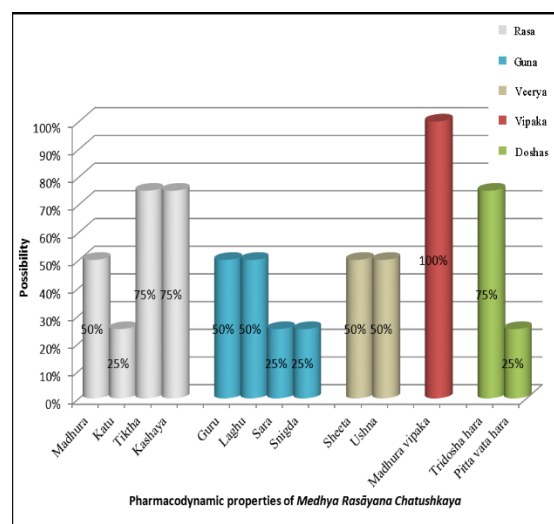
Ayurveda texts, dictionaries, monographs, *Ayurveda database on medical plants used in Ayurveda and Siddha*, Google scholar, science direct, online webpages and journals.

Gathered data were analysed based on three main objectives.

## RESULTS AND DISCUSSION

### Pharmacodynamic properties of *Medhya Rasāyana Chathushkaya*

Analyzing *rasa panchaka* and *dosha karma* of separate plants, majorities were compiled as a percentage (Figure 2).



**Fig 2** Distribution of Pharmacodynamic properties of *Medhya Rasāyana Chathushkaya*

Results of this summary of pharmacodynamics properties were as followed,

*Rasa- Tikta* (75%), *Kashaya* (75%), *Madhura* (50%)

*Guna- Guru* (50%), *Laghu* (50%)

*Veerya- Sheeta* (50%), *Ushna* (50%)

*Vipaka- Madhura* (100%)

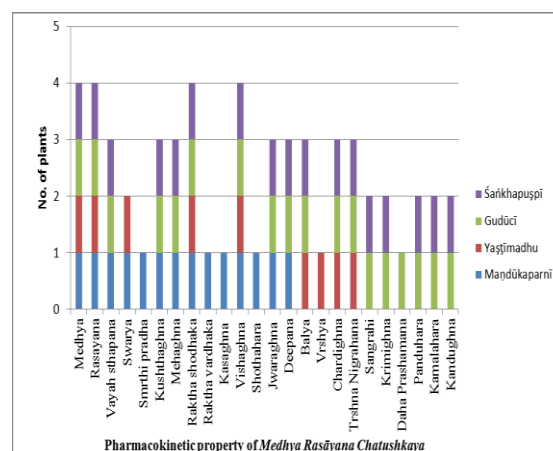
*Prabhava- Medhya* (100%)

*Doshas- Tridosha hara* (75%)

*Shitha veerya* and *Madhura Vipaka* properties promote *Kapha* and enhance *Dharana Karma* (Retention of cognition) while *Ushna Veerya* and *Tiktha Rasa* promote *Pitta* and improve *Grahana Shakthi* and *Smrti* (Grasping power and Memory). All plants have *Medhya* in *prabhava* which is the major factor of *Medhya* action in *Medhya Rasāyana Chathushkaya*. *Tridosha hara* potential was another important factor of *Medhya Rasāyana Chathushkaya*. Because of that it can be prescribed for all of person and can be used as a supplementary drug for day-to-day life.

### Pharmacokinetic properties of *Medhya Rasāyana Chathushkaya*

Along with pharmacokinetic properties of separate plants, common and frequently mentined karma were compiled (Figure 3).



**Fig 3** Distribution of Pharmacokinetic property of *Medhya Rasāyana Chathushkaya*

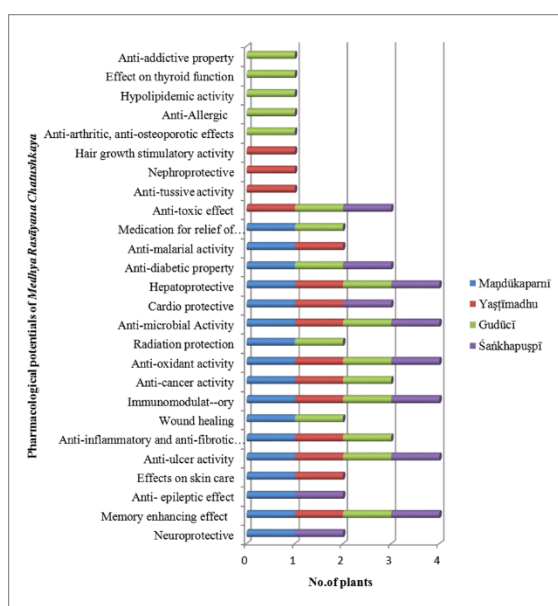




*Medhya, Rasayana, Raktha shodhaka* and *Vishaghna karma* are highly indicated in all plants and also it has been reported that *Vayah sthapana, Kushthaghna, Mehaghna, Jwaraghna, Deepana, Balya, Chardighna* and *Trshna Nigrahana* as marked karma of *Medhya Rasāyana Chathushkaya*.

### Pharmacological potentials of *Medhya Rasāyana Chathushkaya*

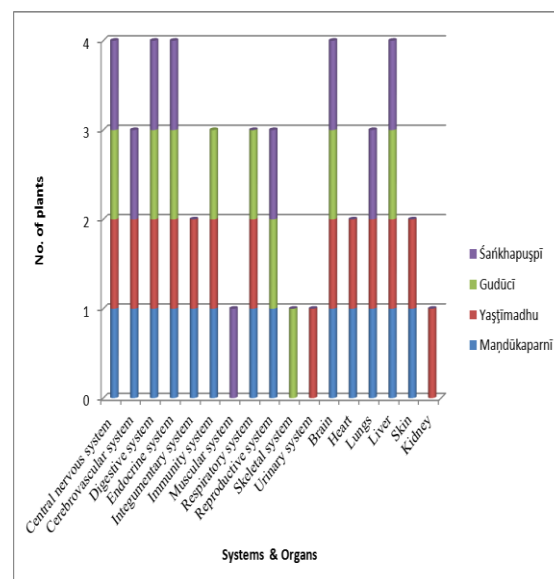
Studying currently available clinical studies and experiments which were focused on plants, the abundance of pharmacological potentials were analyzed (Figure 4).



**Fig 4** Distribution of Pharmacological potential of *Medhya Rasāyana Chathushkaya*

Most of the studies have proved memory enhancing effect & effect on cognitive function, anti-ulcer activity, immunomodulatory, anti-oxidant activity, anti-microbial activity and hepatoprotective in *Medhya Rasāyana Chathushkaya*.

Further, based on these evidences they were categorized according to actions on human body systems and organs (Figure 5). Central nervous system, Digestive system, Endocrine system, Immunity system, Brain and Liver were the most affected parts of the body.



**Fig 5** Distribution of Pharmacological potentials action on body system and organ

## CONCLUSION

*Medhya Rasāyana Chathushkaya* is an excellent effective herbal collection which has been mentioned in Charaka Samhitā. It is a combination of *Mandukaparni swara, Yastimadhi choorna, Guduchi swarasa* and *Shankapushpi kalka*. According to many references, it possesses *Tikta, Kashaya Rasa, Sama sheetoshna* in *veerya, Madhura vipaka, Medhya Prabhava* and *Thridosha hara* action.



In *Medhya*, *Rasayana*, *Raktha shodhaka* and *Vishaghna* are the major *karmas* and memory & cognitive enhancement, anti-ulcer activity, hepato-protection, immunomodulatory, anti-oxidant activity and antimicrobial activity has revealed pharmacological activities of *Medhya Rasāyana Chathushkaya*. Central nervous system, digestive system, endocrine system, immunity system, brain and liver are the functioning areas of body under the action of *Medhya Rasāyana Chathushkaya*. These four plants are freely available especially in Asian countries and are easy to prepare. They can be prescribed for any age group without any adverse effects. It fulfills the main two aims of Ayurveda i.e., prevention and curing and provides both somatic and psychological wellbeing. Totally completing the definition of *Swastha*, *Medhya Rasāyana Chathushkaya* reveals the ability of maintaining equilibrium of *tridosas*, *Agni*, *Dhatu*, *Mala* and all mental functions. Therefore, it is a great day-to-day supplement. Sending this message to public, may be of greatly assistance to create a healthful society.



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