Herbal approach toward Vatarakta (Gout), a Metabolic Syndrome: a review

Kushwaha Ashwani Kumar and Maurya Santosh Kumar*

* Ayurvedic Pharmacy Laboratory, Rajiv Gandhi South Campus, Banaras Hindu University, Mirzapur–231001, Uttar Pradesh, India

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Abstract

Gout is a multi-factorial disorder characterized by hyperuricemia, deposition of uric acid crystals in and around joints as well as in soft tissues. These days its prevalence is increasing due to changes in life style and therefore it has a noteworthy impact on the working population, their work, productivity and physical function. Conventional drugs used in the management of gout have some associated drawbacks. Therefore, it is essential to find out some alternative therapeutic approaches. The clinical features of gout such as sudden burning pain, swelling, redness and tenderness in joints come under the purview of *vatarakta* (gouty arthritis) in Ayurveda classics. Plant based medicine have gained upward attention in current scenario for the prevention and treatment of gout. In recent years many studies were done in search of new xanthine oxidase inhibitors with fewer side effects than available ones and have more precise effects. Therefore, this manuscript aims to perform an updated systematic review on the available information regarding medicinal plant as well as the classical Ayurvedic monoherbal therapy useful in the treatments of gout.

Keywords

Ayurveda, Gout, Hyperuricemia, Uricosuric, Vatarakta, Xanthine Oxidase.

INTRODUCTION

Greentree Group
Gout is the most common form of inflammatory arthritis, with a prevalence of 1–2% in developed countries [1]. It is a disorder of purine metabolism associated with increase level of serum uric acid (serum uric acid >6.8 mg/dL) [2], crystallizes in the form of monosodium urate, deposit in joints, tendons and in the surrounding tissues [3], manifested as a sudden burning pain, swelling, redness and tenderness in joints. Initially, hyperuricemic persons have no prominent symptoms and they remain asymptomatic for long time [2] and gout develop only in about 10% of these people [4]. Gout is the common cause of arthritis in men aged over the fifty [5]. Incidence of gout in men is more than women [6] because before menopause, estrogen promotes urate wasting in the urine [7]. Gout has both modifiable (diet, alcohol, medications, co-morbidities, body mass index, physical fitness) and non-modifiable (genetics, age and gender) risk factors (Fig 1) [1, 8-10]. As the level of uric acid [in men (≤ 7 mg/dl) and women (≤ 6 mg/dl)] crosses its saturation thresholds in physiological fluids [11], urate crystals precipitation started in the joints and other tissues. Non steroidal anti-inflammatory drugs (NSAIDs), colchicine, glucocorticoids, xanthine oxidase inhibitor (like allopurinol, febuxostat) and uricosurics drugs (like probenecid) are used in the treatment of gout. These drugs have some side effects such as gastric ulcer, hypersensitivity; acute kidney injury and possibility of drug interaction with other prescribed drug such as erythromycin restrict their uses [12]. The major objectives in chronic gout management are to keep the serum uric acid level towards normal, prevent joint damage due to hyperuricemia and further occurrence as well as to promote the dissolution of existing uric acid crystals as well as prevent new crystal formation [13]. Some non pharmacological measures includes restricted protein diet, life style modification, weight loss, low alcohol consumption and ensuring sufficient fluid intake [14].

Fig 1 Factors Affecting Gout

AYURVEDIC VIEW

Tridoshas (three basic biological humors of body or Bio energy Principles), vata (the Air or Nervous System Humor), pitta (the biological fire) and kapha (The Water Humor or protective humors) are three physiological basic of the human body. Vata

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dravyapharma@gmail.com
being predominant has the potential to cause more serious and long term diseases than the Pitta and Kapha \[15\]. It gets aggravated due to either Avarana (hindrance in the path) or dhatukshaya (deficiency of body tissue). Vatarakta is one of the unique disorders among the Vatavyadhi (a group of nervous disorder) which is the result of avarana of morbid vata dosha by vitiated rakta (blood) dhatu (tissue) \[16\]. This causes the derangement of Rakta dhatu resulting in Vatashonita (Fig 2). In addition to this, Vatarakta is also produced by the Margavarana of Vayu by Kapha and Medas \[16\]. In Shabda kalpa druma \[17\] definition of Vatarakta is given as “Vata dushtiam raktam yatra roga vishesha”, i.e. it is caused due to the vitiation of Rakta initiated by the morbid Vata is called Vatarakta. It is of two types. When there is involvement of Twak (skin) and Mamsa (muscle) dhatus only, it is known as Uttana Vatarakta (uncomplicated gout). This type of vatarakta has Akunchana (Contraction), Ayama (Dilatation of Vessels), Beda (Splitting type of Pain), Daha (Burning Sensation), Gourava (Heaviness), Kandu (Itching), Rakta twak (Reddish coloration of the skin), Ruja (Pain), Shayava twak (Cyanosis of the skin), Sphurana (Trembling or throbbing sensation), Suptata (Numbness), Toda (Pricking pain). On the other hand, when symptoms like Swayatu grhatita (Hard swelling), Paka (Suppuration), Daha (Burning sensation), Kanjatwa (Lameness), Shyavatha (Cyanosis or pallor), Pangutwa (Paraplegia), Bhrisharthis (Excruciating deep pain), Vidaha (Internal burning sensation), Tamra twak (Coppery discoloration), Ruja (Pain), Sphurana (Throbbing sensation), Adhika purvaruk (Increased pain), Toda (Pricking type of pain), Vatasya sarva Shareera charana (Vitiated vata moves all over the body), Angasya vakrikarana (Disfigurement of the parts), Vatasya sandyasthi Majjasu chindanniva (Aggravated vayu while causing pain-burning sensation constantly moves with high speed through the Sandhi, Asthi and Majja) along with discoloration and hardening of skin are the features of Gambhira Vatarakta (complicated gout). After one year vatarakta becomes Yapya (difficult to cure) \[15, 16\].

**Fig 2. Pathogenesis of Gout according to Ayurveda**
Principle of Ayurvedic management

In classics of Ayurveda both Shodhana and Shamana chikitsa are described for vatarakta. According to Acharya Charaka, Raktadhika vatarakta has to be treated with, Virechana (therapeutic purgation), Ghrita ksheera pana (intake of medicated ghee or milk), Seka (pouring of medicated decoctions over body), Vasti (medicated enema) and Sita nirvapan (application of pastes for cooling). Since Gambhira vatarakta falls into the category of Madyama rogamarga (intermediate path)), no other treatment is better parallel vasti in treating the disease. In case of Vatarakta, developed due to margavarana in the Rakta vaha srotas by morbid Kapha dosha and Medo dhatu, the line of treatment in the initial stage is different, snehana karma is not recommended, the main purpose in this context is to remove the Avarana and to clear the srotas (body channels) in order to monmalized the movement of vata. To achieve this goal Kapha-medo shamaka / Rukshana chikitsa is adopted first\textsuperscript{15,16}.

A. Shodhana Chikitsa (purification treatment)

Shodhana treatment includes Raktaamoksana (bloodletting by leech or other method), Langhana (methods for effecting leanness, reduction of body bulk or resulting in lightness), Vamana (therapeutic emesis), Virechana, Asthapan vasti (decoction
enema), *Snehapana* (intake of medicated oils or ghee) \[^{16, 18}\].

**B. Shamana (pacifying treatment)**

**a. External application**

It includes various treatment modalities like *Alepana* (application of medicated pastes), *Abhyanga* (massage), *Parisheka* (pouring of medicated decoction over body) and *Upanaha* (application of hot poultice). Following drugs are used for external application

1. Application of the paste of *Sigru* (*Moringa oleifera* Lam.) and *Varuna* (*Crataeva nurvala* Buch. -Ham.) with sour gruel removes pain in vatarakta (B. S. *Vatarakta* 68) \[^{19}\].

2. Castor (*Ricinus communis* Linn) seed pounded with milk, applied over the affected part relieve pain in *Vatarakta* (C. S. Ci. 29/140) \[^{16}\].

3. *Nimba* leaves pounded with sour gruel is applied externally in *vatarakta* (H. S. 3. 23/7-8) \[^{20}\].

4. Extracted oil of the fresh stem of *Karira* (*Capparis deciduas* Edgew.) by *patala-yantra* when applied over the affected part, alleviates tingling sensation and *vatarakta* (S. B. 4/490)

5. Linseed (*Linum usitatissimum* Linn) and Castor seeds pounded with milk when applied on the affected part relieves pain (C. S. Ci. 29/140; A. H. Ci 22/34) \[^{15, 16}\].

6. Oil cooked with *Guduchi* decoction and milk alleviates *vatarakta* (C. S. Ci. 29/121) \[^{16}\].

7. Oil, prepared with the decoction of *Satapushpa* (*Anethum graveolens* Linn.), *Kustha* (*Saussurea lappa* C. B. Clarke.) and *Madhuka* separately, alleviates pain in *vatarakta* (B. P. Ci. 29/118) \[^{22}\].

8. Paste of barley powder [*Yava* (*Hordeum vulgare* Linn.)] with *Yastimadhu*, milk and ghee removes pain and burning sensation of *vatarakta* (C. S. Ci. 29/132) \[^{16}\].

9. Paste of linseed, castor seeds and *Satapushpa* pounded with milk is applied externally to remove pain in *vatarakta* predominant in vata (C. S. Ci. 29/140) \[^{16}\].

10. Paste of wheat powder [*Godhuma* (*Triticum aestivum* Linn.)] mixed with goat’s milk and ghee when applied over the *vatarakta* affected area reduces pain (C. S. Su. 3/23) \[^{16}\].

11. Paste of yellow mustard (*Brassica campestris* Linn.); paste of tila (*Sesamum indicum* Linn.) and *ashwagandha* (*Withania somnifera* Dunal.); paste of *Priyala* (*Buchanania*
lansan Spreng.), Slesmataka (Cordia dichotoma Forst. f.) and Kapittha (Feronia limonia (Linn.) Swingle.); paste of Madhusigru (Moringa concanensis Nimmo) and Punarnava (Boerhaavia diffusa Linn.) were prepared. These four pastes, pounded with alkaline water are used to alleviate Vatarakta (S. S. Ci. 5/19) [18].

12. Seeds of Madhusigru mixed with sour gruel as paste is useful in vatarakta (C. S. Ci. 29/151) [16].

13. The Paste of Kasmarya, Madhuka and Saktu (roasted powder of gram) is useful in vatarakta (S. S. Ci. 05/12) [18].

14. Parched Tila (Sesamum indicum Linn.) pounded with milk is applied locally in vatarakta (A. H. Ci. 22/33-34) [15].

b. Internal application

1. Buffalo’s milk, curdled with the powder of flower of Agastya (Sesbania grandiflora Pers.) and the butter extracted there from is useful in severe Vatarakta (V. M. 23/7) [23].

2. By the use of buttermilk and Haritaki (Terminalia chebula Retz.) kapha and medas are reduced (C. S. Ci. 29/157) [16].

3. Milk cooked with Dashmool decoction alleviates pain immediately (C. S. Ci. 29/124); (A. H. Ci. 22/23); (V. M. 23/11) [15, 16, 23].

4. Decoction of Chandana (Santalum album Linn.) sweetened with sugar and honey is effective in vatarakta (S. S. Ci. 5/8) [18].

5. Decoction of Guduchi (Tinospora cordifolia Willd Miers ex Hook. F. & Thoms.) is useful in Vatarakta (S. S. Ci. 5/8; (A. H. U. 40/59) [15, 17].

6. Decoction of Guduchi taken after intake of three or five Haritaki fruits with jaggery is effective in vatarakta (V. M. 23/7; BP. Ci. 29/44) [22, 23].

7. Decoction of Guduchi, Castor and Vasa (Adhatoda vasica Nees.) mixed with castor oil controls generalized vatarakta (S. G. 2/2135) [24].

8. Decoction of Guduchi, Shunthi (Zingiber officinale Rosc.) and Dhanyaka (Coriandrum sativum Linn.) alleviates vatarakta, amavata (rheumatoid arthritis) and all type of kustha (skin disorders) (V. M. 23/4; B. P. Ci. 29/42) [22, 23].

9. Decoction of Haridra (Curcuma longa Linn.) and Guduchi mixed with honey is useful in vatarakta predominant in kapha (B. P. Ci. 29/79) [22].

10. Decoction of Haritaki fried with ghee is effective in vatarakta (A. H. Ci. 22/12) [15].
11. Decoction of Kokilaksha (Astercantha longifolia Nees.) on vegetable diet alleviates vatarakta (A. H. Ci. 22/18) [15].

12. Decoction of Mustaka (Cyperus rotundus Linn.), Amalaki (Emblîca officinalis Gaertn.) and Haridra taken with honey alleviates vatarakta associated with kapha (B. P. Ci. 29/78) [22].

13. Decoction of Patola (Trichosanthes dioica Roxb.) and Nimba (Azadirachta indica A. Juss.) leaves mixed with honey pacifies vataraka (H. S. 3. 23/7-8) [20].

14. Decoction of Rasna (Plucheia lanceolata C. B. Clarke.), Guduchi and Aragvadha (Cassia fistula Linn.) mixed with castor oil alleviates all type of vatarakta (V. M. 25/6) [23].

15. Decoction of the bark of Asvattha (Ficus religiosa Linn.) is useful in Vatarakta (C. S. Ci. 29/158) [16].

16. Decoction of Trivrit (Operculina turpethum Linn.) and Vidari (Pueraria tuberosa DC.) cures vatarakta (B. P. Ci 29/40; B. S. Vatarakta. 40) [19, 22].

17. Dhanyaka one part and two part of Jeerak (Cuminum cymimum Linn.) cooked with jaggery alleviates vatarakta (H. S. 3/23/10) [20].

18. Ghee cooked with decoction of Karvellaka (Momordica Charantia Linn.) is useful in Vatarakta (S. S. Ci 5/12) [18].

19. Goat’s milk cooked with Prisniparni (Uraria picta Desv.) and added with sugar and honey is useful (S. S. Ci. 5-7) [18].

20. Decoction of Guduchi is useful in vatarakta (C. K. 319) [25].

21. Guggulu (Commiphora mukul Hook ex Stocks Engl.) along with Guduchi decoction is effective in vatarakta (C. K. 314) [25].

22. Haritaki mixed with jaggery taken either with cow urine or water is found effective (S. S. Ci. 5. 10/12) [18].

23. Haritaki with jaggery or decoction of Guduchi or Pippali (Piper longum Linn.) vardhamana is used (V. M. 23/16) [23].

24. In vata predominant vatarakta, goat’s milk mixed with half oil and Yastimadhu (Glycyrriza glabra Linn.) 10 g is effective (S. S. Ci. 05/07) [18].

25. Milk mixed with Dhanyaka and shunthi is effective in vatarakta (H. S. 3/23/6) [20].

26. Oil cooked with decoction of Madhuka (Madhuca indica J. F. Gmel.) and Kasmarya (Gmelina arborea Linn.) alleviates vatarakta (C. S. Ci. 29/121) [16].
27. Ghrita or milk cooked with *Guduchi* decoction is effective (H. S. Ci. 22/07) [20].

28. One taking *Munditika* (*Sphaeranthus indicus* Linn.) powder mixed with honey and ghee followed by intake of the decoction of *Guduchi* becomes free from severe vatarakta (C. D. 23/7) [26].

29. One who swallows paste of *Nimba patra* 80 g in morning keeping on diet of wholesome items and ghee becomes free from severe vatarakta (S. B. 4/37) [21].

30. *Triphala* powder mixed with *Trikatu* and honey is effective for the patients of vatarakta (S. S. Ci. 5/34) [18].

31. Regular use of *Guduchi* as juice, paste and decoction for longer period cure vatarakta (V. M. 23/10; B. P. Ci. 29/41) [22, 23].

32. Regular use of Silajatu, Guggulu and honey control vatarakta (C. S. Ci. 29/159) [16].

33. Root of *Saireyaka* (*Barleria Prionitis* Linn.) and *Jivanti* (*Leptadenia reticulata* W. & A.) pounded with goat’s milk and mixed with ghee, applied locally as paste in vatarakta (A. H. Ci. 22/33) [15].

34. *Salparni* (*Desmodium gangeticum* DC.), *Prisniparni* or both type of *Brihati* (*Solanum indicum* Linn.) pounded with milk and mixed with saturating drink control vatarakta (S. S. Ci. 05/10) [18].

35. Vegetable of *Sunisannaka* (*Marsilea minuta* Linn.) useful in vatarakta. (C. S. Ci. 29/52) [16].

36. *Amalki* (*Emblica officinalis* Gaertn.) and *Haridra* sweetened with honey is used to alleviate Vatarakta (C. S. Ci. 05/10) [16].

37. Use of Silajatu and Guggulu along with milk is useful in Vatarakta (A. H. Ci. 22/65) [15].

38. *Vardhaman Pippali* (*Piper longum* Linn.) is useful in vatarakta (S. S. Ci. 05/12) [18].

39. Vatarakta predominant in kapha, decoction of *Mustaka* (*Cyperus rotundus* Linn.), *Draksha* (*Vitis vinifera* Linn.) and *Haridra* mixed with honey alleviate Vatarakta (A. H. Ci. 22/14) [15].

40. Vegetable of the upper end of *Vetra* (*Calamus tenuis* Roxb.) is wholesome in vatarakta (C. S. Ci. 29/52) [16].

**MEDICINAL PLANTS EFFECTIVE IN GOUT**

Medicinal plants have been known for millennia and are extremely respected worldwide as a wealthy source of healing agents for the prevention of a variety of diseases. Over 80% of the world population depends on traditional medicine for their primary health care needs. Also, the overuse of synthetic drugs, which results in higher
incidence of adverse drug reactions, has motivated humans to return to nature for safe remedies. Many plants have been documented for their pharmacological effectiveness in case of gout. In the table no. 1 an attempt was made to compile the accessible data on the plant as anti-gout.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Plant</th>
<th>Family</th>
<th>Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Acacia confuse</em> Merr. [27, 28]</td>
<td>Fabaceae</td>
<td>Okanin, Melanoxetin</td>
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<tr>
<td>2.</td>
<td><em>Ajuga bracteosa</em> Wall Ex Benth. [29]</td>
<td>Lamiaceae</td>
<td>6-Deoxyharpagide, Aajugarin I, Lupulin A, Withaferin A And Reptoside</td>
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<td>3.</td>
<td><em>Allium cepa</em> [30, 31]</td>
<td>Liliaceae</td>
<td>Quercetin, Morin, Myricetin, Kaempferol, Icariin, Apigenin, Luteolin, Baicalin, Silibinin, Naringenin</td>
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<td>4.</td>
<td><em>Amentotaxus formosana</em> Li [32]</td>
<td>Taxaceae</td>
<td>Sugiol</td>
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<td>5.</td>
<td><em>Biota orientalis</em> (L.) Endl [33]</td>
<td>Cupressaceae</td>
<td>Quercetin And Rutin</td>
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<td>6.</td>
<td><em>Blumea balsamifera</em> DC [34, 35]</td>
<td>Asteraceae</td>
<td>Luteolin, Quercetin, Tamarixetin, Dihydroflavonol</td>
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<td>8.</td>
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<td>Caesalpiniaceae</td>
<td>Neoprotosappanin</td>
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<td>9.</td>
<td><em>Cajunin stilbene</em> (L.) Millsp [38]</td>
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<td>Cassia Oil (Cinnamaldehyde Derivatives)</td>
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<td>Caffeic Acid Derivatives And Flavones</td>
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<td>Family</td>
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<td>18</td>
<td><em>Flos Chrysanthemum</em> [49]</td>
<td>Asteraceae</td>
<td>Luteolin And Apigenin</td>
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<td>19</td>
<td><em>Gardenia jasminoides</em> [48]</td>
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<td>Geraniin</td>
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<td><em>Gloriosa superba</em> L. [51]</td>
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<td><em>Lagerstroemia speciosa</em> (L.) Pers. [55]</td>
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<td><em>Lychnophora trichocarpa</em> Spreng [57]</td>
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<td>Luteolin, Apigenin, Lupeol, Lychnopholide And Eremantholide</td>
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<td><em>Lysimachia christinae</em> Hance [58]</td>
<td>Lysimachia</td>
<td>Aqueous Extract</td>
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<td>29</td>
<td><em>Morinda citrifolia</em> L. [59]</td>
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<td>Aglycone, Apigenin</td>
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<td><em>Paederia scandens</em> (Lour.) Merrill [63, 64, 65, 66]</td>
<td>Rubiaceae</td>
<td>Asperuloside, Daphyllloside, Scandoside Methyl Ester, Loganin, Deacetyl Asperulosidic Acid Methyl Ester, Geniposide And Geniposidic Acid</td>
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<td><strong>Family</strong></td>
<td><strong>Extract/Compound</strong></td>
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<td>33.</td>
<td><em>Palhinhaea cernua</em> (L.) Vasc. &amp; Franco&lt;sup&gt;[67]&lt;/sup&gt;</td>
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<td><em>Prunus mume</em> [76]</td>
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<td>43.</td>
<td><em>Ramulus Mori</em> [78]</td>
<td>Moraceae</td>
<td>Ethanol extract</td>
</tr>
<tr>
<td>44.</td>
<td><em>Rhus coriaria</em> L. [79]</td>
<td>Anacardiaceae</td>
<td>Methanolic extract</td>
</tr>
<tr>
<td>45.</td>
<td><em>Rubia lanceolata</em> Hayata [80]</td>
<td>Rubiaceae</td>
<td>Methanol Extract</td>
</tr>
<tr>
<td>46.</td>
<td><em>Salvia miltiorrhiza</em> Bunge [81]</td>
<td>Lamiaceae</td>
<td>Magnesium lithospermate</td>
</tr>
<tr>
<td>47.</td>
<td><em>Saraca ashoka</em> Roxb. [82]</td>
<td>Fabaceae</td>
<td>Ethyl acetate fraction</td>
</tr>
<tr>
<td>49.</td>
<td><em>Semecarpus anacardium</em> L. [84]</td>
<td>Anacardiaceae</td>
<td>Tetra hydro amentoflavone (THA)</td>
</tr>
<tr>
<td>50.</td>
<td><em>Smilax china</em> L. [85]</td>
<td>Liliaceae</td>
<td>Caffeic acid, resveratrol, rutin and oxyresveratrol</td>
</tr>
<tr>
<td>51.</td>
<td><em>Smilax glabra</em> Roxb. [86]</td>
<td>Liliaceae</td>
<td>Palmitic acid, astilbin glucuronide, caffeic acid sulfate, glucuronide, resveratrol</td>
</tr>
<tr>
<td>No.</td>
<td>Species</td>
<td>Family</td>
<td>Active Ingredients</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------</td>
<td>--------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>52</td>
<td><em>Smilax riparia</em>[^86,87,88]</td>
<td>Liliaceae</td>
<td>Smilaxchinoside A and Smilaxchinoside C Riparoside B and timosaponin J</td>
</tr>
<tr>
<td>53</td>
<td><em>Terminalia macroptera</em> Guill et Perr[^89]</td>
<td>Combretaceae</td>
<td>cis-polyisoprene, chebulic acid trimethyl ester, methyl gallate, shikimic acid, corilagin, rutin, narcissin, chebulagic acid and chebulinic acid</td>
</tr>
</tbody>
</table>
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[76] Yi LT, Li J, Su DX, Dong JF, Li CF. Hypouricemic effect of the methanol extract from *Prunus mume* fruit in mice, Pharm. Biol. 50 (11), (2012), 1423-1427.


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