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Review of drugs under *Laghupanchmula*

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Abstract
Even as we commence the new Century with its exciting prospect of gene therapy, plant based medicines remain one of the common forms of therapy available to the world population. Apart from single use of medicinal plants many of the compound formulation based on complexity of diseases are also prescribed. Even today many of the compound formulations referred in those classics are still in practice, which shows strong health benefits of those compound formulations. A few of them noteworthy are-*Triphala*, *Trikatu*, *Mahatpancamula*, *Laghupancamula* and *Dasamula* etc. Considering their long tradition in our country, it was decided to explore science behind one of them; the compound *Laghupancamula.* This compound comprises of five plants i.e. *Salaparni*, *Prisniparni*, *Brihati*, *Kantakari and Goksura.*

Keywords: *Laghupancamula*

Introduction
The vegetable drugs mentioned under *Laghupancamula* are well appeared in Ayurvedic classics and later on identified botanically in different period of time, and now the accepted botanical names of the plants under *Laghu* are as follows- *Salaparni* (*Desmodium gangeticum*), *Prisniparni* (*Uraria picta*), *Brihati* (*Solanum indicum*), *Kantakari* (*Solanum surratance*) and *Goksura* (*T. terrestris*). *Caraka Samhita* and *Susruta Samhita*, the two main original classics of *Ayurveda* have mentioned *Laghupancamula* as one of the compound formulations useful as *Rasayana* (C.Ci. 1/1/43, 1/1/76) [1], and in treatments of *Sotha* (C.Su. 4/16) [1], *Jvara* (C.Ci. 3/267, Su.Ci. 39/216) [1], *Raktapitta* (C.Ci. 4/96) [1], *Gulma* (C.Ci. 5/151) [1], *Kustha* (C.Ci 7/81, 7/87, Su.Ci. 9/7, 9/47) [1, 2], *Vrana* (C.Ci. 2/77, Su.Ci. 1/77) [1, 2], *Vatavyadhi*, (C.Ci. 28/121, Su.Ci. 5/77) [1, 2], and *Vata Sonita* (C.Ci.29/70) [1].

Material and Method
A chronological review of all available *Ayurvedic* classics have been carried out, i.e., *Charaka Samhita* (1000 B.C. to 4th Century A.D.), *Sushruta Samhita* (1000 B.C. to 5th Century A.D.), *Ashtanga Sangraha* (6th Century A.D.), *Ashtanga Hridaya* (7th Century A.D) were also considered to make the picture more clear regarding drugs of of *Laghupanchamula* [3, 4]. The information was critically reviewed and the rationale behind the content of *Laghupanchamula* was derived. Further present scientific research work regarding each drug was gathered. All information was then critically analysed, discussed and concluded.

Observation
On comprehensive literary review it was found that the word *Laghupancamula* as such is not referred in ancient *Ayurvedic* classics i.e. *Caraka Samhita* and *Susruta Samhita*. In *Astanga Sangraha* and *Astanga Hridaya* this term is mentioned as an component of many compound formulations (A.S.Ci.3/23) [3], (A.S.Ci.8/30) [3], (A.S.Ci.8/29) [3], (A.H.Ci.2/36-37/) [4], (A.H.Ci.6/35-36) [4], (A.H.Ci.9/13) [4], and (A.H.Ci.22/25) [4],. It reflects that during ancient times it was known by the name of-*Vidarigandhadi Pancamula* (C.Ci. 1/1/43) [1], *Kaniyapancamula* (S.S.38/67-68) [2], *Khuddkapancamula* (K.S.Kh10/83) [5] and *Kanisthhapancamula* (Si.S.2/29) [2] whereas in medieval period by *Laghupancamula*. All the above terms indicates towards habit of plants of this group i.e. either herb or shrub (*Salaparni*, *Prisniparni*, *Brihati*, *Kantakari* and *Goksura*). *acarya Caraka* named this group as *Vidarigandhadi Pancamula*, based on first drug *Vidarigandha* (*Salaparni*).

Salaparni
Botanical name : *Desmodium gangeticum* (Linn.) DC.
Family : Fabaceae

Botanical description

General Features: An under shrub 60-120 cm high, stems irregular, clothed with appressed white hairs.

Leaves: 1-foliate., petioles 1-2 cm long., stipules scarious. 6-8 mm long linear - subulate, striate at the base, Leaflets membranous, 9-12.5 by 3.5 to 6.3 cm ovate - oblong acute or slightly acuminate, the margins somewhat waved. glabrous and green above, paler and clothed with dense soft whitish appressed hairs beneath, reticulately veined, base rounded, truncate., main nerves 8 -12 pairs, petiolules, 1-5 mm long, hairy, stipels 3 mm long subulate.

Flowers: Flowers in copious ascending terminal and axillary racemes 45-30 cm.long arranged in few flowered fascicles along a slender pubescent somewhat angular rhachis ipedicels 4-6 mm long, filiform, pubescent, bracts subulate, 1.5 to 3 mm long., bracteoles minute.

Calyx: Calyx 2 mm long, hairy, teeth triangular, longer than the companulate tube.

Corolla: 4 mm long, violet or white, standard 3 mm broad, cuneate at the base.

Stamens: Diadelphous, one and nine, anthers uniform Ovary, Sessile or stipitate, many ovuled, style filiform incurved with minute capitate stigma.

Pods: Subfalcate, deeply indented on the lower, slightly indented on the upper edge, joints 6-8, longer than the broad, indehiscent, sparsely clothed with minute hooked hairs, the lower edge rounded, the upper straight.

Root: Poorly developed tap root and 5-15 or more, long deep growing prominent spreading lateral roots arising from its basal part. Root bark is neither thick or fleshy. It has a characteristic yellowish white colour and a leathery texture and easily peelable.

Distribution

It is found in the lower Himalyana region upto 1600m and throughout the plains of India.

Parts Used: The root and whole plant is used.

Chemical Constituents: The aerial parts of the plant contain 5 tryptamine derivatives, Nb-Me-tetrahydroharman and 6-OMe-2-Me-carbolinium cation. The roots contain alkaloid, N, N-di-Me tryptaniine & its N-oxide, N-Me-tryarnine, hypaphorine, hordenine, candicine, a pterocarpan, pterocarpanoids, gangetinin and desmodin. The seeds are known to contain -carboline alkaloid, indole3 -alkylamine and carbolines.

Properties and uses

The root is bitter tonic, astringent and diuretic, used in chronic fever, cough, diarrhea, vomiting, asthma, snake bite and scorpion sting. The root is one of the ingredients of a famous *Ayurvedic* preparation '*Dasamula kvatha'*, which is considered to be antipyretic, alterative and bitter tonic. It is reported to be beneficial in the treatment of typhoid, biliousness and also as diuretic and aphrodisiac [6].

Pharmacological Evalution

In 2005 Mishra, *et al.*, identified bioactive glycosides from *Desmodium gangeticum* [7]. Antiamnesic effects of *Desmodium gangeticum* DC in mice was established by Joshi *et al*., (2007) [8]. Effect of *Desmodium gangeticum* DC. extract on blood glucose in rats and on insulin secretion *in vitro* is also evidenced (Govindarajan, 2007) [9]. A comparative study on *in vitro* and *in vivo* antioxidant activities of aqueous extract of *Desmodium gangeticum* DC. root was done by Kurian, *et al*., (2010) [10]. The extract of the plant was found to possess antioxidant activity when studied for diphenyl picryl hydrazyl (DPPH), nitric oxide, ferryl-bipyridyl and hypochlorous acid scavenging activity along with lipid peroxidation by thiobarbituric acid reactive substances method using rat brain homogenate (Govindarajan *et al*., 2003) [11]. Gangetin, a major pterocarpanoid isolated from the plant when administered orally as a suspension in female rats at a dose of 100 mg/kg body weight in three groups of rats for a period of 5,10 and l5days produced 40, 57 and 87:5 per cent, anti-implantation activity respectively on day 10. Gangetin administered at a dose of 50 mg/kg body weight for 5 days showed 50 per cent anti-implantation activity in female rats. The study suggested that gangetin had effects on the uterus that helps in mobilizing the glycogen (Alam *et al*., 1982) [12]. The water, ethanol and acetone extracts of the root caused 25, 21 and 27 per cent, inhibition of angiotensin converting enzyme *in vitro*, respectively (Hansen *et al*., 1995) [13]. Treatment with the extract also produced significant decrease in the concentration of thiobarbituric acid reactive substance and increase in activities of glutathione reductase and catalase in the myocardial tissue of rats suggesting antioxidant activity of extract. '*Dasamula kvatha*, an *Ayurvedic* formulation consisting of *D. gangeticum* DC. besides nine other constituents produced aspirin like analgesic effects in rats. It produced significant antipyretic effect and mild anti-inflammatory effect in rats against carrageenin-induced oedema. Further, the kvÁtha produced CNS depressant effect as evident by reduction in spontaneous motor activity, potentiation of the pentobarbitone hypnosis and antagonism of amphetamine induced hyperactivity in mice. It also blocked the conditioned avoidance response in rats and reduced the normal body temperature suggesting the tranquillizing effect of the preparation (Gupta *et al*., 1983; 1984) [14].

Prisniparni

Botanical name : *Uraria picta* (Jacq.) Desv.
Family : Fabaceae

Botanical description (Gaur, 1999)

Leaves: Lower leaves 1–3-foliolate, upper 5–7 foliolate.

Leaflets: Linear to oblong or lanceolate, lower ones 3-10 × 2-3 cm., upper ones 6-24 × 0.5-2.5 cm, acute, rarely obtuse, minutely pubescent beneath.

Inflorescence: Rachis, 8-12 cm.

Flowers: Purple, 6-10 mm long, Racemes dense, cylindric, 20 cm long.

Bracts: Caduceus, 1.5 cm long, concealing the buds.

Calyx: Four to six mm long, pubescent; teeth much longer to tube.

Corolla: Purplish to bluish.
Pods: Four to five cm long, 3–6 jointed, white, glabrous, polished.

Distribution
It is a native of tropical zone including Nepal,Srilanka, Norhtern Australia, China, Burma.Herb grows up to 1.5mts tall, is found in dry grassland, west places, open deciduous forests and in all plains of India extending from Himalayas to Ceylon, Malaysia and Phillippines (Gaurav *et al*., 2008) [15]. In Flora of Taiwan second edition, four species were recognized in the genus *Uraria*, *Uraria crinita*. *U.lycopodioides* and *U. neglecta*. (Ohashi *et al*., 2007) [16].

Part(S) Used
Whole plant, root, fruit, seed, leaf.

Chemical constituents
Two isoflavanones 5, 7-dihydroxy-2'-methoxy-3', 4'-methylenedioxyisofla-vanone, and 4', 5'-dihydroxy-2', 3'-dimethoxy-7-(5-hydroxychromen-7yl)-isoflavan-one along with 6 compounds including isoflavanones, triterpenes and steroids were isolated from roots of *Uraria picta* (Jacq.) Desv. The structures of these compounds where established unambiguously by UV, IR, MS and a series of 1D and 2D NMR analysis. The minimum inhibitory concentrations (MIC) for these compounds were found to be in the range of 12.5–200 lg /ml against bacteria (both Gram positive and Gram negative) and fungi (Rahman *et al*., 2007).

Properties and uses
Uraria picta (Jacq.) Desv.is one of the components of *Dasmula* and is credited with fracture-healing properties. In Ghana, the plant is employed for treating heart trouble. The roots are also known to have aphrodisiac properties. Its decoction is prescribed for cough, chills and fevers. The leaves are considered antiseptic and used in gonorrhea. The roots and pods are employed in Bihar to treat prolapse of anus in infants; the pods are also employed for the treatment of sore-mouth in children (Anonymous, 1962). It is used for the treatment of urinary diseases, tumors, edema, burning sensation and difficulty breathing. Its paste, mixed with water, is used as an antidote for snake bite in Bastar, Madhya Pradesh (Parrotta *et al*., 2007) [18].

Pharmacological evalution
Total and fractionated extracts of *U. picta* (Jacq.) Desv. have been assessed for acaricidal activity on Ixodes ricinus. All the extracts were acaricidal to the test organisms. Methanolic extract of this plant is a more potent acaricide compared to the aqueous extract. Similarly, the alkaline-soluble non-polar fraction of the methanolic extract exhibited greater acaricidal activity than the alkaline-insoluble non-polar fraction (Igboechi *et al*., 1989) [19]. Comparative evaluation of Aqueous and methanolic extracts of roots of and whole plants of *U. picta* (Jacq.) Desv. Were studied for anti- inflammatory activity using *in-vitro* and *in-vivo* animal models. The evaluation parameter of *in- vivo* model was NO radical scavenging assay and lipooxygenase assay and Carrageenan induced rat paw edema model was used in the *in vitro* model. Results indicated that the *U. picta* (Jacq.) Desv. has better anti-inflammatory potential than *Asparagus racemosus* (Ahirrao *et al*., 2007) [20]. Hypolipidaemic activity of Abana, an Indian herbomineral preparation containing *U. picta* (Jacq.) Desv. as one of the ingredient was studied to investigate the action of Abana on the lipid and lipoprotein metabolism in albino rats. The results showed that chronic administration of Abana significantly reduce serum lipoprotein lipid components and apoprotein level in rats indicating Abana as cardioprotective and hypolidaemic agent (Khanna *et al*., 1991) [21]. In another study Abana powder was administered orally in rabbits to investigate the effect of Abana. The results showed that administration of Abana for 3 days has an action similar to that chronic administration of isoprenaline which may be due to a specific depressant effect of Abana on the adrenergic receptor and a direct sensitization of the atrium (Pasnani *et al*., 1988) [22]. It has been clinically used as a cardioprotective drug (Parle *et al*., 2007) [23].

Substitution and adultration
Uraria crinite, U.lagopodioides. U. neglecta.

Brihati

Botanical Name	:	*Solanum indicum* Linn.
Family	:	Solanaceae

Botanical description
General Features: A much branched undershrub 0.3 - 1.5 meters high, very prickly, prickles large, with a long compressed base, sharp. Branches covered with minute stellate hairs.

Leaves: 5-15 by 2.5 to 7.5 cm, ovate in out line, acute, subentire or with a few large triangular ovate subacute lobes, sparsely prickly on both sides, clothed above with simple hairs from bulbous bases intermixed with small stellate ones, covered below with small stellate hairs, base cordate cuneate or truncate, often unequal sided., petioles 1.3 to 2.5 cm long, prickly.

Flowers: Flowers in racemose extra axillary cymes., peduncles short, pedicels 6 to 13 mm long, stellately hairy and prickly.

Calyx: 3 mm long, stellately hairy, teeth triangular, 1.5 mm long corolla: 8 mm. long, pale purple, clothed outside with darker purple stellate hairs, lobes 5 mm, long deltoid ovate acute.

Filaments: Very short, anthers oblong lancedite, opening by small pores.

Ovary: Often hairy at the top, style stellately hairy, curved at the apex.

Fruit: Berry 8 mm diameter, globose, dark yellow when ripe, glabrous or sometimes with a few stellate hairs at the apex.

Seeds: 4 mm diameter minutely pitted.

Root: Root is well developed and consists of tap root and many secondary roots and their branches which grow deep into the soil. The secondary roots are long fairly large and strong. Fresh roots have a light yellow or yellowish brown colour and are fairly smooth, except for the presence of many root lets. Bark is thin, easily seperable from the wood (Kirtikar and Basu, 1988) [24].

Distribution
Throughout Tropical India from sea level to about 667m elevation growing in waste land, along roadsides (Anonymous, 1972) [25]. Also occurs in Sri Lanka, Malaya, China, Phillippines (Cooke, 1967) [26] and lndomalaysia and Tropical Africa (Yoganarsimhan, 1996, 2000) [27, 28].

Part(s) used
Whole plant, root, fruit, seed, leaf (B.N. 1982).

Chemical constituents
Plant: Gitogenin, tigogenin, dioscin, methyl protodioscin, methylyl protoprosapogenin A7 dioscin., demissidine, jorjubidine, leptinidine, neotigogenin, paniculidine, solanidine, solacongestine soladulcidine, solafloridine, solaquitidine, tomatidine, yamogenin steroidal alkaloid-diosgenin, 3-sitosterol, lanosterol, solanosine, solamargine, solasodine (Rathore et. al., 1978) [29] Roots: Solamargine, anguivine, Isoanguivine (Ripperget and Hummeirejeb 1994).

Properties and uses
The whole plant and roots are used as carminative and expectorant. These are beneficial in asthma, dry cough, colic, chronic fever and flatulence (Chopra *et al*., 1958) [30]. It relieves pain arising from difficult parturition and also used as aphrodisiac and astringent. Root is diaphoretic and stimulant, useful in catarrhal affections, dropsy, toothache, dyspepsia, colic, verminosis, diarrhea pruritus, leprosy, skin diseases, bronchitis, cardiac disorders and vomiting. Fruits are bitter, pungent, digestive and laxative. Its juice is beneficial in alopecia. Decoction of the seeds is useful in dysuria and vapour from seeds in odotalgia (Chatterjee and Pakrashi, 2003). The juice of the leaves mixed with fresh ginger is given as anti-emetic, digestive, laxative, antibacterial and useful in ringworm (Anonymous, 1996) [31].

Pharmacological evolution
Plant was reported to have hypocholesterotaemic (Kalboro *et al*., 1997), anthelminitic, nematocidal (Qamar *et al*. 1998) [32], marginal choleristic, antihepatotoxic (Asha and Pushpangadan 1998) [33], anti-inflammatory, wound healing and cytotoxic (Gu *et al*., 2004) [34] activities.

Substitutes and adulterants
Solanum insanun Willd, *S. torvum* Swart, *S. melongena* Linn. *S.xanthocarpam* Sc. And S. *aculeattissimum* Jacq. Are used as a substitute (Anonymous, 2000a., Ayer and Kolanmmal 1992) [35].

Kantkari
Botanical name : *Solanum surattense* Burm. F. (Syn.*S. xanthocarpum* Sch. & Wendi.).

Family : Solanaceae

Botanical description
Plant-A prickly perennial herb, woody at the base, spreading root and shoot system. Leaf and stem provided with straight, yellow, glabrous and shining prickles measuring 2- 15 mm long.

Leaf- Simple, petiolate, elliptic, sub-acute, Sub-pinnatifid, reticulate, stellate hairs on both surface, long- yellow sharp prickles on time midrib and nerves.

Flower- Extra axillary single flower, peduncles and pedicels short, curved Stellatery hairy purple measuring 3-4 cm in diameter.

Calyx - sepals 5 green, united at the base forming a calyx tube measuring 8 mm in length.

Androecium - stamens 5, free, attached by short basifixed filament to the corolla tube in between the petals. Anthers bilobed, with four loculi, open by pore at the tip, glabrous. Oblong or lanceolate, measuring 8-12mm in length.

Gynoecium - carpels two united, ovary 2 chambered, style short and stigma ovoid.

Fruit – Berry, fleshy, globose measuring 13-20 mm in diameter with white and green markings on the fruit wall, calyx persistent with prickles and hairs.

Seed- Numerous, embedded in the fleshy mucilaginous mass, flattened, round with a curved end measuring 2-3mm diameter and glabrous.

Ethan botanical use
According to Ahuja (1965) [36], the white variety (Laxmana or Putrada) is known for sure birth of a son in the *Ayurvedic* literature, but this plant is not easliy available. The pulp of the fruits is made into a paste and is applied on skin infections. The flowers are eaten to promote digestion in Jammu and Kashmir (Kaul *et. al.* 1991) [37].

Distribution
Solanum surattense is distributed throughout India, Sri Lanka, South East Asia, Malaysia and tropical Australia.

Parts used
Whole plant, fruits, flowers, seeds, leaves, stem and roots are used.

Chemical constituents
Alcoholic extract of plant contain fatty and resinous substances. The fruits contain carotene, caffeic, chlorogenic, isochlorogenic and neocholorogenic acids, esculin, esculetin, scopoletin, cycloartanol, diosgenin, carpesterol, solasodine, solamargine, rhamnosyl-D-glucoside, β-sitosterol and stigmasteryl glucoside. Arachidic, linoleic, oleic, palmitic and stearic acids and solanocarpine from the fruit oil and heterosdes of tomatidienol from fruit-stalk have been isolated. The flowers contain diosgenin, apigenin and quercetin-3-O-glucopyranosyl-O-D-mannopyra-noside (Chatteriee and Pakrashi, 1995) [40].
Solasodine is present in fruits; the glycoalkaloid content of fruits collected from plants growing in Jammu and Kashmir is reported to be 3.5% (total alkaloids 1.1%). The presence of diosgenin in the plant has been reported. Solasodine has been isolated from the plant. The alkaloids can form a source for cortisone and sex harmone (Chopra *et. al*., 1969) [38].
Seeds (20.7% of fresh wt. of the fruit) yield 19.3% of greenish yellow, Semi-drying oil with characteristic odour. The component fatty acids of the oil are oleic, linoleic, palmitie, stearic and arachidic. The unsaponifiable matter contains two sterols one of which is carpestorol (Anonymous, 1972) [39].

Medicinal uses
According to Chatterjee and Pakrashi (1995) [41], the whole plant is alterative, antiasthmatic, aperient, astringent, digestive, febrifuge, bitter and pungent. This is used in bronchitis, cough, dropsy and constipation. A decoction of the plant is given in gonorrhoea and to promote conception. The fruits, flowers and stems are bitter and carminative and are prescribed in vesicular and watery eruptions (Chopra *et al*, 1956) [38]. The bud and flower juice is used in watery eyes (Agarwal, 1986) [40]. The roots are considered expectorant, diuretic, antiasthmatic and antiemetic (Chatterjee and Pakrashi, 1995) [41] and are used for cough and pain of chest (Chopra *et al.*, 1956) [38]. The roots are beaten up and mixed with wine and are given to check vomiting. The decoction of the roots with that of Giloya *(Tinospora cordfolia*) is given in fever and cough.

Pharmacological evolution
Pharmacological studies on the herb have shown that aqueous and alcoholic extracts of the plant possess hypotensive effect which is partially inhibited by atropine, the more persistent secondary fall in the blood pressure and broncho-constriction are inhibited by antihistaminic drugs. Both glycoalkaloid and fatty acid fractions of the extract cause liberation of histamine from chopped lung tissue. The beneficial effect of the drug on bronchial asthma may be attributed to the depletion of histamine from bronchial lung tissue. The gluco-alkaloid saponin fraction was active in much smaller doses (0.5-2 mg/kg) in increasing cardiac contractility and tension of isolated ventricular and papillary muscles of cat, indicating a positive inotropic effects. The glucoalkaloidal fraction of the drug seems to possess cardiotonic effects worth investigating clinically.

Substitution and adulteration
The commercial drug of *S. surratense* is often found adulterated with the allied species *S indicum* Linn.

Goksura

Botanical name	**:**	*Tribulus terrestris* Linn.
Family	**:**	Zygophyllaceae

Botanical description
General Features
It is a tap rooted herbaceous perennial plant that grows as a summer annual in colder climates. It is a trailing and spreading herb, densely covered with minute hair.

Stem-The stems radiate from the crown to a diameter of about 10 cm to over 1 m, often branching. They are usually prostrate, forming flat patches, though they may grow more upwards in shade or among taller plants.

Leaves-The leaves are pinnately compound with leaflets less than a quarter-inch long.Leaves compound, in opposite pairs, leaflets 3 to 6 pair, upto 8 cm long.

Flowers-The flowers are 4 to10 mm wide, with five lemon yellow petals. Ovary briskly, style short and stout.

Fruit-Fruits are globose, spinous or tuberculate, consisting of fine hairy or nearly glabrous, often muriculate and woodi cocci, each with two pairs of hard sharp spines, one pair longer than the other. A week after each flower blooms, it is followed by a fruit that easily falls apart into four or five single-seeded nutlets.

Seeds- The nutlets or "seeds" are hard and bear two to three sharp spines, 10 mm long and 4 to 6 mm broad point-to-point. Fruit often cling to clothes and bodies of animals. Seeds are many in woody cocci.

Occurrence and distribution
It is found in waste places and dry habitats throughout the warmer regions of India ascending upto an altitude of 3000 m including West Rajasthan and, Gujarat, Deccan and Andhra Pradesh.

Parts Used
The fruits, leaves, stems and roots are used.

Ethnobotanical Use
A decoction of the plant is used to remove gravels locally. In Peshawar valley, the fruits are used by women to ensure fecundity (Watt, 1972) [42].

Chemical Constituents
The aerial parts of the plant contains chlorogenin, diosgenin and its acetate, gitogenin, astragalin, dioscin, 3-deoxy-diosgenin, gracillin, harman, hecogenin, ruscogenin, trillin, furostanol glycoside, spirosterol saponin and a dihydroxy spirosteroidal sapogenin, trigogonin-3-diglucorhamnoside alongwith saponins C & G. The leaves possess 3-D (6”-p-coumaroyl)-glucoside. The phytochemical investigation of the aerial parts of *Tribulus terrestris* Linn. resulted in the isolation of the novel furostanol saponin 1, named tribol, together with the known spirostanol saponins 2 and 3 and sitosterol glucoside (Conrad *et al*., 2004). An HPLC-ELSD-ESI-MS method has been developed for the analysis of the steroidal saponins in the aerial parts of *T. terrestris* (De Combarieu *et al*., 2003). The fruits contain glucose, rhamnose, rutin, chlorogenin and gitogenin. The flowers are reported to contain kaempferol, campesterol, 13-sitosterol and stigmasterol. Harmine have been reported in seeds and sitosterol, stigmasterol and neotigogenin have been isolated from the root (Chatteijee and Pakrashi, 1994) [41].

Medicinal Uses: *Tribulus terrestris* Linn. Is a diuretic, tonic and aphrodisiac, used in urinary disorders, hyperuricccemia and impotence.In Unani medicine it is used to inhibit the formation of kidney stone. *Tribulus terrestris* Linn. contains three groups of active phytochemicals: Dioscin, protodioscin and diosgenin. These substances have effect on sexual performance and may treat various sexual disorders, they regulate sexual energy level and strength by increasing the percentage of free testosterone level for men and they affect pregnenolone, progesterone and estrogen. The hormone balancing effects of Bulgarian *T. terrestris* for women makes this herb suitable for premenstrual syndrome and menopausal syndrome. These protect the prostate from swelling and in combination with the X steroidal saponins, protect the prostate from cancer. Steroidal saponins currently referred to as X steroidal saponins (Sun *et al*., 2003). These X steroidal saponins affect the complete immune system (Toshkov *et al*., 1985) [44]. They have been demonstrated to possess anti-bacterial and anti-viral effects. Bulgarian *Tribulus terrestris* Linn. is used internally and externally to treat herpes, and virus infections such as influenza and the common cold.

Tribulus terrestris Linn. Was found to be a rich source of calcium (Duhan *et al*., 1992) [45].

Pharmacological evalution

It is a very potent diuretic and tonic drug (Selvam, 2008) [47]. The steroidal saponin constituents obtained from *Tribulus terrestris* Linn. exhibit antimicrobial and cytotoxic effects (Chu *et al*., 2003) [48]. Saponins from *T. terrestris* (STT) exert its cytotoxic effect on liver BEL-7402 cells by inducing apoptosis (Sun *et al*., 2004) [49]. Effects of *T. terrestris* (TT) on hormonal secretion were evaluated in primates, rabbit and rat to evaluate its usefulness in the management of erectile dysfunction (ED) (Adaikan *et al*., 2000) [50].

Substitutes and adulterants

The fruits of *Pedalium murex* Linn. are occasionally substituted to *T terrestris*, being considered as large' *Goksura*. The fruits of *Acanthospermum hispidum* DC. Resemble the individual cocci of *Tribulus terrestris* Linn. and are frequently found mixed with the later.

Observation

In *Charaka Samhita,*. Sutra sthan the group is mention *Shvayathuhara Mahakashaya*; the drugs are *Kantakarika*, *Brihati*, *Shalaparni*, *Prishniparni*, and *Gokshura* [1]. Which is used in Soth (oedama).In Chikitsasthana, for ingredient of *Brahmarasayana Vidarigandhadi panchamula which is synonym of laghupanchamula* which consist of *Vidarigandha*, *Brihati*, *Prishniparni*, *Nidigdhika*, and *Shvadmshtra* is mentioned [1]. In *Chikitsasthana*, either group alone as such or with the drugs of *Brihatpanchamula*, is included in many compound formulations, a few of them being *Mahakalyanaka Ghrita*, *Taila*, *Dashamuladi Ghrita*, *Mustadi Churna*, and *Taila* indicated in *Apasmara*, *Visarpa*, *Gulma*, *Kushtha*, and *Vrana*, respectively. It is siddhi sthan have been included for Basti [1].

- In *Sushruta* the drugs of *Kaniyapanchamula* are *Trikantaka*, *Brihatidvaya* (*Brihati*, *Kantakari*), and *Prithakaparnyo* (*Shalaparni*, *Prishniparni*), the properties of *Kaniya panchamula* are also ascribed, i.e., *Kashaya*, *Tikta*, and *Madhura* in *Rasa* as having *Vataghna*, *Pittashamana*, *Brimhana*, and *Balavardhana Karma*. In *Cikitsasthana*, laghupanchamula in various dosage forms, i.e., *Kashaya*,] *Kshira*, *Taila*, and *Kvatha* in *Vrana*, *Bhagna*, *Vatavyadhi*, and *Arsha*, respectively [2].
- In both *Ashtanga Sangraha* and *Ashtanga Hridaya*, it is grouped under *Hrisvapanchamula* and are *Madhura Rasa* and *Madhura Vipaka*; neither *Atishita* nor *Atiushna* and *Sarvadoshahara* by its action i.e.neither too hot nor too cold in potency and pacify all the three doshas. In *Chikitsasthana* Laghupanchmula are mentioned for as *Ghrita*, *Kvatha*, and *Taila*for *Shvasa-Hikka*, *Shvasa*, and *Kushtha*, respectively [3, 4]. The separate drug pharmacological action and research work on its medicinal uses correlate with action of laghupanchmula mention in caraka, Susruta, Astanga sangraha and Astanga hridaya.

Conclusion

The original classical name of *Laghupancamula* is *Kaniyapancamula*, *Vidarigandhadi* and *Khuddakapancamula*, which is changed as *Laghupancamula* from *Astanga sangraha.* This compound comprises of five plants i.e. *Salaparni*, *Priniparni*, *Brihati*, *Kantakari and Goksura.* Therefore, the present review indicates that s the authentic use of these formulations in traditional *Ayurvedic* system for the treatment of *Sotha* (inflammation), *Sula* (painful conditions) *Vrana* (wound), *Rasayana* (Rejuvenator), *Jwara* (fever), *Gulma* (cancer) and other uses correlate with separate drug research work on its uses and pharmacological action. Further advancement in this work is required through molecular research of whole group of drug.

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