

# Textual Relook on Classical Therapeutic Applications of an Indigenous Herb: Gokshura (*Tribulus Terresteris*), A Potential Vaajikarana Herb

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## Abstract

Ayurveda is an ancient medicine system, incorporating therapeutic herbs which are in application as old as the human civilization. The efficacies of multiple such herbs has been documented consistently and thereafter classified scientifically, in ayurvedic samhitas and nighantus. As per the knowledge available in classical texts, gokshura (*Tribulus terrestris*) is found to be a potential as a medicine against ailments such as Ashmari (Renal stones), effective mutravirechaniya (Diuretic) and is included in different vaajikarana (Aphrodisiac) formulations. Gokshura, an annual prostrate herb, and nowadays it is also used to increase testosterone level, aphrodisiac activity, strength and endurance. The various formulations of the plant have been documented in classics and newer are available in the market such as Gokshuradi guggulu, Gokshuradi paka, and Gokshura tablets. In the present study, the authors have tried to present the different aspects of the herb in the structured manner. More work can be carried out to such as formation of nanoparticles prepared from the extracts of different drugs along with gokshura (*Tribulus terrestris*) and observe its activity in different models to improve diseased conditions. Not only this but more study needs to be focussed on forming newer formulations having better activity in treatment of male infertility.

**Keywords:** Gokshura, *Tribulus terrestris*, Vaajikarana, Aphrodisiac, Herb

## Introduction

Modernisation and changes in lifestyle of humans has led to many physical and mental ailments. One of the areas which have been most affected is the sexual life of the couples along with rise of infertility ratio and needs a concern globally [1]. One of the possible causative factors for infertility in males is the inappropriate levels of testosterone. Tackling this issue, is the need of time and one of the herb, Gokshura (*Tribulus terrestris*), has been classically renowned to be effective in male disorders such as impotency and infertility [1].

Gokshura is an annual herb, and can be found growing in dry, hot and sandy regions, up to a height of 3000 m. The plant is known to be used in urinary disorders traditionally. It has laid its important in various conditions such as mutravirechaniya (diuretic), ashmari (renal stones) and sveta-pradara (leucorrhoea) [1, 2]. This zygophyllaceae member has been found to be chemically rich in saponins, glycosides, tannins and flavones. Many studies has been carried out on this herb and it has been proved to improve the testosterone level (in human there by improve fertility in males) [1, 2]. In this present study, the classical review of Gokshura (roots and fruits) has been attempted along with compilation of different pharmacognostical and pharmacological action of the drug as discussed in different classical texts.

**Charaka Samhita-** the authors of this classical text has reported Gokshura to be one of the best herbal drug to be used in mutrakricha (difficulty in passing urine) and for alleviation of vata dosha [3]. Gokshura has been categorised under Mutravirechaniya mahakasaya [4], Krimighana mahakasaya [5] and shothahara mahakasaya [6]. The warm oil prepared with dashmoola, a formulation composing gokshur roots, is effective in granthivisarpa by parisachana kriya [7]. In total, nearly 33 formulations have been discussed in Charaka Samhita incorporating gokshura as a main ingredient along with their therapeutic application (Table 1).

**Table 1: Formulations described in Charaka Samhita with their indications**

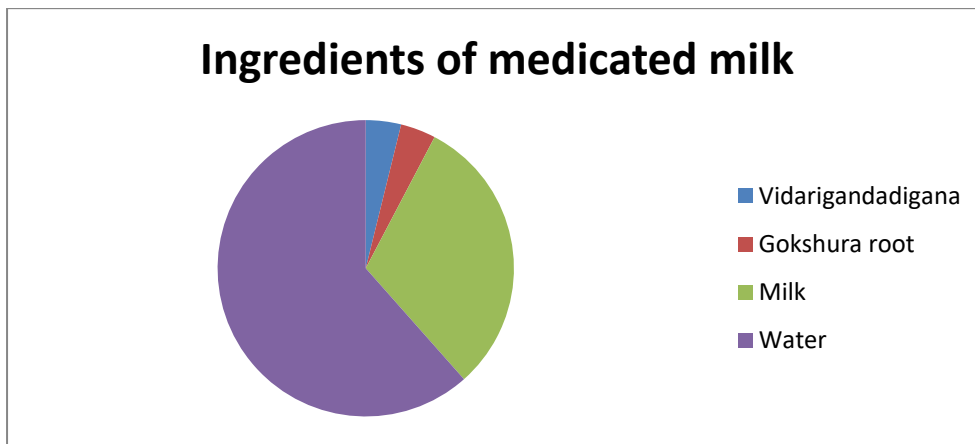
S. No.	Formulations	Indications
1.	Dwitya vata shamaka lepa[8]	Vata vyadhi
2.	Vataj vikar nashak peya[9]	Vataj vyadhi
3.	Mutrakrichhanashini peya[10]	Mutrakrichha
4.	Dashmoolamayuradi basti [11]	Vatavikara
5.	Dashmooladi niruha basti[12]	Vata roga
6.	Sthiradi niruhabasti[13]	Agni vardhak, balya , netral
7.	Erandmooladi niruhabasti[14]	Ashmari , Sharkara , Arsha , grahani.
8.	Dashmooladi ksheera[15]	Vata rakta
9.	Shuddha vatanashak dashmooladi ghrita[16]	Vata roga
10.	Dashmooladi majja sneha[17]	Majja ksaya , virya ksaya , oja ksaya , vata vikar
11.	Tripahaladi mahasneha[18]	All type of vataj disorders.
12.	Paschanabhedadi churna[19]	Ashmari bhedana and patana
13.	Paschanabhedadi ghrita[20]	Ashmari bhedana and patina
14.	Gokshuradi yoga[21]	Ashmari bhedana
15.	Punarnavadi yoga[22]	Ashmari , Sharkara
16.	Trutadi ghrita[23]	Gulma , Ashmari
17.	Karpasmuladi yoga[24]	Shukraja mutrakrichha.
18.	Brahmarasayan[25]	Rasayana,medya,balya
19.	Dashmooladya ghrita[26]	Bala, varna vardhaka, agni vardhak.

20.	Dantyarishta[27]	Arshavikara , panduroga , Agni vardhak.
21.	Nagaradya ghrita[28]	Arsharoga , Grahani vikar , Gudabhransha
22.	Dashmooli ghrita[29]	Kaphaja gulma
23.	Bhallatakadya ghrita[30]	Kaphaja gulma nashaka , Swasa , kasa
24.	Mishraka sneha[31]	Kaphaja gulma , udraroga , vataroga, kapharoga
25.	Panch panchmoola ghrita[32]	Kasa, jwara, raktapitta, shoola
26.	Panchmoolasiddha dugdha[33]	Parshawa shoola , sirashoola, jirna jwara
27.	Trikantakadi dugdha[34]	Mala mutra rukawata , sujana yukata jwara
28.	Patoladiniruha basti[35]	Jwara
29.	Apatyakar ghrita[36]	Vaajikarak
30.	Vrishya payas[37]	Vaajikarak
31.	Bringhani gutika[38]	Vaajikarak, bringhan , bala vardhak.
32.	Chayawanpraasha[39]	Swasa roga, swarakasaya , hridayaroga, jathraagni vardhak, rasayna, vatarakta, vatavikara
33.	Dashmooladi vasasneha[40]	Vatanashak

**Sushruta Samhita** – Acharya Sushruta has categorised gokshura as veervartadigana [41], in laghu panchmool [42] and kantikpanchmoola [43]. Laghu panchmoola is suggested to be used as vatanashaka, pittashamaka, and having bringhana and balya (strengthening) properties. Kantikpanchmoola is effective in raktapitta (bleeding disorder), Vataja, Pittaja and Kaphaja shotha (inflammation), all types of prameha (urinary disorder including diabetes) and to cure shukra doshas (seminal disorders). Mutradoshahara bala ghritam is used to cure different types of mutradosha's (urinary disorders). Shukra dosha (seminal disorders) may be taken care of when patient takes vanshalochana 1 masha (nearly 1 gm), sharkara (sugar) 6 masha (nearly 6 g), honey 6 masha, along with mutradoshahara balaghritam 6 masha and milk. It also possess vaajikaraka (aphrodisiac) property and cures all type of shukradosha[44]. Mutradoshahara baladikalkam is prepared using different herbal ingredients where equal quantity of khraitai, gokhru, kaunch beeja (seed), talamkhane, rice, shatparvak root, devadaru (fruit shell), chitraka, bahera (fruit shell) are taken and kalka (Paste) is prepared with 2 tola (1tola=12gm.) powder with sheetal jala (cold water). This kalka along with sura (alcoholic preparation) helps curing all types of mutradosha (urinary disorders) and may be used in ashmari (renal stones) conditions [45].

Acharya Sushruta has also suggested medicated milk to be taken in vatapittamutraghata (anuria). The milk is prepared by taking equal quantity of plants of vidarigandhadi gana and gokshura root. The ingredients are powdered and thereafter, 32 tola of coarse powder is taken, and to this 8 times of milk and 32 times water is added and boiled, until milk is left. It is then filtered, and this preparation may be given to the patient with sharkara and honey as adjuvant. It is useful in mutraghata, caused due to imbalancing of vata and pitta dosha [46].

For the treatment of vatajwara, baladi kwath has been suggested, where the decoction is prepared by taking 2 tola, each of bala, darbha and gokshura, to which 32 tola water is added and boiled, till nearly 8 tola left over. After filtering, sugar and ghee are added (1 tola each) and the prepared decoction is given to patient [47]. Another formulation discussed for the treatment of vatajwara has been shatapushpadi kwath, which may be prepared by taking 4 parts each of saunf, vacha, kushtha, devadaru, Nirgundi beeja, dhaniya, khasa, nagarmotha. To the ingredients 32 tola water is added and boiled till nearly 8 tola is left over. After filtering the prepared decoction, honey (6 masha) and sugar (1 tola) is added [48].



**Figure 1: The ratio of enlisted ingredients in medicated milk [46] as per Sushruta Samhita.**

**Dravyaguna vinyana** – Acharya Priya vrit sharma has categorised this plant as mutravirechniya (diuretic). The botanical source *Tribulus terrestris* Family- Zygophyllaceae is defined and different synonyms with regional names enlisted [49].

**Rasa Panchaka [49]:**

Rasa of Gokshura is Madhur (sweet)

Guna/Properties of Gokshura is Guru (Heavy), Snigdha

Virya/ Potency of Gokshura is Sheeta (cold)

Vipaka/ Digestion is Madhur (sweet)

Doshakarma of Gokshura is Vatapittashamaka

**Table 2: Classical actions and uses as discussed in Dravyaguna vinyana**

S. No	System	Karma (action)	Therapeutic Uses
1	Nadisansthan (Nervous system)	Vednasthapana and vatashamaka	Nadidaurbalya, vednayuktavikara, vatavyadhi
2	Pachansansthana (Digestive system)	For amasya it is balya, anuloman and in high dose it is saraka.	Agnidaurbalya, arsha, vib andha.
3	Raktavahasanthana (Circulatory system)	Hridya, raktapittashamaka and shothahara.	Hridayaroga, raktapitta, shotha
4	PrajnanSansthana (Reproductives ystem)	Garbhasthapana	Garbhapata, yonivyapta, klaibya
5	MutravahaSansthan (Urinary system)	Ashmarinashan, mutrala,	Ashmari, mutrakricha, bastishotha
6	Satmikarana (Immune system)	Balya (strengthening)	Daurbalya
7	Swasanasanthana (Repiratory system)	Kaphanisaraka	Kasa, swasa

Classical actions and uses

Gokshura has been an importance herb possessing multiple pharmacological actions (Table 2) and hence, been used for treating various disorders (Table 2) since classical times [49].

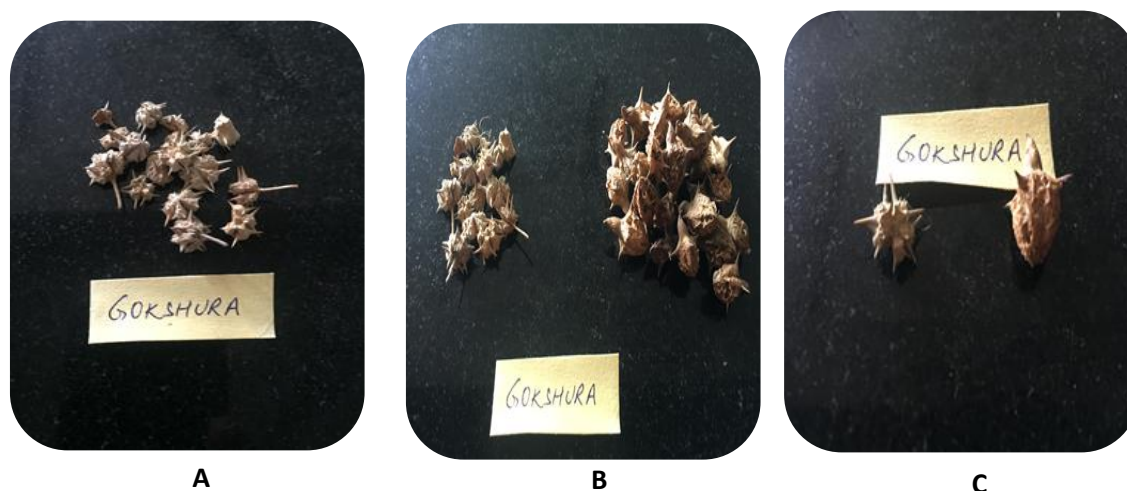
**Table no. 3: Varieties of Gokshura as described in Dravyaguna Vigyana**

S. No.	Plant name	Botanical name	Family
1.	Gokshura	<i>Tribulus terrestris</i>	Zygophyllaceae
2.	Bara gokshura	<i>Pedaliium murex</i>	Pedaliaceae

Different varieties of Gokshura have been illustrated in Dravyaguna Vigyana (Table 3; Figure 1). The variety which is accepted for medicinal uses *Tribulus terrestris* (Figure 1). The root and fruit are the main parts used in various formulations along with the dose (Table 4). Some of the formulations are also mentioned such as Gokshuradi churna, Gokshuradi avleha, Gokshuradi guggulu, Gokshuradi kwath and dashmoolarishta [49].

**Table no. 4: Dose of Gokshura as described in Dravya guna Vigyana**

S. No.	Dosage form	Dose
1.	Powder	3-6gm.
2.	Decoction	50-100ml.



**Figure 1: Different varieties of Gokshura; A Gokshura; B-C: Both varieties of Gokshura**

**Shankar nighantu-** In this text described properties of Gokshura are sheetal (cold) , balakarak (Strengthening property), bringhana (bulk promoting) properties and madhur in nature. It is used in mutrakricha (difficulty in passing urine), Ashmari (stones), prameha (urinary disorders) and daha (burning sensation). It is used as bastishodhaka , viryavardhak , agnideepaka (increase digestive fire), shwasa (difficulty in breathing), Khaansi (cough), hridayaroga (heartdisorders), Bawaseer (piles), Bastivata, Tridosha, Kustha(skin disorders), Shoola(painful conditions), and rasayana(rejuvenator). Two varieties of gokshura are enlisted in this text: Chhoti gokhru and Bara gokhru, where Bara Gokhru has been cited to be more effective [50].

**Sharangdhar Samhita-** In Sharangdhar samhita gokshuradi guggulu is used for prameha(urinary disorders), mutrakricha(dysuria), pradar (excessive vaginal discharge), mutraghat (anuria), vatarakta (gout), vataroga, shukravikara, ashmari (renal stones)[51]. Gokshuradi kwatha is used specially in ushnvata. Prepared kwath of gokshura fruit and roots and add honey, it is useful in all types of mutrakricha [52]. Dashmoolarishta is used in grahani roga, Aruchi (indigestion), Swasa (difficulty in brathing), kasa (cough), gulma (tumor), bhagandara (fistula-in-ano), vatavyadhi, ksayaroga (physical weakness), panduroga (anaemia), kamalaroga (jaundice), kustha (skin disorder), arsha (piles), prameha, mandagani (low digestive fire), udraroga (abdominal disorders), sharkara (diabetes), ashmari (renal stones), mutrakrichha (dysuria), dhaatuksaya (weakness of tissues), Shukra (semen) and bala vardhak (physical strength)[53].

**Ashtang sangraha-** In this text, Gokshura has been mentioned as a component of mutravirechniya mahaksaya (diuretic). Shavdanshatra is the term used for Gokshura in mutravirechniya mahakasaya (diuretic) [54].

**Adarsh nighantu-** In Adarsh Nighantu, gokshura has been categorised as in kantik panchmoola [55], laghu panchmoola [56] and in laghugokshuradi varga [57]. The fruit is suggested to be used for churna preparation and root is used for decoction. Laghu gokshura bears diuretic property and brihad gokshura possess rasayana guna (rejuvenator) [57].

**Ayurveda sara sangraha-** In this text various formulations are mentioned like Gokhru paka[58], Gokshuradi churna[59], Trikanatakadi kwath[60], Gokshuradi guggulu[61].Gokhru paka is suggested to be used as vajikarana (aphrodisiac). Gokshuradi churna is suggested to be used in raktapradara (menorrhagia), sweta pradar (leucorrhoea), raktatisara and raktapitta (bleeding disorder) diseases. Trikantakadi kwath is effective in ashmari (renal stones) and mutraghat diseases. Gokshuradi guggulu is suggested to be used in ashmari (renal stones), shukraprameha and used as a vrishya (increase muscle mass) and rasayana (rejuvenator) [61].

**Priya nighantu-** According to this text moola (root) is having ushna virya and Acharya P.V. Sharma suggested in dashmoola only moola (root) is used. Gokshura fruit properties are sheeta virya, madhur, balya, vrishya, rasayana [62].Gokshura is an ingredient of Laghu panchmoola [63] and dashmoolam [64]. Laghu panchmoola is effective in jwara (fevers), kasa (cough), swasa, mutrakricha, hridayaroga. Dashmoolam is effective in all types of vatadisorders. It shows effect in shotha and jwara nashaka and balya properties [64].

**Rasatantrasara v siddhaprayogsangrah-** In this text, different formulations with gokshura as one of the ingredients has been discussed such gokshuradi ghrita [65] and shatavari ghrita [66] useful in mutrakricha and mutraghata respectively, and gokshuradi avleha [67], described under paka-avleha sharbat prakaran is reported to be effective in mutrakricha, raktaprameha and ashmari. Similarly, trikantakadi kwath [68], maharasnadi kwath[69], dashmoola kwath [70] and ashtadashang kwath[71] has been elaborated under kasaya prakarana. Gokshura guggulu [72] is suggested to be used in prameha, shukradosha, mutraghat. Dashmoola kwath is effective shoolanashak, vataprakop, shotha, kasa, swasa, kanthavrodha, hridayavrodha, sweda. In vatashlesmajwara disease pipali churna is used as anupana (adjuvant) with dashmoola kwath and in apsamar disease, kalyana ghrita is

suggested to be used as anupana (adjuvant) with dashmoola kwath. Ashtadashang kwath, is effective in tandra, pralap, aruchi, daha, swasa and sannipata.

**Bhavaprakasha nighantu-** In this text two varieties of Gokshura have been enlisted as gokshura Gokshura (*Tribulus terrestris*; Zygophyllaceae), Bara gokshura (*Pedalium murex*; Pedaliaceae). Gokshura (*Tribulus terrestris*) has been suggested to possess sheetal, snehana, mutravirechniya, shothahara, vatahara, balya, vrishya, vednasthapan properties. Gokshura shows diuretic effect due to nitrates and volatile oils are present in it. The fruit is suggested to be used for powder preparation and roots are used for decoction [73].

**Table no. 5: Characteristics of Gokshura as per Ayurvedic Pharmacopoeia of India [74]**

Macroscopic Characters	Microscopic Characters
<p>Root: The root is found nearly 7-8cm. long and 0.3-0.7cm. dia., which is slender, cylindrical and fibrous along with frequently branched possessing multiple small rootlets. It is yellow to brown in colour, tough, woody and surface becomes rough due to presence of small nodules. The fracture of the root is fibrous, possessing aromatic odour, along with sweetish and astringent taste.</p>	<p>Root: A mature root possesses single layer of epidermis is present, followed by nearly 4-5 layers of thin walled parenchymatous cortex, distinct endodermis, pericycle enclosing diarch stele. 4-6 layered cork is present, along with single layered cork cambium, followed by nearly 6-14 layers of parenchymatous cells (thin walled) with widely distributed varying number of fibres. The secondary cortex cells exhibit secondary wall formation along with reticulate thickening, the fibres may be found in groups which may resemble those of phloem. The secondary phloem may be divided into two zones: outer zone is characterised by presence of numerous phloem fibres along with few slightly collapsed sieve tubes; inner zone may possess many parenchymatous cells, which may be devoid of fibres and may exhibit sieve tubes and companion cells along with distinct phloem rays. A few cells may get converted into fibres in outer region.</p>
<p>Fruit: the fruit is light or greenish yellow in colour, stalked and is five ribbed or angled. It is nearly 1cm in diameter along with five pairs of short stiff and prominent spines, which are pointed downwards and about 0.5 cm in length. Ripened fruit may be separated into five segments (cocci) and each segment may appear as single fruit possessing four or more seeds.</p>	<p>Fruit: Each coccus may possess small epidermal cells which are rectangular along with unicellular trichomes in abundance. The mesocarp may possess 6-10 layers of large parenchymatous cells, with abundant rosette of calcium oxalate crystals. Subsequently, 3-4 compact layers of small cells containing prismatic crystals of calcium oxalate may also be observed.</p>



**Ayurvedic Pharmacopoeia of India:** In this text, Gokshura consists of dried, entire fruit and root of *Tribulus terrestris* (Zygophyllaceae), an annual, rarely perennial common weed of the pasture land road sides and other waste places, chiefly in hot, dry and sandy regions, grows throughout India as prostrate herb and up to 3,000 m as in Kashmir. The different synonyms of gokshura has been illustrated regionally viz. Svadamastra, Goksuraka, Trikantak (Sanskrit); Gokhri, Gokshura (Bengali); Caltraps fruit (English); Gokhru (Hindi) and Bhakra, Gokhru (Punjabi) [74]. Thereafter, the macroscopic and microscopic features of root and fruits of this herb have been discussed (Table 5) which plays a significant role in identification of the raw material. Subsequently, the physico-chemical parameters (Table 6) of both root and fruits have been illustrated where standardised values of foreign matter, total ash, Acid-insoluble ash, alcohol soluble extractive and water soluble extractive have been depicted. The different chemical constituents (Table 7) present in the fruit and roots suggest the reason for different pharmacological potential of gokshura. Subsequently, the different formulations and dose (Table 8-9) of gokshura has been illustrated in this authentic text book [74].

**Table no. 6: Physico-chemical parameters suggested in Ayurvedic Pharmacopoeia of India**

S. No.	Parameters	Root	Fruit
1	Foreign matter	<2%	<1%
2	Total ash	<13%	<15%
3	Acid-insoluble ash	<3%	<2%
4	Alcohol soluble extractive	>4%	>6%
5	Water soluble extractive	>10%	>10%

**Table no. 7: Chemical constituents of Gokshura as per Ayurvedic Pharmacopoeia of India**

S. No.	Fruit	Root
1	Potassium nitrates	Alkaloids
2	Sterol	Saponins
3	Sapogenin with pyroketone ring	
4	Gitogenin	
5	Hecogenins	

**Table no. 8: Formulations of Gokshura as per Ayurvedic Pharmacopoeia of India**

S. No.	Root	Fruit
1.	Sahacaradi Taila	Goksuradi Guggulu
2.	Dasamulakwath churna	Traikanaka Ghrta
3.	Dasmulakautraya churna	Drakshadi churna
4.	Dasmulapancakoladi churna	-

**Table no. 9: Dose of Gokshura as per Ayurvedic Pharmacopoeia of India**

S. No.	Dosage form	Fruit	Root
1.	Decoction	20-30gm.	20-30gm.
2.	Powder	3-6gm.	-

Hence, this review exhibits the importance of Gokshura as observed by various classical physicians such as Acharya Charaka and Sushruta, due to it being a member of multiple formulations.

**Conclusion**

Herbal drugs and their preparations contribute significantly towards the maintenance of the health of individuals where classical system of medicine such as Ayurvedic system, Chinese system and Siddha system is practiced as in India and China. Correspondingly, these drugs also affect the economy of the country owing to their demand locally and globally. Amongst different herbs in use, Gokshura (*Tribulus terrestris*), positions itself as an important medicinal herb as it is a potential in treating some commonly found ailments such as urinary disorders including renal stones, inflammations, as rejuvenator and most importantly in sexual dysfunctions. Gokshura has been reported to be one of the most used herbal origin drugs in various classical formulations such as dashmoola kwatha since classical era. The changes in the modern-day lifestyle have affected the sexual life and the number of infertility cases is on rise which can be well observed by increase in number of cases in maternity hospitals. To take care of such issues, herbal medicines possessing drugs such as gokshura may provide a platform with natural origin that can contribute significantly towards the required medical care of a couple. The various formulations, as illustrated in the classical text, may be employed by the physicians with classical practice, to treat the medical cases. Correspondingly, the synergism of this plant with other herbs can be focussed for newer formulations at the laboratory and industrial levels that can benefit the society.

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**Conflict of Interests**

The authors declare that there is no conflict of interests regarding the publication of this paper.

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