

**Review Article*****Microstylis muscifera (Jeevak): Highly Therapeutic and Endangered Orchid***Richa Raturi¹, Gunpreet Kaur¹, Vikas Gupta¹, Mukesh Maithani², RG Singhal³, Parveen Bansal^{1*}¹UCER, Baba Farid University of Health Sciences, Faridkot, Punjab²Multidisciplinary Research Unit, Guru Gobind Singh Medical College, Faridkot, Punjab³Shobhit University, Meerut

Received 02 Oct. 2017; Accepted 15 Nov. 2017

ABSTRACT

In ancient times, Ashwani Kumars (Ayurvedic wonder healers) have been said to see the old, frail and emaciated body of Rishi Chyawan and decided to rejuvenate his body through medication by incorporating *Ashtawarga*, a group of eight medicinal plants in a "Leham" (a semi solid formulation) and did the miracle of rejuvenating the body of Rishi Chyawan as youthful. Since then after the name of Rishi Chyawan, the preparation was called as *Chyawanprash* and has been a favorite and most demanded medicine for Kings and rich people. *Microstylis muscifera* is one of the important plants of *Ashtawarga* group. Department of AYUSH has suggested use of substitutes in formulations in absence of original plants however this option is being exploited by manufacturers rendering this precious plant in ignored condition. Hence it becomes important to highlight the therapeutic potentials of this plant in front of scientists so that a justified research is carried out on an important but ignored plant. A limited data with scientific evidences are available in modern literature/internet sources; whereas old texts show valuable evidences in regional languages or in Sanskrit. Hence real uses of the plant are not well understood by scientific fraternity. Purpose of this compilation is to bring all the therapeutic potentials at a single platform so as to enable scientists working on these plants to know the scientific clues available in ancient literature. The compilation reflects multiple uses of plant active components in a number of Ayurvedic formulations useful in plethora of disorders.

Keywords: *Jeevaka, Ashtawarga, Anti-aging, Rejuvenative***1. Introduction**

The desire to alleviate pain and discomforts, longing for external health, longevity and vitality prompted early man to explore his natural surroundings. In this process he combined instincts with indulgence and learned many lessons that led to the development of the art of healing by using plants. Due to green wave sweeping across the world, the demand for herbal drugs has increased several folds [1]. *Ayurveda*, the ancient healing science considered by many scientists literally means (Ayur: Life; Veda: Science) science of life. *Ayurvedic* science also called the "Mother of All Healing" basically originated more than 5,000 years ago in India by saints and rishis like Ashwani Kumars, Atreya, Bhardwaja, Dhanwantri, Charaka, and Sushruta etc.

Ayurveda is one of the oldest and widely practiced medical systems all over the world owing to less side effect and maximum therapeutic effect. The main aim of *Ayurvedic* system of medicine is to promote health and increase immunity than to fight disease. Hence it is not only a medical system but a way of life that aims at the holistic management of health and diseases widely practiced in Indian subcontinent. Its concepts and approaches are considered to have perfected during 2500-500 BC [2]. Charak Samhita and Sushrut Samhita (500-100 BC) are the two main *Ayurvedic* classics, where in more than 700 plants along with their classification, pharmacological and therapeutic properties have been described [3]. During early phase of *Ayurvedic* development, Ashwani Kumars (*Ayurvedic* wonder healers) saw the old, frail and emaciated body of Rishi

Chyawan and decided to rejuvenate his body through medication. For this, these scientists of old era invented *Ashtawarga*, a group of eight medicinal plants and did the miracle of rejuvenating the body of Rishi Chyawan as youthful. Since then after the name of Rishi Chyawan, the preparation was called as *Chyawanprash* and has been a favorite and most demanded medicine for Kings and rich people [4].

Microstylis muscifera is one of the important plants of *Ashtawarga* group. The name of *Malaxis* genus derives from the Greek word 'Malaxis' for soft/tender that refers to the thin texture of leaves. The species of this genus have pseudobulbs stems, fibrous roots, membranaceous/plicate leaves, greenish/whitish non-resupinated flowers of terminal and erect racemes. This non-resupinate nature of the flowers of *Microstylis* is differentiates it from other genus *Liparis* [5, 6]. In ancient times, Indian species of *Malaxis* were considered under the genus *Microstylis* Nutt. This genus is well known for several therapeutic species that are used as a vital component of *Ayurvedic* and pharmaceutical products having aphrodisiac (*M. acuminata* D. Don), diaphoretic (*M. versicolor* Sant. {Rishabha} and Kapadia), and rejuvenating properties [*M. acuminata*, *M. muscifera* (Lindl.) O. Ktze.] [7, 8]. The therapeutic importance of orchids is due to presence of phytochemical contents such as alkaloids, glycosides, flavonoids etc [9]. Four plants of orchids [*Malaxis acuminata* D. Don, {Rishbhak}, *Microstylis muscifera* (Lindl.) Ridl. {Jeevaka, *Habenaria edgeworthii* Hook.f. ex Collet {Rajamasha} and *Habenaria intermedia* D. Don {Asvasini}] are important part of *Ashtawarga* group and other rejuvenating formulations [10]. *Microstylis muscifera* (Lindley) Kuntze, is a rare, terrestrial perennial, endangered medicinal orchid of Himalayan region belongs to family *Orchidaceae*. *Microstylis muscifera* is commonly known as *Jeevak* or *Jeevaka* in Hindi. *Jeevak* is distributed from tropical to alpine areas of the world having more than 35,000 species with 800 genera in which 166 genera and 1141 species are presented in India [11-12]. Out of

1141 species, 240 species are distributed in Himalayan region and Uttarakhand between 2500-3700m [13]. Most of the orchid species are facing different degrees of threats to their survival due to habitat loss, the fragmentation of populations, genetic drift and anthropogenic pressures. To protect these species in their natural habitats, the government of India has imposed a ban on the commercial exploitation of orchids.

Traditionally, the therapeutic activities of pseudobulbs of *Jeevak* have been well established in Indian System of Medicine (ISM) since time immemorial. Paste of pseudobulb is useful in external application in insect bites and in treatment of rheumatism with combination of other medicinal plants. The swollen stem of *Jeevak* is sweet, refrigerant, aphrodisiac, styptic, antidysenteric, febrifuge and tonic. It is used in conditions of sterility, seminal weakness, internal and external hemorrhages, dysentery, fever, emaciation, burning sensation and general debility [14]. It is the vital component of formulations like *Chyawanprash* etc. It also has been used as a nutritive tonic and in bleeding diathesis, burning sensation, fever, phthisis, bronchitis and tuberculosis. It also enhances sperm formation [15-16]. Due to wide therapeutic actions, increased demand of *Jeevak* has lead to over harvesting, habitat degradation and other biotic interferences in its native ranges. These conditions have decreased population of *Jeevak* in the forests. Now, it has been considered as endangered medicinal plant on the basis of changes in species parameters [14, 17]. Hence there is a great need of conservation of these highly valuable therapeutic plants before complete extinction [13-14]. Due to the lack of authentic species from natural habitats, systemized studies/clinical studies has not been carried out on this group of plants. A very few studies related to its therapeutic potentials have been carried out however the number of studies do not commensurate with the therapeutic importance of *Jeevak* mentioned in ancient literature. Moreover the information available is highly scattered and not ready to be used by scientists working on such important plants.

Hence the present manuscript has been compiled with an aim to put the therapeutic potentials of *Jeevak* at a single platform so as to give a thrust to clinical studies on therapeutic effects as well as pharmacological actions of the plant.

1.1. Wide Geographical Distribution

Jeevak is found all over the world but mainly found in Asia and well distributed in Thailand, China, Nepal, Bhutan, Malaysia, Java, Sumatra, Laos and India generally at the height of 1400m. It is also found in Vietnam, Philippines, Australia and Peru [18-19]. In India, it is mainly found in the Himalayan, Assam, Nagaland, Manipur, Mizoram, Uttarakhand, Tripura, Arunachal Pradesh, Himanchal Pradesh, Khasia & Jaintia and peninsular (Western Ghats, Nilgiris) hills on the mainland and Andaman hills. In Himalayas, it is spread from Shimla eastwards to Sikkim within an altitudinal range of 1500-2300m [20-22]. Uttarakhand has highest density of *Jeevak*. Banj-oak habitat was found the most suitable habitat for the orchids followed by Mixed-oak and Banj Grassy Slopes [23].

1.2. Synonyms

Chiranjivi, Dirghayu, Harsanga, Kshveda, Kurchashira, Pranada, Shringaka and Svadu [14, 24].

1.3. Active Constituents

Jeevak contains a bitter principles alkaloids, flavonoids and glycosides. B-sitosterol has been isolated from its ethyl acetate extract of *Jeevak* other isolated compounds include are piperitone, citronellal, eugenol, limeonene, 1, 8-cineole, D-cymene, O-methybatatin and cetyl alcohol [25]. It also contains different fatty acid like linoleic acid, linolenic acid, oleic acid, palmitic acid, eicosenoic acid, eicosadienoic acid, stearic acid, gamma-linolenic acid, other vitamin alpha-tocopherol and gama-tocopherol, terpoid, piperitone, glucose, rhamnose, choline, limonene, p-cymene and ceryl alcohol [26-34]. Lohani et al. determined the metal content and volatile constituent by atomic absorption spectrophotometer and GC-MS and found that it contains Copper (Cu), Zinc (Zn),

Manganese (Mn), Iron (Fe), Potassium (K), Calcium (Ca), Magnesium (Mg), Aluminium (Al), Barium (Ba), Boron (B), Molybdenum (Mo) [35].

1.4. Substitutes

Keeping in view the scarcity of *Ashtawarga* group of medicinal plants, Department of AYUSH suggested some substitutes that can be used in place of original plant. Substitutes suggested for "*Jeevak*" are *Shatavari* (roots), *Ashwagandha* (roots), *Vidarikand* (sap), *Pueraria tuberosa* (wild) and *lalbehman* (*centaurium roxburghii* (D. Don) druce [32].

1.5. Important Ayurvedic Formulations containing *Jeevak* easily available in market

Ayurvedic formulations wherein *Jeevak* have been used as an important component are given in Table 1. It shows various therapeutic actions of these formulations.

1.6. Therapeutic action

Jeevak is sweet, refrigerant, aphrodisiac, haemostatic, anti-diarrhoeal, styptic, antidiysenteric, febrifuge, cooling and tonic. It is spermopiotic, useful in sterility, seminal weakness, internal hemorrhages, external hemorrhages, burning sensation, arthritis, fever, bleeding diathesis and general debility [36-46].

1.6.1. Raspanchak of *Jeevak*

Rasa: Madhura

Guna: Picchila, Snigdha

Virya: Sheeta

Vipaka: Madhura

Prabhava: Vata Pitta pacifying

1.7. Pharmacological Activities

1.7.1. Antioxidant property

Jeevak is a well known plant used for antioxidant activity. In a recent report the extracts of *Jeevak* plant has been used to prepare gold nanoparticles and have shown a potent antioxidant activity against 2, 2 diphenyl-1-picrlhydrazyl (DPPH) radical at room temperature [47]. Similarly in another study,

Garg *et al.* (2012) tested the antioxidant property of *Jeevak* in butanol extract using several methods like 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical, reducing capability by Fe^{3+} - Fe^{2+} transformation method, hydrogen peroxide scavenging method and found that *Jeevak* contains a potent antioxidant activity [48].

1.7.2. Anti-inflammatory Activity

The ethanolic extract (50% v/v) of *Jeevak* (tubers) (Orchidaceae) has been shown to exhibit anti-inflammatory and analgesic activities in rats. It showed dose-dependent inhibition in cotton pellet-induced granuloma at the dose of 50-200 mg/kg [49].

1.7.3. Galactogogue effect:

Classical literature of *Ayurveda* describes the utilization of several drugs as galactogogue. According to recent analysis, it has been shown that plants with Madhura rasa, Snigdha/Guru guna, Sheeta veerya and Madhura vipaka are likely to have more pronounced galactogogue effect. *Jeevak* has been mentioned to have galactogogue effect and possess physical qualities as well as pharmacological attributes analogous to that of breast milk [50].

1.7.4. Cooling, febrifuge and spermopiatic activity

The bulb of the *Microstylis muscifera* showed cooling, febrifuge and spermopiatic activity [51].

1.7.5. Treatment of arthritis

Rhizomes of *Microstylis muscifera* has been recommended to be used in the treatment of arthritis [52].

1.7.6. Antipyretic activity

Decoction prepared from the fresh pseudobulbs of *Microstylis muscifera* have been shown to treat fever [35, 36].

2. Conclusions

The analysis of literature reveals that *Jeevak* is a wonder plant used by Saints/Rishies since ages however due to a number of reasons; plant has entered the list of endangered plants facing extinction. The plant has been shown to have a potent antioxidant activity along with its use in arthritis and a potent antipyretic, anti-inflammatory, antimicrobial agent. The compilation clearly shows that the plant and its active components have been used in more than 35 *Ayurvedic* formulations of high therapeutic value useful in a number of disorders specifically male and female reproductive disorders. There is a need to initiate systemized observational studies/clinical trials to create scientific evidences and establish all the indicated therapeutic effects. Conduct of clinical studies may help in bringing out new potent formulations for male/female reproductive disorders in which allopathic medicines have a limited use.

Table 1: Therapeutic potential of Ayurvedic formulations containing *Jeevak*

S. No.	Formulation	Uses as mentioned in ancient texts	Reference
1.	<i>Apatyakari Shashtikadi Gutika</i>	Male fertility enhancing.	53,54
2.	<i>Vrishya Pooplika</i>	Potent aphrodisiac.	53
3.	<i>Jeevaneeya Gana</i>	Anti-aging.	53
4.	<i>Shukrala Shukrajanana</i>	Improving quality of semen and ovum.	53
5.	<i>Snehopaga</i>	Adjuvants of Snehana (oleation treatment).	53
6.	<i>Vrushya Ghrita</i>	Aphrodisiac ghee promotes virility, strength, complexion, voice and nourishment.	54
7.	<i>Sarpavisha Aushadha</i>	It is used in fighting poison of Mandali snake.	55
8.	Medicated oil prepared by cooking with cow's urine, water, salt and the paste of <i>Jeevaka</i>	Cures heart disease.	56
9.	Medicated ghee prepared by cooking buffalo-ghee with milk and the paste of <i>Jeevaka</i>	Treatment of heart disease.	56
10.	<i>Baladya Taila</i>	Cures many diseases manifested in the head and neck supra- clavicular region.	56
11.	<i>Mayura Ghrita</i>	Cures head diseases, facial paralysis and disease of the ears, eyes, nose, tongue, palates, mouth and throat.	56
12.	<i>Mahamayura Ghrita</i>	This medicated ghee is used for (inhalation therapy), (drinking), enema and massage. It is very useful for all types of head- diseases, serious types of cough and asthma, torticollis, stiffness, of the back, hoarseness of voice, facial paralysis, diseases of the female genital tract, menstrual disorders and seminal disorders. It helps in the procreation of offspring even by a barren woman. Drinking this ghee, after the bath at the end of the menstrual period, will help in the procreation of a male offspring.	56
13.	Paste prepared from milk, <i>Jeevaka</i> and other plants	Cures tawny hair.	56
14.	Milk, ghee, honey wax, <i>Jeevaka</i> and other plants based cream	Cures gout.	57
15.	<i>Jivaniya yamaka</i>	Used for cure of epilepsy.	58
16.	<i>Brumhani Gutika</i>	This recipe is exceedingly aphrodisiac, nourishing and promoter of strength.	59
17.	<i>Vajikarana Ghrita</i>	It prevents early ejaculation of semen and excellent strength of genital organ.	59
18.	Medicated Bone Marrow	This recipe promotes strength and nourishment in	60

	enema (Prepared from paste of <i>Jeevaka</i> , bones of domesticated, marshy-land and aquatic animals crushed and cooked by adding <i>Dashmoola kashya</i>)	the patients having diminished bone marrow, semen and ojas.	
19.	<i>Amrtadya Taila</i>	This medicated oil causes restoration of normal health in patients with less potency, weak digestion, lower strength, low potency, lower intelligence and used in the patients suffering from insanity, depression and epilepsy.	60
20.	<i>Ksheerayoga</i>	Medicated milk and jaggery is useful in the treatment of fever, burning sensation, phthisis and depletion of body tissues.	61
21.	<i>Moolasav</i>	This is an effective recipe for stimulating the power of digestion, bleeding and abdominal tympanitis, aggravated heart diseases, anaemia and prostration of limbs.	62
22.	<i>Linctus containing Jeevaka</i>	Promotes muscle tissue and blood.	63
23.	<i>Amruta Prasha Ghrita</i>	It cures cough, hiccup, fever, asthma, burning sensation, vomiting, fainting, diseases of the heart, female genital tract and urinary tract. It helps in the procreation of a male child.	63
24.	<i>Svadamshtadi Ghrita</i>	It promotes strength and muscle tissues of emaciated persons	63
25.	<i>Sarpigudah</i>	These cakes cure cough, hiccup, fever tuberculosis, bronchial asthma and jaundice, diminution of semen, oligospermia, insomnia, morbid thirst and emaciation.	63
26.	<i>Shravanyadi Ghrita</i>	Cures gout.	64
27.	<i>Madhuparnyadi Taila</i>	Use of this medicated oil in 4 different ways (internal intake, massage, medicated enema and inhalation) cures diseases caused by (vitiated blood), burning sensation, pain and fever. It promotes strength and complexion.	64
28.	<i>Mahapadma Taila</i>	Cures Vatarakta pervading the whole body, and other serious diseases caused by the aggravated Vata.	64
29.	<i>Affusion of Oil, ghee, muscle fat or bone marrow cooked with Jeevaka and other Jivaniya drugs</i>	Cures stiffness, convulsion and pain in Gout. If, however, there is burning sensation, these recipes is cooled, and thereafter, used for affusion.	65
30.	<i>Paste containing ghee, Jeevaka, paste of barley with glycyrrhiza, milk etc.</i>	Cures burning sensation and pain or gout.	64
31.	<i>Brihat Shatavari Ghrita</i>	Uterine diseases and morbidities of menstruation and semen. It promotes virility and helps the woman to get a male progeny.	65

32.	<i>Bala Ghrita</i>	It cures diseases caused by aggravated Vayu & Pitta and helps the woman to conceive.	65
33.	<i>Jeevaneeyadi Ghrita</i>	Helps in conception and cures uterine diseases.	65
34.	<i>Medicated oil containing Jeevaka</i>	Used as vaginal douche in dryness of vagina, absence of menses.	65
35.	<i>Vrihani gutika</i>	Minimize the sperm and ovum defects and ensure a healthy progeny.	66

References

- Mishra AK, Gupta A, Gupta V, Sannd R, Bansal P. Asava and arishta: an Ayurvedic medicine-an overview. *Int J Pharm Biol Arch.* 2010, 1(1): 24-30.
- AYUSH (Ministry of Health & Family Welfare, New Delhi). Overview of current scenario on traditional medicines. *International Conclave on Traditional Medicine, AYUSH, New Delhi* p. 2006: 3-28.
- Valiathan MS, Thatte U. Ayurveda: The time to experiment. *Int J Ayurveda Res.* 2001, 1(1): 3-4.
- Himani, Jain R. Review on Chyawanprash Rasayana the Complete Rejuvenator. *Univers J Pharm.* 2015, 4(4): 19-22.
- Cullen J. *The Orchid Book.* Cambridge: Cambridge University Press; 1992. p. 403-404.
- Bose TK, Bhattacharjee SK, Das P, Basak U. *Orchids of India.* Calcutta: Naya Prokash; 1999. p .600.
- Chauhan NS. Medicinal orchids of Himachal Pradesh. *J Orchid Soc India.* 1990, 4: 99-106.
- Lawler LJ. *Ethnobotany of the Orchidaceae.* In Arditti J, Editor. New York: Cornell University Press, Ithaca; 1984. p. 27-149.
- Hossain MM. Therapeutic orchids: traditional uses and recent advances - An overview. *Fitoterapia.* 2011, 82: 102-40.
- Virk JK, Bansal P, Gupta V, Kumar S, Singh R. Lack of pharmacological basis of substitution of an endangered plant group Ashtawarga -A significant ingredient of polyherbal formulations. *Am J Phytomed Clin Therapeut.* 2015, 2: 690-712.
- Vij SP, Sood R. Chromosome number in Indian orchids – A complete tabulation. In: *Biology, conservation & culture of orchid.* East – West press, New Delhi; 1986. p. 221-292.
- Virk JK, Gupta V, Kumar S, Singh R, Bansal P. Ashtawarga plants - Suffering a triple standardization syndrome. *Journal of Traditional and Complementary Medicine.* 2017, 1-8, <https://doi.org/10.1016/j.jtcme.2016.12.011>
- Jalal JS. Orchids of Uttaranchal: A Plea for Conservation. *McAllen Int Orchid Soc J.* 2007, 8(10): 11-3.
- Chauhan RS, Nautiyal MO, Prasad P. Habenaria intermedia D. Don- An Endangered Medicinal Orchid. *Mc Allen Int Orchid Soc J.* 2007, 8: 15-20.
- Dey AC. *Indian medicinal plants used in Ayurvedic preparations.* Dehradun: Bishen Singh Mahendra Pal Singh Publisher (Indian); 198. p. 126
- Joshi GC, Tiwari LM, Lohani N, Upreti K, Jalal JS, Tiwari G. Diversity of orchids in Uttarakhand and their conservation strategy with special reference to their medicinal importance. *J Am Sci* 2009, 1: 47-52.
- Ved DK, Kinhal GA, Ravikumar K, Prabhakaran V, Ghate U, Vijayshanker R et al. Conservation assessment and management prioritization for the medicinal plants of Jammu and Kashmir, Himachal Pradesh and Uttarakhand. Bangalore. FRLHT. 2003.
- Chauhan RS, Nautiyal MC, Prasad P, Purohit H. Ecological features of an endangered medicinal orchid, *Malaxis muscifera* (Lindley) Kuntze, in the western Himalaya. *McAllen Int Orchid Soc J.* 2008, 9(6): 8-12.
- Atwood JT. The size of orchidaceae and the systematic distribution of epiphytic orchids. *Selbyana* 1986;9:171-186.
- Trivedi PC. *Indian Medicinal Plants.* Jaipur: Aavishkar Publisher & Distributer (Indian); 2009. p. 31.
- Raizada MB, Naithani HB, Saxena HO. *Orchids of Mussorie.* Dehradun: Bishen Singh

- Mahendra Pal Singh Publisher (Indian); 1981. p. 100
22. Gupta A. Studies on *Microstylis Wallichii* Lindl. A Medicinally important orchid. J Glob Res Comput Sci Technol. 2016, 3(4): 1-11.
 23. Jalal JS, Rawat GS. Habitat studies for conservation of medicinal orchids of Uttarakhand, Western Himalaya. Afr J Plant Sci of Plant Science. 2009, 3(9): 200-4.
 24. Singh AP. Ashtavarga- Rare Medicinal Plants. Ethnobot Leaflets. 2006, 10(3): 104-8.
 25. Sharma A, Rao CV, Tewari RK, Tyagi LK, Kori ML, Shankar K. Comparative study on physicochemical variation *Microstylis wallichii*: A drug used in Ayurveda. Acad J Plant Sci. 2009, 2(1): 4-8.
 26. Bhatnagar JK, Handa SS, Duggal SC. Chemical investigations on *Microstylis wallichii*. Planta Medica. 1970, 20: 157-61.
 27. Gupta R, Aggarwal M, Baslas RK. Chromatographic separation and identification of various constituents of essential oil from bulb of *Malaxis acuminata*. Indian Perume. 1978, 22(4): 287-8.
 28. Sunita G. Substitute and adulterant plants. New Delhi: Periodical Experts Book Agency; 1992.
 29. Poornima B. Adulteration and substitution in herbal drugs a critical analysis. Int J Res Ayurveda Pharm. 2010, 1(1): 8-12.
 30. Roy A, Mallick A, Kaur A: Adulteration and substitution in Indian medicinal plants. Int J Pharma Res Bio. 2013, 2(1): 208-218
 31. Uniyal M. Medicinal plants and minerals of Uttarakhand Himalaya, Baidyanath. Patna: Ayurved Shodh Sansthan; 1987. p.168-233.
 32. Balkrishna A, Vashistha RK, Srivastva A, Mishra RK. Astavarga plants-threatened medicinal herbs of the North-West Himalaya. Int J Med Arom plants. 2012, 4: 661-76.
 33. Anonymous. Quality control methods for medicinal plant materials. Geneva. World Health Organization, 2000.
 34. Ved DK, Kinhal GA, Kumar KR, Prabhakaran V, Ghate U, Sankar RV et al. CAMP Report : Conservation assessment and management prioritization for the medicinal plants of Jammu & Kashmir, Himachal Pradesh & Uttarakhand, workshop. Shimla, Himachal Pradesh. FRLHT, 2003.
 35. Lohani N, Tewari LM, Kumar R, Joshi GC, Kishor K, Kumar S et al. Chemical composition of *Microstylis wallichii* Lindl. from Western Himalaya. J Medicinal Plants Res. 2013, 7(31): 2289-92.
 36. Deb CR, Deb MS, Jamir NS, Temjensansangba I. Orchids in indigenous system of medicine in Nagaland, India. Pleione. 2009, 3: 209-11.
 37. Sood SK, Negi, CJ, Lakhanpal TN. Orchidaceae and Mankind. New Delhi: Deep Publications; 2006.
 38. Singh DK. Orchid diversity in India: An overview. In: Pathak P, Sehgal RN, Shekhar N, Sharma M, Sood A. Editors. Orchids: Science and Commerce. Bishen Singh Mahendra Pal Singh, Dehradun, India; 2001. p. 35-65.
 39. Mulgoonkar MS, Studies on dermal anatomy of recorticolous orchids from India. Int J Mendel. 2005, 22(3-4): 105-106.
 40. Singh A, Duggal S. Medicinal orchids: An overview. Ethnobot Leaflets. 2009, 13: 351-63.
 41. Singh MP, Dey S. Indian medicinal plants. Delhi. Satish Serial Publishing House; 2005. p. 1- 436.
 42. Jalal JS, Kumar P, Pangtey YPS. Ethnomedicinal orchid of Uttarakhand, Western Himalaya. Ethnobot Leaflets. 2008, 12: 1227-30.
 43. Dash VB. Materia Medica of Tibetan medicine. Indian Science Series. Delhi: Sri Satguru Publisher, 1994. p. 300-472.
 44. Nautiyal S, Rao KS, Maikhuri RK, Negi KS, Kala CP. Status of medicinal plants on way to Vashuki Tal in Mandakini Valley, Garhwal, Uttaranchal. J. Non-timber Forest prod. 2002, 9: 124-31.
 45. Ghanaksh A, Kaushik P. Antibacterial potential of therapeutic orchid. J Orchid Soc India 2007;21(1-2):23-27
 46. Balasubramanian P, Rajasekaran A, Prasad SN. Notes on the distribution and ethano botany of some medicinal orchids in nilgiri biosphere reserve. Zoo's Print J. 2000,15(11): 386.
 47. Gopal BB, Shankar DS, Kumar PS. Study of Antioxidant Property of the Pseudobulb Extract of *Crepidium acuminatum* (Jeevak) and its use in the Green Synthesis of Gold nanoparticles. Int J Res Chem Environ. 2014, 3(4): 133-8.
 48. Garg P, Aggarwal P, Sharma P, Sharma S. Antioxidant activity of the butanol extract of

- Malaxis acuminata (Jeevak). J Pharm Res. 2012, 5(5): 2888-9.
49. Sharma A, Reddy GD, Kaushik A, Shanker K, Tiwari RK, Mukherjee A et al. Analgesic and anti-inflammatory activity of Carissa carandas Linn. fruits and Microstylis wallichii Lindl. tubers. Natul Product Sciences. 2007, 13(1): 6-10.
 50. Srikanth N, Manjula, Tewari D, Haripriya N, Mangal AK. Plant based Galactogogues in Ayurveda: A promising move toward drug development. World J Pharm Res. 2015, 4(11): 687-705.
 51. De LC, Pathak P, Rao AN, Rajeevan PK. Commercial Orchids. Berlin. Walter de Gruyter; 2014. p. 300
 52. Subramoniam A, Madhavachandran V, Gangaprasad A. Medicinal plants in the treatment of arthritis. Ann Phytomedicine. 2013, 2: 3-6.
 53. Mishra RN. The Vajikaran (Aphrodisiac) Formulations in Ayurveda. Int J Res Pharm Chem. 2012, 2: 197-207.
 54. Hebbar JV. Charaka Samhita Sutrasthana made easy; Asikta Kshiriyi Vajikarana Pada: Charak Chikitsa 2.2. Available at: <http://www.easyayurveda.com/2016/02/02/charaka-chikitsa-sthana-30th-chapter-yoni-vyapat/>. [Date last accessed 23 August 2017].
 55. Hebbar JV. Charaka Samhita Chikitsa Sthana; Charaka Visha Chikitsa: Chapter 23. Available at: <http://easyayurveda.com/2015/12/02/charaka-visha-chikitsa-23rd-chapter/> [Date last accessed 23 August 2017].
 56. Hebbar JV. Charaka Chikitsa; Trimarmeeya Chikitsa: Chapter 26. Available at: <http://easyayurveda.com/2015/12/22/trimarmeeya-chikitsa-charaka-26/>. [Date last accessed 23 August 2017].
 57. Hebbar JV. Charaka Samhita sutrasthana; Aragvadheeya Adhyaya: Chapter 3. Available at: <http://easyayurveda.com/2013/11/05/charaka-samhita-sutrasthana-chapter-3-aragvadheeya-adhyaya/>. [Date last accessed 23 August 2017]
 58. Hebbar JV. Charaka Samhita Chikitsa Sthana; Apasmara Chikitsa: Chapter 10. Available at: <http://www.easyayurveda.com/2015/09/19/c-haraka-apasmara-chikitsa-chapter/>. [Date last accessed 23 August 2017]
 59. Hebbar JV. Charaka Chikitsa; Samyoga Sharamuliya Vajikarana Pada: Chapter 2.1. Available at <http://easyayurveda.com/2015/07/13/charaka-chikitsa-2-1-samyoga-sharamuliya-vajikarana>. [Date last accessed 23 August 2017]
 60. Hebbar JV. Charaka Samhita Chikitsa Sthan; Vatavyadhi Chikitsa Adhyaya: Chapter 28. Available at: <http://www.easyayurveda.com/2016/01/03/charaka-vatavyadhi-chikitsa-28/>. [Date last accessed 23 August 2017]
 61. Hebbar JV. Charaka Samhita Chikitsa Sthana; Kasa Chikitsa Adhyaya: Chapter 18. Available at: <http://easyayurveda.com/2015/11/05/charaka-kasa-chikitsa-17th-chapter/>. [Date last accessed 23 August 2017]
 62. Hebbar JV. Charaka Samhita Chikitsa Sthana; Charaka Grahani Dosh Chikitsa: Chapter 15. Available at: <http://easyayurveda.com/2015/10/15/charaka-grahani-chikitsa/>. [Date last accessed 23 August 2017]
 63. Hebbar JV. Charaka Samhita Chikitsa; Charaka Kshatasheena Chikitsa: Chapter 11. Available at: <http://www.easyayurveda.com/2015/09/23/c-haraka-kshatasheena-chikitsa/>. [Date last accessed 23 August 2017]
 64. Hebbar JV. Charaka Samhita Chikitsa Sthana; Charaka Samhita Vatarakta Chikitsa: Chapter 29. Available at: <http://www.easyayurveda.com/2016/01/06/charaka-vatarakta-chikitsa-29/>. [Date last accessed 23 August 2017]
 65. Hebbar JV. Charaka Samhita Chikitsa Sthana; Yoni Vyapat Chikitsa Adhyaya: Chapter 30. Available at: <http://www.easyayurveda.com/2016/02/02/charaka-chikitsa-sthana-30th-chapter-yoni-vyapat/>. [Date last accessed 23 August 2017]
 66. Shloka 24-32. Charak Samhita, Vol II, Chapter 2, Qtr 1, Section 6; Chikitsasthanam. Varanasi: Chaukhambha Orientalia, 1998; 37.