

An Overview on Health Benefits of Chasteberry Plant

Shreyash D. Ghadge*, Akshada D. Suryawanshi, Amol S. Deshmukh, Vaibhav A. Bidve, Anushka S. Abhang
Shri Swami Samarth Institute of Pharmacy, Malwadi, Bota, Tal- Sangamner, Dist. Ahmednagar, Maharashtra.

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***Corresponding author:** Shreyash D. Ghadge, Shri Swami Samarth Institute of Pharmacy, Malwadi, Bota, Tal- Sangamner, Dist. Ahmednagar, Maharashtra.

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Abstract

Medicinal plants are used worldwide due to their lower risk of side effects and eco-friendly, cost-effective production when compared to chemical drugs, encouraging researchers to further exploit the therapeutic potential of the former. One of the most popular medicinal plants is *Vitex agnus-castus* L., grown in tropical and sub-tropical regions, to which different health benefits have already been attributed. In this perspective article, the in vitro and in vivo therapeutic properties of *V. agnus-castus* L. have been analysed and reviewed with a special focus on its health-promoting effects and potential nutraceutical applications.

Graphical Abstract:

Vitex agnus-castus (Chasteberry)



• Botanical illustration of Chasteberry plant

Leaves: palmate, 5-lobed

Flowers: purple, fragrant, June-August

Fruits: dark purple berries

Native to Mediterranean, Asia

Traditional medicine: women's health, hormone regulation

Bioactive compounds: flavonoids, iridoids, terpenoids.

Keywords:

chaste tree; *vitex agnus-castus* L.; bioactive compounds; in vitro studies; in vivo studies; nutraceuticals; health-promoting properties.

Abbreviations:

High performance liquid chromatography (HPLC), Diode array detector (DAD), Liquid chromatography (LC), Dichloride methane (DCM), Polycystic ovary syndrome (PCOS), premenstrual syndrome (PMS).

1. Introduction:

Medicinal wild plants and herbs have been considered worldwide for centuries as valuable tools in the management of different diseases, due to their ease of

use and improved cost effectiveness when compared to chemical remedies obtained from synthesis. Plants have recently been exploited for nutraceutical purposes, as they play a key role in the development of food and plant-derived Phyto complexes with medicinal properties, to be used in health conditions as preventive or curative tools. A popular medicinal plant with recognized beneficial effects on human health is *Vitex agnus-castus* L., belonging to the Lamiaceae family (formerly included in the Vibrionaceae family), native to the Mediterranean area and diffused in Europe, Asia, and North Africa. It has been used by people in Italy, Iran, Greece, and Egypt for over 2500 years, mainly to treat gynaecologic disorders. It is a globally famous plant known by different names, e.g. Fruit de gattilier (French), Sauzgatillo (Spanish), Panj-angosht (Persian), Frutto di Agnocasto (Italian), and Chaste tree (English) [1].

The term *agnus-castus* combines the Greek (*hagnos*, meaning pure, chaste) and the Latin (*castus* from “*castitas*” meaning chastity), repeating the term chaste for “pure”, which refers to the anaphrodisiac properties of this plant and its use by monks to maintain celibacy (thus the “monk’s pepper” synonym). The word “*castus*” has been used for centuries to remark further the meaning or purity associated with this plant. Homer, the semi-legendary author of the *Iliad* and the *Odyssey* epic poems, defines *agnus-castus* as a “tendrils for braiding”, explaining the origin of the genus “*Vitex*”. Discords, the Greek physician, used to suggest *V. agnus-castus* to decrease libido [2].



Fig 1: Chasteberry plant & their Marketed formulation.

Pietro Andrea Mattioli, an Italian physician and botanist of the XVI century, commented in his text “*Compendium de Plants Omnibus una cum Earum Iconibus*” (1571) with reference to the properties of *V. agnus-castus* L. that: “.it

forces the impulses of Venus when eaten either fried or raw .it is believed that not only eating or drinking it will make chaste men but even lying on it “. *V. agnus castus* is also known as “monk’s pepper” since the fruits of this plant have a bitter taste *Vitex agnus-castus* L. fruits have been traditionally consumed as food to enhance milk volume and to treat flatulence and diarrhea as well as cyclic breast pain, menopause, acne, infertility, premenstrual dysphoric disorder and other menstrual disorders (amenorrhea, dysmenorrhea) [3].

The European Medicines Agency and the German Health Commission have reported many health benefits of this medicinal plant, including regulation of the menstrual cycle and treatment of premenstrual syndrome, and mastalgia. This paper is focused on a perspective analysis of the health-promoting effects of *V. agnus-castus* L. and its nutraceutical potential. There are many reported data on the different beneficial health promoting potentials of this plant, including antioxidant, immunomodulatory, cytotoxic, antimutagenic, antimicrobial, antifungal, antinociceptive, opioidergic, antiepileptic, and anti-inflammatory properties, as well as benefits for osteopenic syndromes [4].

2. Chemical constituents

The chemical composition of *Vitex agnus-castus* L. includes many different chemical compounds, among which are: vitexilactone, rolundifuran, ketosteroids, diterpenoids (vitexlactam, vitexilactone, viteagnusin I, and rotundifuran), flavonoids (orientin, kaempferol, penduletin, luteolin, artemetin, vitexin, and casticin), and iridoids (agnuside, agnoside, agnocastoid A/B, and aucubin). The identification and quantification of agnuside (Figure 2), together with p-hydroxy benzoic acid, can be achieved by high- performance liquid [5].

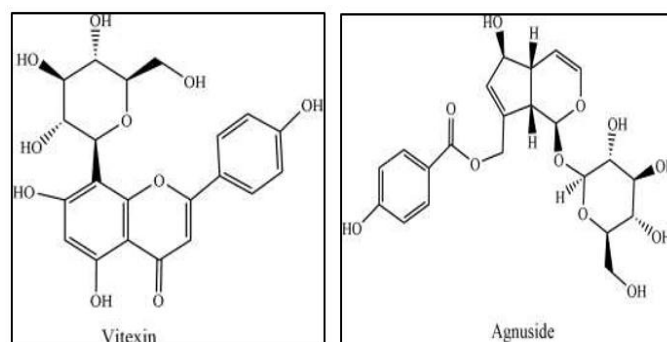


Fig. No. 2: Chemical structure of vitexin (a) and of agnuside (b).

chromatography (HPLC). This method has been validated for extracts of the species *Vitex negundo* L. and *Vitex trifolia* L., with limits of quantification and detection of 25 µg/mL and 10 µg/mL, respectively [5].

Gokbulut et al. measured the levels of vitexin, isolated from *V. agnus-castus* L. fruit and leaf extracts, using the RP-HPLC-DAD (diode array detector) technique, and the results showed that this flavonoid was present in considerable amounts ($0.342 \pm 0.0153\%$ and $0.252 \pm 0.0089\%$, respectively). Agnuside together with casticin (a tetramethoxyflavone) have been used as fingerprint markers to evaluate the quality of Japanese commercial products containing

V. agnus-castus L. Another marker validated for quality assessment was reported using a liquid chromatography-mass spectrometry (LC-MS)-based metabolomic technique and nuclear magnetic resonance (NMR) spectroscopy to detect 3-O-transferuloyl tormentic acid, which was isolated from the *V. agnus-castus* L. fruit extract. In another study, using a rapid ultra-high-performance liquid chromatography diode array detector (UHPLC-DAD-QTOF-MS), seven markers of *V. agnus-castus* L. fruit extract was claimed to be used as reference compounds for quality validation of medicinal products containing this extract, in particular, vitetrifolin D (labdane diterpenoid), 5-hydroxykaempferol-3,6,7,4'-tetramethylether, casticin, isovitexin, and agnuside compounds [6].

A study conducted to compare the chemical markers occurring in food supplements and in *V. agnus-castus* L. extracts, using the liquid chromatography electrospray triple quadrupole tandem mass spectrometry (LC/ESI/(QqQ)MSMS) method in multiple reaction monitoring (MRM) mode as a quantitative analysis, reported the presence of aucubin, orientin, luteolin-7-O-glucoside, agnuside, isovitexin, homoorientin, and casticin compounds [7]. According to the findings from RP-HPLC-DAD analysis, *V. agnus-castus* L. leaf and fruit extracts contained chlorogenic and caffeic acid phenolic compounds with average concentrations of 0.27% and 0.32% (w/w), respectively. Isolated eighteen compounds from *V. agnus-castus* L. fruit extract, using 1D/2D NMR and mass spectrometry methods, and their chemopreventive potential was studied in Hepa 1c1c7 cells, which showed NADP(H): quinone oxidoreductase type 1 (QR1) induction potential related, with vitetrifolin D and vitelactam C being the most promising. In another study, the method of supercritical carbon dioxide was used to detect the compounds

dihydroselarene, α -terpinyl acetate, trans-caryophyllene, sabinene, and 1,8-cineole. Ono et al. applied HPLC coupled with NMR analysis to determine the chemical constituents of *V. agnus-castus* L. fruits, reporting that viteagnuside was the main compound present [8].

3. Health benefits

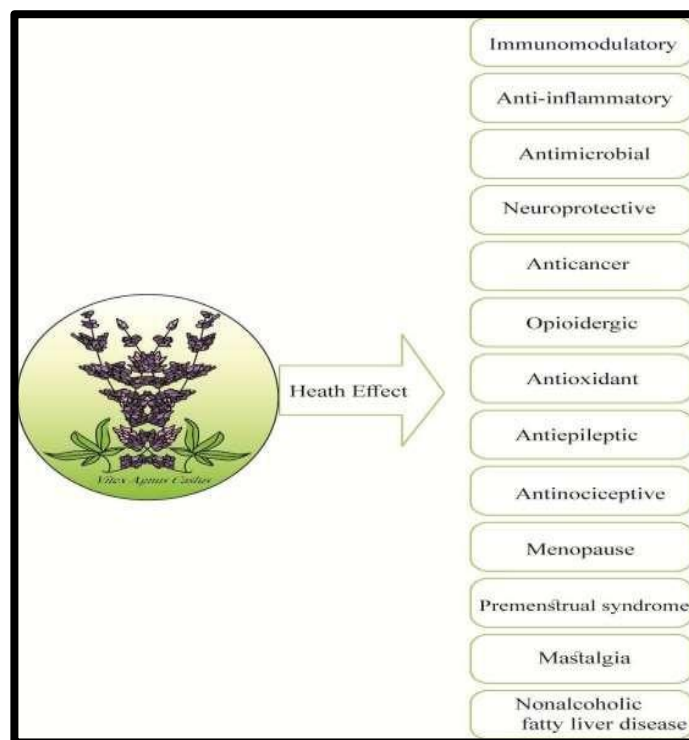


Fig.No.3: Health Benefits.

4. Pharmacological Activities

4.1. Premenstrual syndrome

This may help with conditions where estrogen and progesterone levels fluctuate, such as premenstrual syndrome (PMS) [9].

In one study, 93% of women who took chasteberry during three menstrual cycles reported a decrease in PMS symptoms, including anxiety, depression, and cravings.

Other studies have found that chasteberry may also help with PMS-related constipation and water retention [10].

Example such as breast pain, infertility, mood swings, anger anxiety [11].

4.2 Antifungal Activity

According to the study, the alcoholic and aqueous extracts of vitex had antifungal activity. *Candida*

Albicans (Fungal infection appears on skin, mouth and vaginal area in womens) [12].

Moreover, alcoholic extract of chasteberry may contain a Fluconazole content, Fluconazole is the antifungal agent they act as reducing the overgrowth of yeast candida albicans [13].

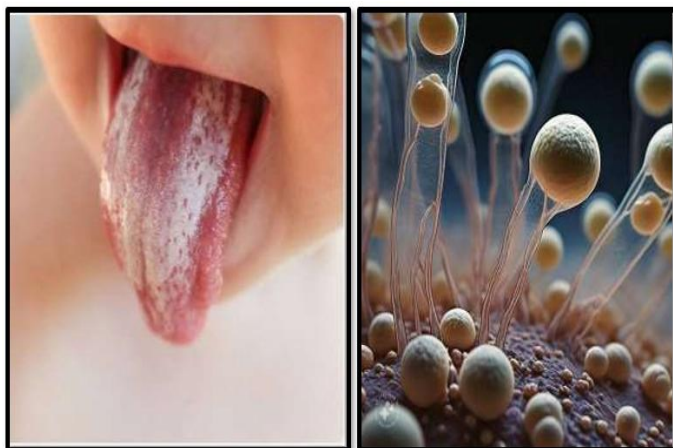


Fig.No.4: *Candida albicans* fungal infection.

4.3. Snake venom neutralization activity

The methanolic root extracts of *Vitex negundo* Linn. and *Emblica officinalis* showed antisnake venom activity. The plant *Vitex negundo* Linn. Extracts significantly antagonized the *Viperarussellii* and *Naja kaouthia* venom induced lethal activity, both in in vitro and in vivo studies. *Vipera russellii* venom-induced haemorrhage, coagulant, Defibrinogenating and inflammatory activity were significantly neutralized by both plant extracts. No precipitating bands were observed between the plant extract and snake venom. The methanolic root extracts of *Vitex negundo* Linn. and *Emblica officinalis* Gaertn. were explored for the first time for antisnake venom activity [14].

5. In-vitro & In-vivo studies vitex agnus-castus

5.1. Some in-vitro studies on vitex agnus – castus

5.1.1. Estrogen receptor binding

Chasteberry extract bound to estrogen receptors, suggesting potential estrogenic activity [15].

5.1.2. Progesterone receptor binding

Chasteberry extract also bound to progesterone receptors, indicating potential progestogenic activity [16].

5.1.3. Dopamine receptor modulation

Chasteberry extract modulated dopamine receptors, which may contribute to its effects on hormone regulation and menstrual disorders [17].

5.2. Some in-vitro studies on vitex agnus – castus

5.2.1. Menstrual cycle regulation

Chasteberry extract regulated menstrual cycles in women with polycystic ovary syndrome (PCOS) [18].

5.2.2. Uterine and ovarian protection

Chasteberry extract protected against uterine and ovarian damage in women with PCOS [19].

5.2.3. Sperm quality and quantity

Chasteberry extract improved sperm quality and quantity in man with testicular damage [20].

5.2.4. Uterine and ovarian protection

Chasteberry extract protected against uterine and ovarian damage in women with PCOS [21].

6. Preparation of extracts

Activity Leaf of Nirgundi plant dried in the Atmosphere followed by it will be crusheds 50g powder was initially soaked in 200 ml of DCM (Dichloro methane) in airtight conical flask in a shaker for Hours and then it was filtered through by Muslin cloth and then filtered it through whatman filter paper. The filtrate was Collected into airtight brown bottle, similar Process was repeated thrice with fresh DCM and the filtrates were pooled Together. Followed by the DCM can be Removed by using rotary evaporator at low Temperature and these dried extract Material was stored in the Refrigerator [22].

7. Conclusion

Chasteberry has been traditionally used to treat various health conditions, including menstrual disorders, fertility issues, and hormonal imbalances. Modern research has validated some of these uses, demonstrating the plant's potential to regulate hormone balance, improve fertility, and alleviate symptoms of PMS and menopause. In conclusion, Chasteberry is a valuable plant with a wide range of potential health benefits. Further research is needed to fully elucidate its mechanisms of action and to confirm its efficacy for various health conditions. Nevertheless, Chasteberry remains a promising natural remedy for those seeking alternative or complementary therapies.

Conflict of Interest

The authors declare no conflict of interest.

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