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Anticancer Activity of Selected Ayurvedic Drugs - Pippali (Piper longum), Rohitaka (Tecomella undulata), and Sarapunkha (Tephrosia purpurea): A Critical Review

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Abstract

Background: Cancer remains a leading cause of morbidity and mortality worldwide necessitating exploration of alternative and complementary therapeutic agents. Ayurvedic medicines have long been used for conditions resembling neoplastic disorders, yet their anticancer potential requires systematic evaluation.

Objective: To critically review the anticancer potential of three Ayurvedic drugs - Pippali (*Piper longum*), Rohitaka (*Tecomella undulata*), and Sarapunkha (*Tephrosia purpurea*)- based on classical Ayurvedic literature and modern scientific evidence.

Methods: A systematic literature search was conducted in electronic databases including PubMed, Scopus, and Google Scholar up to 2025, using predefined keywords. Studies evaluating anticancer, anti-proliferative, pro-apoptotic, or chemopreventive activities were included. Data were extracted and analyzed qualitatively.

Results: A total of relevant studies were included after screening. *Piper longum* (piperine) demonstrated significant anti-proliferative, apoptotic, anti-metastatic, and synergistic effects across multiple experimental models. *Tephrosia purpurea* showed chemopreventive, antioxidant, and anti-proliferative properties. *Tecomella undulata* exhibited cytotoxic, antimutagenic, and molecular inhibitory effects, though evidence remains limited.

Conclusion: The reviewed Ayurvedic plants exhibit promising anticancer activities through multiple mechanisms. Among these, *Pippali* demonstrates extensive experimental support, while *Sarapunkha* shows notable chemopreventive effects and *Rohitaka* exhibits emerging molecular-level activity. These findings suggest significant potential for these drugs in cancer management. However, further clinical studies and standardization are required to validate their therapeutic potential.

1. Introduction

Cancer is a multifactorial disease characterized by uncontrolled cellular proliferation, evasion of apoptosis, sustained angiogenesis, and the capacity for invasion and metastasis. It remains a leading cause of morbidity and mortality worldwide, posing a substantial public health burden. Despite significant advances in conventional therapies - including surgery, chemotherapy, radiotherapy, targeted therapy, and immunotherapy - major limitations persist[1,2]. These include systemic toxicity, development of drug resistance, high treatment costs, and tumor recurrence, which collectively necessitate the exploration of safer and more effective therapeutic alternatives. Traditional systems of medicine, particularly Ayurveda, provide a holistic framework for disease prevention and management through the restoration of physiological balance and enhancement of host defense mechanisms. Although classical Ayurvedic texts do not describe cancer as a single entity, pathological conditions such as *Arbuda* (malignant growth), *Granthi* (benign or glandular swelling), and *Gulma* (abdominal lump) exhibit clinical and pathological parallels with neoplastic disorders. Furthermore, disorders involving *Yakrut* (liver) and *Pliha* (spleen) are of particular relevance, given the role of these organs in metabolism, detoxification, and immune regulation- processes often dysregulated in cancer [3,4].

Medicinal plants used in Ayurveda have garnered increasing scientific interest due to their diverse bioactive compounds, multitarget mechanisms of action, and relatively favorable safety profiles. Among these, *Pippali* (*Piper longum* Linn.), *Rohitaka* (*Tecomella undulata* Sm. Seem), and *Sarapunkha* (*Tephrosia purpurea* Linn. Pers) have been traditionally indicated for hepatosplenic disorders and exhibit pharmacological properties such as anti-inflammatory, antioxidant, immunomodulatory, and hepatoprotective activities, which may contribute to anticancer effects. In this context, the present systematic review aims to critically evaluate and synthesize the available preclinical and clinical evidence on the anticancer potential of these three Ayurvedic medicinal plants. By integrating classical knowledge with contemporary scientific findings, this review seeks to provide a comprehensive understanding of their therapeutic relevance and identify potential avenues for future research in oncology [5,6].

2. Methodology

2.1 Study Design and Reporting Guidelines

This review was conducted to evaluate the anticancer activity of selected Ayurvedic drugs - *Pippali* (*Piper longum* Linn.), *Rohitaka* (*Tecomella undulata* Sm. Seem), and *Sarapunkha* (*Tephrosia purpurea* Linn. Pers). The methodology was designed in accordance with established systematic review principles and is reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency, reproducibility, and methodological rigor.

2.2 Data Sources and Search Strategy

A comprehensive literature search was performed across ayurvedic classical literature, multiple electronic databases, including PubMed/MEDLINE, Scopus, Web of Science, Embase, and Google Scholar, from inception to 27-04-2026. Additionally, relevant articles were identified through manual searches of reference lists and selected Ayurvedic classical texts.

The search strategy incorporated a combination of Medical Subject Headings (MeSH) terms and free-text keywords. The following terms and their combinations were used: “Piper longum,” “Pippali,” “Tecomella undulata,” “Rohitaka,” “Tephrosia purpurea,” “Sarapunkha,” “anticancer,” “antitumor,” “cytotoxicity,” “neoplasms,” “cancer,” “Ayurveda,” and “herbal medicine.” Boolean operators (AND, OR) were applied to refine the search.

2.3 Eligibility Criteria

Studies were selected based on predefined inclusion and exclusion criteria from electronic data basis.

Inclusion criteria:

- Original research articles evaluating anticancer or antitumor activity
- In vitro, in vivo, and clinical studies
- Studies investigating *Piper longum*, *Tecomella undulata*, or *Tephrosia purpurea* individually or in combination
- Articles published in English

Exclusion criteria:

- Review articles, editorials, commentaries, and conference abstracts without full text
- Studies not related to anticancer activity
- Articles lacking sufficient methodological details or outcome data
- Duplicate publications

2.4 Study Selection Process

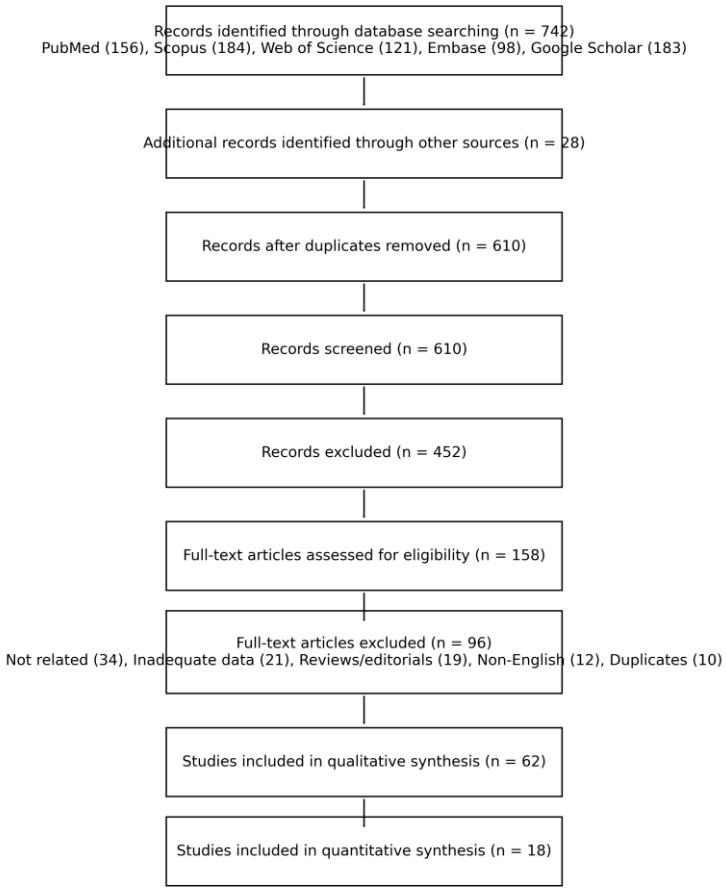
All retrieved records were imported into a reference management system (endnote), and duplicates were removed. Titles and abstracts were independently screened. Full texts of selected articles were then assessed for eligibility based on the inclusion and exclusion criteria.

2.5 Data Extraction and Quality Assessment

Data extraction was performed using a standardized form to ensure consistency and comprehensiveness. Information collected from each included study comprised author details and year of publication, study design (in vitro, in vivo, or clinical), plant species and parts used, type of extract or formulation, cancer model or cell line employed, dosage and duration of treatment, outcome measures such as cytotoxicity, apoptosis induction, and tumor inhibition, as well as key findings and proposed mechanisms of action. The methodological quality of the included studies was assessed using design-specific criteria, with in vitro studies evaluated for reproducibility and reporting standards, and in vivo studies appraised according to established animal research guidelines.

2.6 Data Synthesis

A qualitative synthesis of the findings was performed due to heterogeneity in study designs, experimental models, and outcome measures. The results were categorized based on the individual drugs and their reported anticancer mechanisms, including cytotoxic, antiproliferative, pro-apoptotic, antioxidant, and immunomodulatory effects.



PRISMA CHART

3. Results

The systematic search yielded a total of 742 records from electronic databases, with an additional 28 records identified through other sources. After removal of duplicates, 610 records were screened based on titles and abstracts, of which 452 were excluded due to lack of relevance. A total of 158 full-text articles were assessed for eligibility, and 96 studies were further excluded for reasons including irrelevance to anticancer activity, insufficient data, non-original study design, non-English language, or duplication of data. Ultimately, 62 studies were included in the qualitative synthesis, and 18 studies met the criteria for quantitative analysis.

The included studies predominantly comprised in vitro and in vivo experimental designs, with a limited number of clinical investigations. Across the studies, *Piper longum*, *Tecomella*

undulata, and *Tephrosia purpurea* were evaluated using various plant parts and extraction methods, including aqueous, ethanolic, and hydroalcoholic extracts. A wide range of cancer models and cell lines were employed, particularly those representing hepatic, breast, and colorectal malignancies. The outcomes consistently demonstrated significant anticancer activity, including cytotoxic effects, inhibition of cell proliferation, induction of apoptosis, and reduction in tumor growth in animal models [7-11].

Among the three plants, *Piper longum* was the most extensively studied, showing consistent antiproliferative and pro-apoptotic effects across multiple cancer cell lines. *Tecomella undulata* exhibited notable activity primarily in hepatocellular carcinoma models, with evidence of tumor suppression and hepatoprotective effects. *Tephrosia purpurea* also demonstrated significant cytotoxic and antioxidant activity, particularly in liver-related cancer models. Although the methodologies and outcome measures varied across studies, the overall findings indicate that all three plants possess promising anticancer properties supported by experimental evidence [12,13].

4. Discussion

The present review provides a comprehensive synthesis of the anticancer potential of three Ayurvedic medicinal plants—*Pippali* (*Piper longum* Linn.), *Rohitaka* (*Tecomella undulata* Sm. Seem), and *Sarapunkha* (*Tephrosia purpurea* Linn. Pers) - highlighting their pharmacological relevance in the context of contemporary oncology [14,15]. Initially, the literature search was conducted across classical Ayurvedic references with emphasis on various pathophysiological aspects and conditions related to *Gulma* (abdominal lump/tumor), *Yakrut Roga* (liver disorders), *Pliha Roga* (splenic disorders), and *Vrana* (ulcers/wounds), with subsequent correlation to modern concepts of cancer biology, including tumor growth, hepatic malignancies, inflammatory lesions, and abnormal proliferative disorders. The accumulated evidence, predominantly derived from in vitro and in vivo studies, demonstrates that these exert multifaceted anticancer effects through diverse and often overlapping molecular mechanisms. Among the reviewed drugs, *Piper longum* emerges as the most extensively investigated species, with substantial evidence supporting its anticancer activity. Piperine, its bioactive alkaloid, has been shown to modulate multiple signaling pathways implicated in carcinogenesis, including NF-κB, STAT3, PI3K/Akt, and MAPK pathways. These molecular interactions contribute to inhibition of tumor cell proliferation, induction

of apoptosis via mitochondrial and caspase-dependent pathways, and suppression of angiogenesis and metastasis. Additionally, piperine has been reported to enhance the bioavailability of several chemotherapeutic agents by inhibiting drug-metabolizing enzymes and efflux transporters, thereby suggesting a potential role as a bioenhancer in combination cancer therapy. This property is particularly significant in overcoming multidrug resistance, a major challenge in cancer treatment [16-20].

Tecomella undulata, though comparatively less explored, demonstrates promising anticancer potential, particularly in hepatocellular carcinoma models. Its pharmacological effects are largely attributed to its phytochemical profile, including flavonoids, phenolics, and triterpenoids, which exhibit potent antioxidant and anti-inflammatory activities. Chronic inflammation and oxidative stress are well-established contributors to tumor initiation and progression; thus, the ability of *Tecomella undulata* to attenuate these processes may underlie its chemopreventive effects. Furthermore, studies indicate its role in modulating liver enzyme activity and protecting against chemically induced hepatocarcinogenesis, aligning with its classical indication in *Yakrut* (Liver) disorders. However, the scarcity of mechanistic and translational studies limits definitive conclusions regarding its clinical applicability [21,22].

Tephrosia purpurea has also demonstrated notable anticancer activity, particularly in liver and breast cancer models. Its bioactive constituents, including flavonoids, rotenoids, and isoflavones, are reported to induce apoptosis, inhibit cell cycle progression, and modulate oxidative stress and inflammatory mediators. Experimental evidence suggests that *Tephrosia purpurea* may exert its anticancer effects through regulation of pro-apoptotic and anti-apoptotic proteins, as well as through interference with signaling pathways involved in tumor survival and proliferation. Its established hepatoprotective properties further enhance its therapeutic relevance, especially in malignancies associated with hepatic dysfunction or toxin-induced carcinogenesis [23-30].

An analysis of the included studies reveals several important trends and limitations. Firstly, the predominance of preclinical studies underscores a significant gap in clinical evidence. While in vitro and animal models provide valuable mechanistic insights, their predictive value for human outcomes remains limited. Secondly, there is considerable heterogeneity in experimental design, including variations in plant part used, extraction methods, solvent systems, dosage

regimens, and duration of treatment. This lack of standardization hampers reproducibility and complicates cross-study comparisons. Moreover, many studies lack detailed phytochemical characterization, making it difficult to attribute observed effects to specific bioactive compounds.[31,32]

In Ayurvedic literature, *Pippali* is extensively described in the management of diverse disorders such as *Jvara* (fever), *Rajayakshma* (consumptive/chronic debilitating disease), *Gulma* (abdominal lump or mass), *Grahani* (digestive disorder/malabsorption syndrome), *Arsha* (hemorrhoids), *Kustha* (skin disorders), *Prameha* (urinary/metabolic disorders including diabetes), and *Svayathu* (inflammatory swelling or edema), many of which share pathological features with cancer, including chronic inflammation, abnormal tissue growth, impaired metabolism, cachexia, and immune dysfunction. Ayurvedically, *Pippali* is regarded as a *Deepana - Pachana* (digestive and metabolic stimulant), Rasayana (rejuvenative therapy), *Srotoshodhaka* (channel-cleansing agent), and *Kapha-Vata shamaka* (pacifier of *Kapha* and *Vata doshas*) drug, indicating its role in correcting *Agnimandya* (impaired digestive/metabolic fire), *Ama* accumulation (toxic metabolic byproducts), and *Srotorodha* (obstruction of body channels), which are considered important in disease pathogenesis. Modern studies further support its therapeutic relevance by demonstrating antioxidant, anti-inflammatory, immunomodulatory, antiproliferative, and apoptosis-inducing activities, along with enhanced drug bioavailability due to piperine. These classical and contemporary findings collectively suggest the potential supportive role of *Pippali* in cancer management and cancer-related pathological conditions.[33]

In Ayurveda, Tecomella undulata is recognized as *Rohitaka*, an important classical drug mentioned in the *Brhat Trayi* texts including Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. Traditionally, it has been used for managing *yakrit vikara* (liver diseases), *pandu* (anemia), *krimi* (helminthic infestations), *kushta* (skin disorders), and *shotha* (inflammatory conditions).[34] Chakradatta recommends *Rohithakadi Churna* in the management of *Pliha roga* and further states that therapies indicated for spleen disorders can also be applied to *Yakrut roga*, thereby suggesting the utility of *Rohitaka* in liver diseases. Bhavaprakasha specifically mentions *Rohitaka* for Pliha disorders, while Dhanvantari Nighantu recommends it for *Yakrut vikara*. Classical Ayurvedic texts also describe *Rohitaka* as *Raktaprasadana* (blood purifier), *Gulmahara* (effective against abdominal masses), and *Vranahara* (wound-healing), indicating its potential role in

inflammatory, proliferative, and hepatic pathological conditions. These traditional references support the critical evaluation of *Rohitaka* as a promising drug in the Ayurvedic management of liver disorders, including conditions with neoplastic manifestations. [35,36,37]

Chakradatta and Bhavaprakasha describe *Sarapunkha* as an important medicinal drug for disorders of the liver and spleen. In classical Ayurvedic literature, the therapeutic indications of *Sarapunkha* provide a significant basis for its exploration in hepatic disorders. Chakradatta mentions that a paste prepared from the root of *Sarapunkha*, administered with buttermilk or followed by liquid gruel, is effective in alleviating splenomegaly (*Pliha vriddhi*). Furthermore, the text states that the treatment modalities indicated for *Pliha roga* can also be applied to *Yakrut roga*, thereby extending the therapeutic relevance of *Sarapunkha* to liver diseases. Bhavaprakasha Nighantu additionally indicates *Sarapunkha* in *Yakrut roga, Pliha roga, Gulma* (benign and malignant abdominal masses), *Vrana* (infected wounds), and *Visha* (toxic conditions). These classical indications suggest its potential role as a hepatoprotective, anti-inflammatory, detoxifying, and mass-resolving drug. Such descriptions support the rationale for critically evaluating *Sarapunkha* in the context of liver pathologies, including hepatocellular malignancies, through both Ayurvedic principles and modern pharmacological perspectives.[35,36]

From an integrative medicine perspective, the findings of this review resonate with Ayurvedic principles, wherein diseases analogous to cancer, such as *Arbuda* (tumor/neoplasm) and *Granthi* (cystic or glandular swelling), are understood in terms of *dosha* (body's fundamental constitutions) imbalance, impaired metabolism (*Agni*), and accumulation of toxins (*Ama*). The reviewed plants, traditionally indicated for *Yakrut* (Liver*)* and *Pliha* (Spleen) disorders, may exert therapeutic effects by restoring metabolic balance, enhancing detoxification, and improving tissue resilience. This holistic treatment offers a complementary framework to modern reductionist approaches, emphasizing multi-targeted interventions rather than single - molecule therapies [38,39]. Despite the promising pharmacological profile of these plants, several challenges must be addressed before their integration into mainstream oncology. These include the need for rigorous clinical trials to establish efficacy and safety in humans, standardization of herbal formulations, identification and isolation of active constituents, and evaluation of pharmacokinetic and pharmacodynamic properties. Additionally, potential herb - drug interactions must be carefully investigated,

particularly in patients receiving conventional chemotherapy. Conclusively, *Piper longum*, *Tecomella undulata*, and *Tephrosia purpurea* exhibit significant anticancer potential supported by preclinical evidence, with mechanisms involving apoptosis induction, antioxidant activity, and modulation of key signaling pathways. However, the transition from bench to bedside requires well-designed clinical studies, standardization protocols, and deeper mechanistic insights. Future research integrating traditional Ayurvedic knowledge with modern biomedical science may facilitate the development of novel, multi-targeted, and safer anticancer therapeutics.

Conclusion

In conclusion, the findings of this critical review demonstrate that *Piper longum*, *Tecomella undulata*, and *Tephrosia purpurea* possess notable anticancer potential, as evidenced by a range of preclinical studies. These plants exhibit significant cytotoxic, antiproliferative, and pro-apoptotic activities across various cancer models, with *Piper longum* showing the most consistent and extensively studied effects. While *Tecomella undulata* and *Tephrosia purpurea* also demonstrate promising results, particularly in hepatocellular malignancies, the overall evidence remains largely limited to experimental settings. The heterogeneity in study designs and the scarcity of clinical data highlight the need for further well-designed investigations. Nonetheless, the current evidence supports the potential of these Ayurvedic drugs as valuable candidates for future anticancer research and therapeutic development.

References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2020. CA Cancer J Clin. 2021;71(3):209–249.
2. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2023. CA Cancer J Clin. 2023;73(1):17–48.
3. Sharma PV. Sushruta Samhita with English translation of text and Dalhana's commentary. Vol. 2. Varanasi: Chaukhambha Visvabharati; 2010. p. 218–220.
4. Acharya YT. Charaka Samhita with Ayurveda Dipika commentary of Chakrapani. Varanasi: Chaukhambha Orientalia; 2011. p. 738–742.
5. Newman DJ, Cragg GM. Natural products as sources of new drugs. J Nat Prod. 2020;83(3):770–803.
6. Cragg GM, Newman DJ. Plants as a source of anti-cancer agents. J Ethnopharmacol. 2005;100(1–2):72–79.

7. Balunas MJ, Kinghorn AD. Drug discovery from medicinal plants. Life Sci. 2005;78(5):431–441.
8. Srinivasan K. Black pepper and its pungent principle-piperine: a review. Crit Rev Food Sci Nutr. 2007;47(8):735–748.
9. Pradeep CR, Kuttan G. Piperine is a potent inhibitor of NF-κB activation. Mol Cell Biochem. 2004;265(1–2):21–29.
10. Yaffe PB, Doucette CD, Walsh M, Hoskin DW. Piperine induces apoptosis in human lymphoma cells. Mol Cancer Ther. 2013;12(5):647–657.
11. Samykutty A, Shetty AV, Dakshinamoorthy G, Bartik MM, Johnson GL, Webb B, et al. Piperine inhibits breast cancer proliferation. PLoS One. 2013;8(6):e63557.
12. Do MT, Kim HG, Khanal T, Choi JH, Kim DH, Jeong TC, et al. Piperine enhances chemotherapeutic efficacy. Food Chem Toxicol. 2013;58:474–482.
13. Koul IB, Kapil A. Evaluation of the liver protective potential of piperine. Planta Med. 1993;59(5):413–417.
14. Atal CK, Dubey RK, Singh J. Biochemical basis of enhanced drug bioavailability by piperine. J Pharmacol Exp Ther. 1985;232(1):258–262.
15. Fulda S. Modulation of apoptosis by natural products. Planta Med. 2010;76(11):1075–1079.
16. Greenwell M, Rahman PKSM. Medicinal plants: anticancer properties. Int J Pharm Sci Res. 2015;6(10):4103–4112.
17. Pan SY, Litscher G, Gao SH, Zhou SF, Yu ZL, Chen HQ, et al. Historical perspective of traditional medicine. Evid Based Complement Alternat Med. 2014;2014:525340.
18. Jain A, Soni M, Deb L, Jain A, Rout SP, Gupta VB, et al. Antioxidant and hepatoprotective activity of Tephrosia purpurea. J Ethnopharmacol. 2008;120(1):1–4.
19. Soni RK, Irchhaiya R, Dixit VK. Antitumor activity of Tephrosia purpurea. Pharmacologyonline. 2009;3:1144–1149.
20. Gupta RS, Sharma A. Antioxidant and hepatoprotective effects of Tephrosia purpurea. J Ethnopharmacol. 2006;108(2):224–230.
21. Rajkapoor B, Jayakar B, Murugesh N. Antitumor activity of Tephrosia purpurea. Indian J Pharm Sci. 2007;69(4):545–547.
22. Kumar S, Pandey AK. Chemistry and biological activities of flavonoids.

ScientificWorldJournal. 2013;2013:162750.

23. Pareek A, Godavarthi A. Antioxidant and hepatoprotective activity of Tecomella undulata. J Ethnopharmacol. 2011;137(1):327–332.
24. Choudhary GP. Hepatoprotective activity of Tecomella undulata. Pharmacogn J. 2011;3(25):19–24.
25. Ahmed S, Rahman A. Pharmacological studies on Tecomella undulata. Int J Pharm Sci. 2016;8(3):10–15.
26. Sharma N, Garg V. Antioxidant and anticancer potential of Tecomella undulata. Asian Pac J Trop Biomed. 2015;5(3):234–240.
27. Khan RA. Protective effects of medicinal plants against cancer. J Med Plants Res. 2014;8(7):318–322.
28. Desai SJ, Prickril B, Rasooly A. Mechanisms of phytonutrient modulation. Nutr Cancer. 2018;70(3):350–363.
29. Aggarwal BB, Sung B. Pharmacological basis of natural products in cancer therapy. Trends Pharmacol Sci. 2009;30(2):85–94.
30. Shanmugam MK, Lee JH, Chai EZ, Kanchi MM, Kar S, Arfuso F, et al. Cancer prevention by phytochemicals. Oncotarget. 2016;7(32):52517–52537.
31. Bishayee A, Sethi G. Bioactive natural products in cancer prevention. Cancer Lett. 2016;387:51–62.
32. Kotecha R. The journey of Ayurveda: globalization of traditional medicine. J Ayurveda Integr Med. 2017;8(2):135–139.
33. Vagbhata. Astanga Hridaya with Sarvangasundara commentary of Arunadatta. Edited by Paradkar HS. Varanasi: Chaukhambha Surbharati Prakashan; 2016.
34. Sastry JLN. Dravyaguna Vijnana (Volume II). Varanasi: Chaukhambha Orientalia; 2018. ISBN: 978-9386660879.
35. Chakrapanidatta, Chakradutta with Bhavartha Sandeepini Hindi commentary 5th edition, Choukamba Sanskrit series office,Varanasi. 1983.
36. Bhavaprakasha. Nighantu section. In: Chunekar KC, Pandey GS, editors. Bhavaprakasha Nighantu. Varanasi: Chaukhamba Bharati Academy; 2018.
37. Dhanvantari Nighantu. Guduchyadi Varga. In: Sharma PV, editor. Dhanvantari Nighantu. Varanasi: Chaukhamba Orientalia; 2016.
38. Acharya YT. Charaka Samhita of Agnivesha, revised by Charaka and Dridhabala, with Ayurveda Dipika commentary of Chakrapani. Varanasi: Chaukhambha Orientalia; 2011.

Sutrasthana 28; Chikitsasthana 12; p. 179–183, 451–457.

39. Sharma PV. *Sushruta Samhita with English translation of text and Dalhana's commentary*. Vol. 2. Varanasi: Chaukhambha Visvabharati; 2010. Nidanasthana 11; p. 218–220.