Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18642
DOI URL: http://dx.doi.org/10.21474/IJAR01/18642

RESEARCH ARTICLE

COMPARATIVE ANALYSIS OF ARDRAKA AND SHUNTHI: PHARMACOGNOSTIC INSIGHTS INTO ZINGIBER OFFICINALE ROSCOE

Dr. Sonal Singh Kushwaha[1], Dr. Priya Gupta[2] and Dr. Suman Panwar[3]

1. PG Scholar, Department of Dravyaguna Vigyana, Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.
2. PG Scholar, Department of Dravyaguna Vigyana, Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.
3. Professor and HOD, Department of Dravyaguna Vigyana, Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.

Manuscript Info

Manuscript History
Received: 28 February 2024
Final Accepted: 31 March 2024
Published: April 2024

Key words:-
Ardraka, Ginger, Macroscopy, Microscopy, Pharmacognosy, Shunthi, Zingiber officinale Roscoe

Abstract

Ginger, known botanically as Zingiber officinale Roscoe, has long been revered in culinary traditions and the ancient healing system of Ayurveda. This study delves into the multifaceted properties and applications of ginger, focusing on both its fresh form, Ardraka, and its dried rhizome, Shunthi. Through detailed pharmacognostic analysis, ginger's macroscopic and microscopic characteristics are explored, revealing distinctive features such as a laterally compressed rhizome, buff-coloured appearance with longitudinal striations, and intricate cellular structures containing bioactive compounds like gingerols and shogaols. Chemically, ginger boasts a diverse array of compounds with pharmacological effects ranging from anti-inflammatory to digestive stimulation. Ayurvedic literature extols ginger's virtues for its ability to balance doshas, enhance digestion, and alleviate various ailments including colic, rheumatoid arthritis, and respiratory issues. Ardraka is noted for its pungent, bitter, and sweet tastes, while Shunthi, possessing similar therapeutic actions, may aggravate Pitta dosha due to its heating nature. This comprehensive analysis underscores ginger's botanical complexity and therapeutic potential, advocating for its integration into both traditional and modern medicinal practices.

Introduction:-

Ginger holds a significant place not only in culinary traditions but also in the ancient healing system of Ayurveda. The dried rhizome of ginger is referred to as Shunthi, whereas the fresh form is known as Ardraka(Kushwaha SS et. al.,2023).Ayurveda, which is the science of life, is a holistic approach to health and wellness that originated in ancient India thousands of years ago. Within the realm of Ayurveda, Ginger is revered for its diverse medicinal properties and therapeutic applications.

Botanically, it is classified as Zingiber officinale Roscoeand belongs to the Zingiberaceae family (Kirtikar KR et. al., 1994). Its rhizome, or underground stem, is the primary part used in both culinary and medicinal preparations. In Ayurveda,Zingiber officinale Roscoe, a perennial herb of the Zingiberaceae family, boasts a creeping tuberous

Corresponding Author:- Dr. Sonal Singh Kushwaha
Address:- PG Scholar, Department of Dravyaguna Vigyana, Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.

rhizome and erect leafy stems reaching 0.6-1.4 meters. Its narrow, linear leaves surround the stem, with light green flowers appearing July-September. Cultivated widely in India, it's known by synonyms like Mahaoushadh and Vishwbheshaj(Gupta P and Kushwaha SS, 2023). In Ayurveda, it is esteemed for its Katu taste, Snigdha qualities, Ushna potency, and Madhura post-digestive effect. Praised for anti-inflammatory and dosha-balancing properties, it aids digestion and finds use in treating ailments like colic, rheumatoid arthritis, diarrhoea, and respiratory issues, among others.Shunthi is believed to balance the Vata and Kapha doshas while potentially aggravating Pitta dosha if used excessively.

Chemically, ginger contains a diverse array of bioactive compounds, including gingerols, shogaols, and zingerone (Mao QQ et.al, 2019). These compounds exhibit various pharmacological effects, such as anti-inflammatory, antioxidant, and digestive stimulant properties(Ali BH et.al., 2008). In Ayurveda, ginger is commonly used to enhance digestion, alleviate digestive discomforts like bloating and gas, and promote overall gastrointestinal health. It is also valued for its ability to kindle Agni (the digestive fire), which is essential for proper metabolism and assimilation of nutrients (Chunekar KC, 2020).

Samhita/ Nighantu	Varga
Charak Samhita	Arshoghna varga, Deepaniya varga, Sheeta Prashamana, Sula Prashamana, Trishna nigrahana, Stanya shodhana, Triptighna varga
Susrutha Samhita	Trikatu, Pippalyadi gana
Ashtanga Hridaya	Shunthi-Aushadha varga, Ardraka-Shaka varga
Bhavaprakash Nighantu	Haritakyadi varga
Madanpal Nighantu	Shunthyadi varga
Raj Nighantu	Mishrakadi varga, Pippalyadi varga
Kaiyadeva Nighantu	Pippalyadi gana

Table 1:- Classification of Shunthi/Ardraka in various Samhitas and Nighantus.

Material and Methods:-

Collection of the sample

Fresh and dried rhizomes of Zingiber officinale Roscoewere collected from the local market of Chandigarh in the month of March 2024. The freshrhizome was washed under running tap water and blotted dry while the dried rhizome was soaked in water for 12-14 hours.

Panchendriya Pareeksha (Organoleptic examination) of the fresh drug:

Organoleptic characters of the rhizome of Ardraka and Shunthi by Shravanendriya (Auditory), Sparshanendriya (Tactile), Chakshurendriya (Visual), Rasanendriya (Taste) and Ghranendriya (Odour) has been evaluated (table 1).

Table 1:- The Organoleptic evaluation of the fresh and dried rhizome ofZingiber officinaleRoscoe.

Pareeksha (Examination)	Fresh	Dried
Shravanendriya (Auditory)	Characteristic sound	Characteristic sound
Sparshanendriya (Tactile)	Comparatively Smooth or sightly wrinkled texture	Rough with longitudinal striations or scars.
Chakshurendriya (Visual)	Outer yellowish-brown colour	External- buff coloured Inner- white coloured
Rasanendriya (Taste)	Agreeable and pungent	Agreeable and pungent
Ghranendriya (Odour)	Aromatic	Aromatic

Macroscopic and microscopic evaluation

Macroscopic characters like shape, size, and margins were recorded as per visual observation. For the Micrometric evaluation, the fresh leaves were used. Sections were visualized under Compound microscope after slide preparation by transverse sectioning using dissecting kit.

Fig 1:- Macroscopy of Zingiber officinale roscoe.

Results and Discussion:-

Transverse section of driedrhizome of Zingiber officinaleRoscoe

Macroscopic features:

The rhizome is laterally compressed and adorned with short, flattish, ovate branches on its upper side, each marked by a depressed scar at its apex. Typically, the rhizome pieces measure between 5-15 cm in length, 1.5-6.5 cm in width (with a usual diameter of 3-4 cm), and 1-1.5 cm in thickness. Externally, it boasts a buff-coloured appearance, featuring longitudinal striations and occasional loose fibres, while its fracture yields a short, smooth surface. Internally, a transverse section reveals a narrow cortex occupying about one-third of the radius, alongside a distinct endodermis, and a wide stele housing numerous scattered fibro-vascular bundles and yellow secreting cells. Its scent is characterized by an agreeable and aromatic aroma, while its taste is both agreeable and pungent.

Microscopic features:

The transverse section of the rhizome reveals a cortex consisting of isodiametric thin-walled parenchyma cells interspersed with vascular strands and numerous isodiametric idioblasts, ranging from 40-80 µ in diameter. These idioblasts contain a yellowish to reddish-brown oleo-resin. The endodermis, slightly thick-walled and devoid of starch, is followed by a nearly continuous row of collateral bundles, typically lacking fibres(Gavrilova A et al,2022). The stele comprises thin-walled parenchyma cells arranged radially around numerous scattered collateral vascular bundles. Each vascular bundle includes a few unlignified, reticulate, or spiral vessels measuring up to about 70 µ in diameter, accompanied by a group of phloem cells and unlignified, thin-walled, septate fibres up to about 30 µ wide and 600 µ long, featuring small oblique slit-like pits. Additionally, scattered idioblasts similar to those found in the cortex, ranging from 8-20 µ wide and up to 130 µ long with dark reddish-brown contents, are associated with vascular bundles(Rungsung W et al,2014). The parenchyma of both the cortex and the stele is densely packed with flattened, rectangular, ovate starch grains, predominantly measuring 5-15 µ wide, 30-60 µ long, about 25 µ wide, and 7 µ thick, and exhibiting five transverse striations.

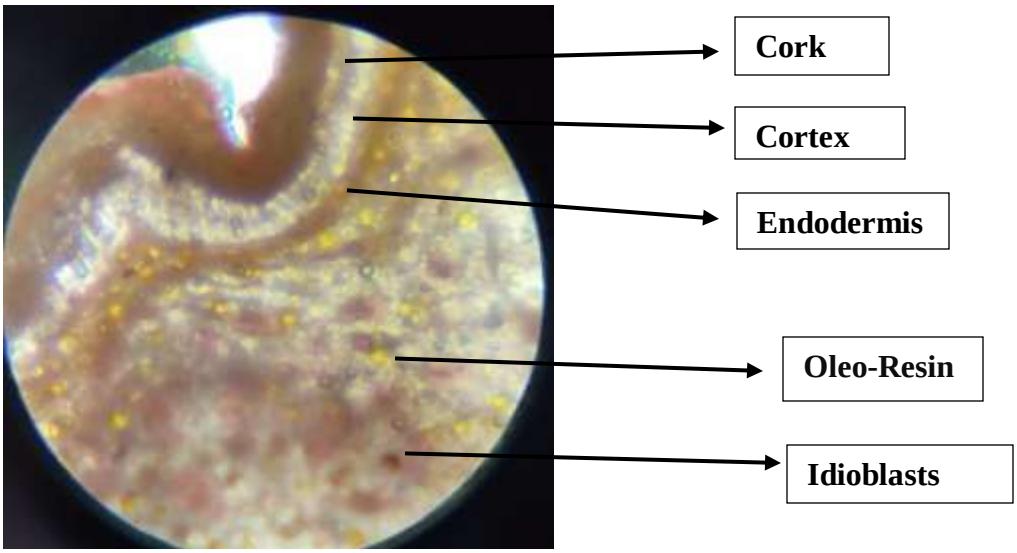

Figure 1:- Microscopic features of Shunthi (Zingiber officinaleRoscoe).

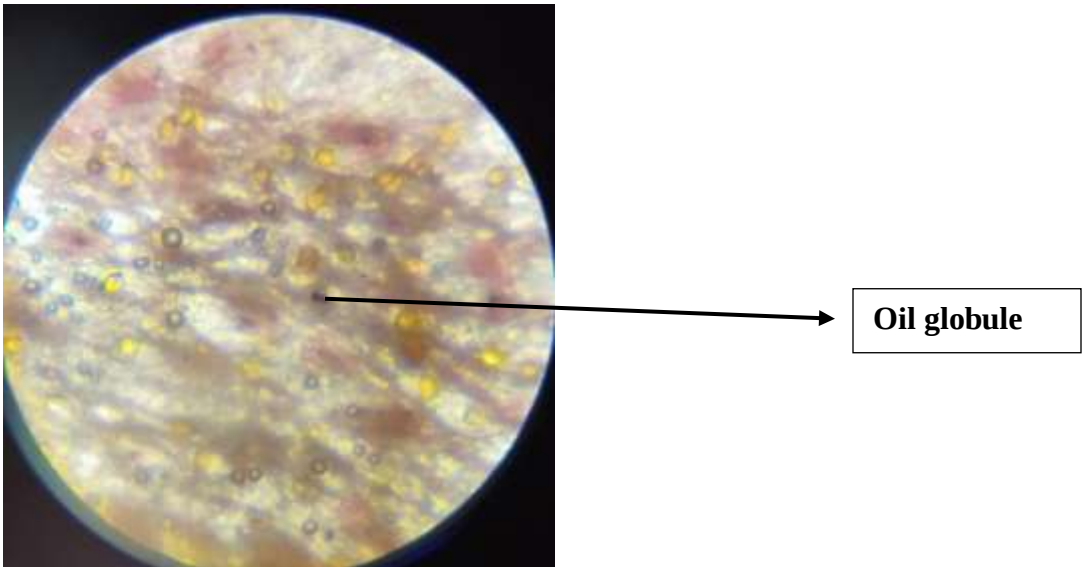

Figure 2:- Microscopic features of Shunthi (Zingiber officinaleRoscoe).

Transverse section of fresh rhizome of Zingiber officinale Roscoe

Macroscopic features:

The rhizome of ginger occurs either as an entire structure or in smaller pieces, with a laterally compressed form bearing flattish ovate branches on the upper side, each marked with a depressed scar at its apex. These pieces typically measure between 5 to 15 cm in length, 1.5 to 6.5 cm in width (with an average of 3 to 4 cm), and 1 to 1.5 cm in thickness. When fractured, the rhizome exhibits a short fracture with projecting fibers, while a transverse section reveals a wide central stele with numerous greyish cut ends of fibers and yellow secreting cells. Notably, the unmistakable scent of ginger, reminiscent of its gingery aroma, and its pungent taste further confirm its identity.

Microscopic features:

The microscopic examination reveals detailed anatomical structures within the rhizome. Starting from the outermost layer, irregularly arranged brown cells form the outer cork, succeeded by thin-walled, colourless cells forming the inner cork. Moving inward, the secondary cortex consists of hexagonal to polygonal parenchymatous cells containing circular to oval starch grains and oleo-resin globules in idioblasts. Oil cells have suberized walls, and numerous cortical fibrovascular bundles are scattered throughout, more densely distributed inward. These bundles vary in size and composition, with vessels exhibiting distinct patterns of thickening(Chittaragi D et. al., 2022). The

endodermis surrounds the central stele, which comprises parenchymal cells filled with starch grains and oleo-resin cells. Fibrovascular bundles include smaller ones along the pericycle and larger ones dispersed throughout the stele, containing xylem, phloem, parenchyma, and sclerenchyma.

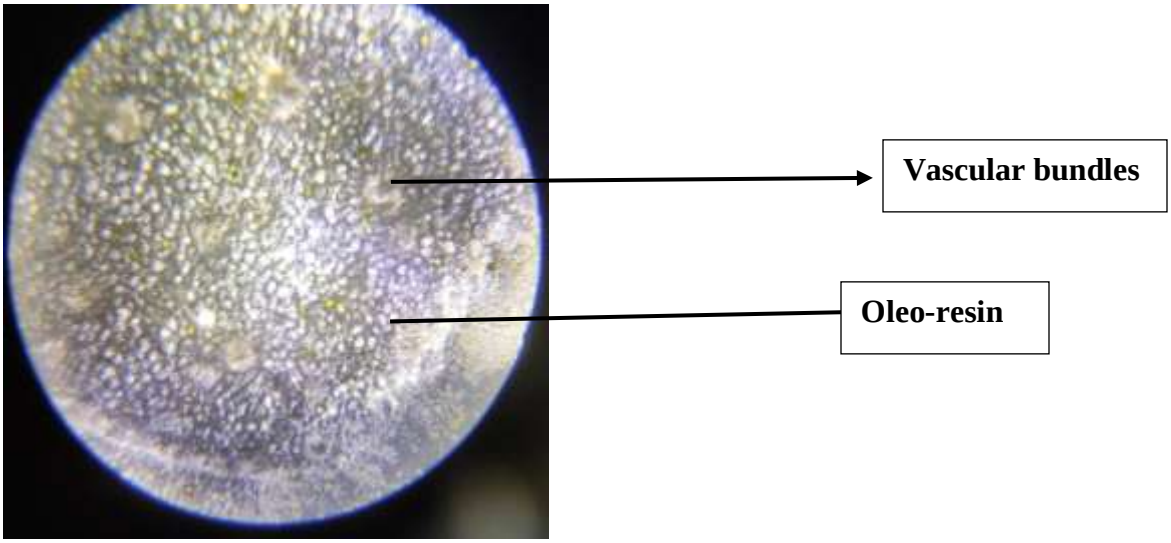

Figure 3:- Microscopic features of fresh Ginger (Zingiber officinale Roscoe).

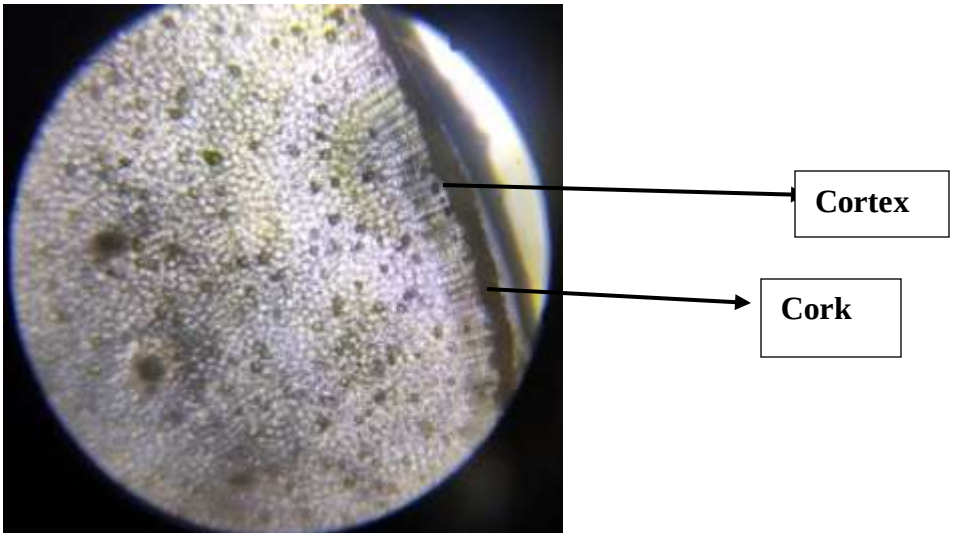

Figure 4:- Microscopic features of fresh Ginger (Zingiber officinaleRoscoe).

Conclusion:-

The pharmacognostic analysis of Ginger (Zingiber officinaleRoscoe) emphasizes its detailed examination at both macroscopic and microscopic levels. Macroscopically, ginger exhibits distinctive characteristics such as a laterally compressed rhizome with ovate branches, buff-coloured appearance with longitudinal striations, and an agreeable aroma. Microscopic evaluation reveals intricate structures including parenchymatous cells, fibrovascular bundles, and oleo-resin cells containing bioactive compounds like gingerols and shogaols.

Ardraka, or fresh ginger rhizome, is characterized by its pungent, bitter, and sweet tastes, along with dry and penetrating qualities. It possesses warming potency and is known for its digestive, anti-inflammatory, and aphrodisiac properties, beneficial for balancing Vata and Kapha doshas. On the other hand, Shunthi, or dried ginger rhizome, shares similar therapeutic actions but may exacerbate Pitta dosha due to its heating nature, making it suitable for Vata and Kapha imbalances while needing caution in Pitta conditions.

This comprehensive analysis highlightsginger's botanical complexity and therapeutic potential, facilitating its integration into both traditional and modern medicinal practices.

References:-

1. Agnivesh,Charaka Samhitha.10th ed. Varanasi:ChaukhambhaOrientalia.
2. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (Zingiber officinale Roscoe): a review of recent research. Food and chemical Toxicology. 2008 Feb 1;46(2):409-20.
3. Bhavaprakash, Mishra. S.BhavaprakashNighantu Vidyotini Hindi commentary. 10th ed. Varanasi: Chaukhambha orientalia;2002. p.15.
4. Chittaragi D, S. Menon J, EV A. Histochemical analysis and storage behaviour of ginger (Zingiber officinale Roscoe) under zero-energy cool chamber (ZECC). Plos one. 2022 May 5;17(5): e0265320.
5. Chunekar KC. Bhavaprakash Nighantu. Chaukhambha Bharti Academy, Varanasi. Pushpa Varga. 2020; p. 496.
6. Gavrilova A, Gavrilov G, Trifonova D. Contribution to the microscopic identification of Zingiber officinale. Pharmacia. 2022 Jan 19;69(1):93-7.
7. Gupta P, Kushwaha SS. A CRYSTAL COMPENDIUM ON RAJA NIGHANTU.
8. Kirtikar KR, Basu BD. "Indian Medicinal Plants." Bishen Singh Mahendra Pal Singh, Dehra Dun. 1994; 2(3): 1884-1888.
9. Kushwaha SS, Gupta P. Critical analysis of Bhavaprakash Nighantu–a review. World J Pharm Res. 2023 May 19;12(9):1250-1256.
10. Kushwaha SS. Surpala's Vrikshayurveda: A Rare Gem in the Field of Horticulture. Int Ayurvedic Med J. 2023 Jul;7(5):454-459
11. Mao QQ, Xu XY, Cao SY, Gan RY, Corke H, Beta T, Li HB. Bioactive compounds and bioactivities of ginger (Zingiber officinale Roscoe). Foods. 2019 May 30;8(6):185.
12. Rungsung W, Dutta S, Mondal DN, Hazra J. Pharmacognostical characterization on the rhizome of Ginger. Research Journal of Pharmacognosy and Phytochemistry. 2014;6(2):88-91.
13. Sankhyadhar Satish Chandra, Deepika. S, Chunekar K.C.Raja Nighantu. 1st ed. Varanasi: ChaukhambhaOrientalia;2010. p.200,201,300,1057,1061,1063,1078.
14. Sastry J.L.N. Raghnathan.K,Madanapāla Nighantu.1st ed.Varanasi:Chaukhambha Orientalia;2010.
15. Sharma. P. V, Sharma.G.P. KaiyadevaNighantu. 1st ed.Varanasi:Chaukhambha orientalia;2009. p.213.
16. Susrutha. Susrutha Samhitha.38th Ch.9th ed. Varanasi:ChaukhambhaOrientalia.
17. Vagbhatta.AshtangaHrudaya.Reprint 1995.Varanasi: Chaukhambha orientalia;1995. p.109,119.