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Review Paper

An Overview on Phytoconstituent and Activities of Phyrus Pashia

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ABSTRACT

Buch-Ham is a Pyrus pashia. Ex D. Don, which includes about 38 species in temperate regions of the North Hemisphere, is found in the Himalayan region with higher ethnic uses. One significant medicinal plant is Pyrus Pashia. The purpose of this study is to examine the pharmacological active chemicals found in Pyrus pashia fruit and their potential to prevent diabetes. Following their dissolution in distilled water, methanolic extracts of fruit, bark, and leaves were separated using four organic solvents in ascending order of increasing polarity as n-hexane, chloroform, ethyl acetate, and n-butanol. Notably, important phenolic compounds with anti-inflammatory and antioxidant qualities, including gallic acid, catechin, caffeic acid, coumaric acid, and ellagic acid, were found by high-performance liquid chromatography (HPLC) examination. The existence of primary and secondary metabolites such as alkaloids, glycosides, flavonoids, steroids, saponins, and tannins was discovered by phytochemical and pharmacological analysis of the plant.

INTRODUCTION

Pyrus pashia commonly known as wild pear or Himalayan pear and belonging to family Rosaceae. The fruit is employed frequently in the traditional medicine as supplementary food, minerals, vitamins, polyunsaturated fatty acids, certain phytochemical, and dietary fibres [1]. The quality of fruits is generally recognized by parameters such as color, shape, texture, total soluble solids (TSS), acidity, sugar content, organic acids, and volatile compounds. Several bioactive and phenolic components present in P. passia flowers make them beneficial in the treatment of heart disease and cancer The fruit is employed frequently in the traditional medicine as supplementary food, minerals, vitamins, polyunsaturated fatty acids, certain phytochemical, and dietary fibres.[2]

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With its attractive flowers and edible fruits, Phyrus pashia serves not only as a source of food but also plays a role in local ecosystems, providing habitat for various wildlife. It is generally known as Kainth and goes by several other names such as Batangi, Molu, Tangai, Sohjhur and Mehal [3-4]. Mainly pyrus pashia is known as kainth, shegal. The early fruit is mostly of light green color but at maturity, its color turns blackish brown with numerous yellow and white dots on its skin surface.[5] The shape of fruit is often described as oblate, ovoid, obovoid, oval or quince. On average the fruit diameter ranges from 1 to 4 cm and the height ranges from 2 to 5 cm Pyrus pashia is used in traditional medicine with various parts of tree employed for their health benefits. The plants are best grown in the height range of 750 to 2600 m. The immature fruits are usually willow green in colour with light brown spots on the outer surface, the fruits turn black and soft when they mature or ripe [6]. The fruits are rich in nutrients, containing several essential vitamins including vitamins A, B1, B2, B3 and C. n. The leaves of P. pashia are rich in polyphenolic compounds like chlorogenic acids, flavan-3-ols and arbutin exhibit a wide range of physiological activities and are used for the development of several therapeutic agents. f P. pashia fruit, however, there has been limited research on the value addition of P. pashia fruit. Fruits have a very short shelf life, and it can be extended with the help of food processing techniques



Fig.1. Phyrus pashia

Habitat: Phyrus pashia is a deciduous tree that typically reaches heights of 5 to 10 meters. It features broad, ovate leaves and white to pink flowers that bloom in spring [7]. The fruit is a pome, resembling a small pear, with a sweet and tangy flavour profile. The tree thrives in well-drained soils and is often found in hilly regions. is primarily found in mountain region of South Asia, including parts of India, Nepal, Bhutan. *Pyrus pashia* is a tolerant tree that grows on sandy loamy soil that is well drained [8-9]. It is adapted to a precipitation zone that ranges from 750 to 1500mm/yr or more, and a temperature that ranges from -10 to 35 C [10]

Geographical distribution: is primarily found in mountain region of South Asia, including parts of India, Nepal, Bhutan, Punjab, Himachal

Table 1

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopside
Order	Rosales
Family	Rossaceae
Subfamily	Maloideae
Genus	Pyrus
Species	p. pasia

Chemical constituent

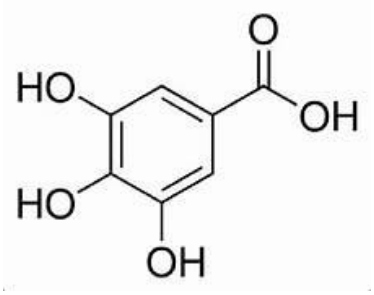
Some other constituents are phenolic compounds, terpenoids, glycosides, alkaloids, fatty acids, steroids. previous study demonstrated that the *P. pashia* fruit comprised of major phenolics, such as gallic acid, catechin, caffeic acid, coumaric acid, ellagic acid and several other phytochemicals [11] the chemical constituents of *P. pashia* flower and isolated 28 compounds. They also reported a novel glycosidic phenolic compound, namely 4-*O*-*Z*-coumaroyl-arbutin, Among the 28 compounds, hydroquinone exhibited the highest content. In the branches and leaves, 20 terpenoids and two new terpenoids have been reported. Gallic acid, catechin, caffeic acid, coumaric acid, ellagic acid,

and several other phytochemicals are among the main phenolics found in P. pashia fruit.

Table 2

S.no.	Plant part	Chemical constituent
1	Fruit	Gallic acid, sterols, terpenes, Catechin, tannins, alkaloids. phenols
2.	Flowers	Arbutin, hydroquinone, 4methoxy benzoic acid, apegenin
3.	Bark	Steroids, tannins, flavones, beta sitosterol
4	Branches and leaves	Caffeic acid, picein, 3,4-dihydroxyacetophenone

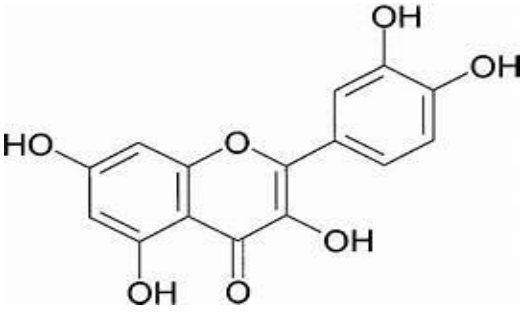
Phenolic compounds are primarily driven by the need to understand their influence on sensory qualities such as color, antioxidant potential and nutritional value in foods. It has been reported that the flowers of Pyrus genus contain a certain amount of phenolics such as arbutin, chlorogenic acid, and flavonoids [12]. Phenolic compounds play vital functions in plant reproduction and development, act as important defense mechanisms against pathogens, and parasites contribute significantly to the vibrant colors displayed by various plant species. The phenolic content of plant materials and their antioxidant activity highlight the significant role in stabilizing lipid oxidation. their antioxidant properties, these compounds offer a diverse array of medicinal benefits, including anti-inflammatory, anti-microbial, anti-allergic, anti-thrombotic, and vasodilator effects, thus attributing the control of various diseases to the constituents of medicinal plants.



Gallic acid

Flavonoids

Flavonoids, such as flavones, flavanols and condensed tannins are the secondary metabolites that exhibit antioxidant properties primarily due to the presence of unbound hydroxyl groups. These compounds not only demonstrate antioxidant efficacy in vitro but also function as antioxidants within living organisms [13-14]. In various plants, flavonoids are also contained in high amounts. The predominant flavonoids in ten pears include B-ring dihydroxylated flavonol derivatives, including quercetin and isorhamnetin, and monomeric and polymeric flavan 3-ols, like epicatechin and proanthocyanidins. [15 17] It is thought that these substances help to determine colour, fruit quality, and durability. Total flavonoid contents in the 80% ethanol extracts of pear fruits were measured using the colorimetric method with aluminum chloride. Their presence in food such as wine, tea, soybeans, and liquor ice has explored their potential health benefits due to their notable antioxidant properties and the ability to delay or mitigate various conditions believed to be associated with oxidative stress, including atherosclerosis, cancer, Parkinson's disease, and diabetes.



quercetin

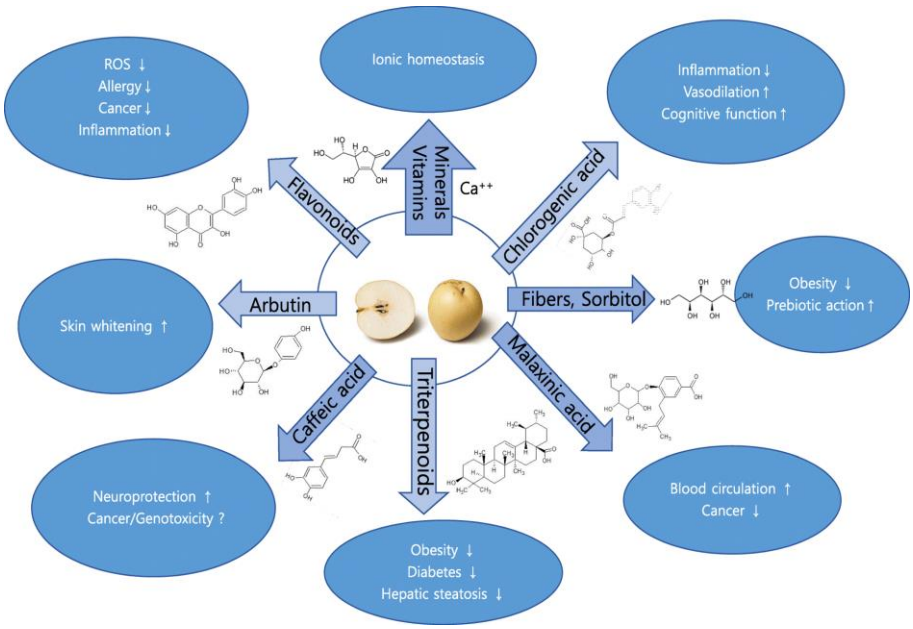
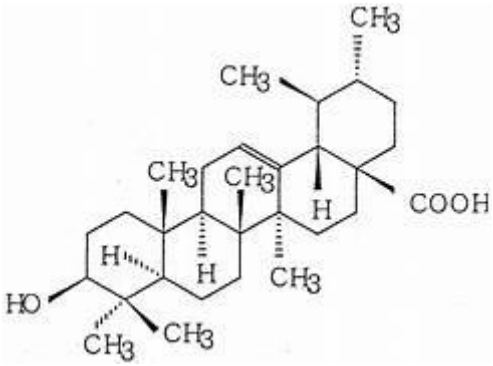


Fig.2.chemical constituent

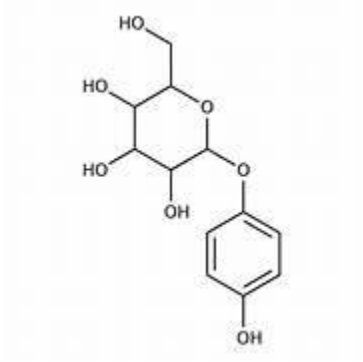
Triterpenoids

Among triterpenoids, particularly urosolic (Fig. 2), oleanolic, and betulinic acids have been identified in European pear cultivars (P. communis), more than 17-fold higher in the peels than flesh. Its isomer, oleanolic acid, has been speculated to have anti-oxidative, antitumor, anti-inflammatory, anti-diabetic, and antimicrobial effects, it increases energy expenditure[18] and suppresses aromatase activity, an enzyme responsible for converting androgens to estrogens.



Arbutin

Arbutin, hydroquinone-β-D-glucopyranoside (Fig. 2), is a well-known antibiotic, and skin whitening compound [19]. It is degraded into hydroquinone, a skin bleaching agent, and is used in cosmetics as a fragrance, reducing agent, and melanin polymerization inhibitor.[20] A Chinese group reported the peel of imported Korean pears (Chinese name, Youran) contained approx. 1.5–20-fold higher amounts of arbutin (6982.0 μg/g dry weight) than other 9 different pear varieties cultivated (323.3–4395.8 μg/g dry weight) in China and South Africa.



Pharmacological properties

Recent studies highlight the medicinal potential of Phyrus pashia. Its fruits and leaves are rich in phenolic compounds, flavonoids, and antioxidants, which are linked to various health benefits, including anti-inflammatory,

antimicrobial, and anti-diabetic properties [21]. Traditional medicine practices in regions where it is indigenous often utilize these parts for treating ailments.

1.Antimicrobial activity

Medicinal plants, rich in various phytochemicals, may serve as potent antimicrobials. In several countries, wildly grown plants are used for medicinal purposes The various extracts from *P. pashia* plant parts have exhibited antimicrobial activities against pathogenic bacteria and fungi. [22-23] . Particularly, the ethanolic extract of the fruit skin displayed remarkable antibacterial activity against Klebsiella pneumonia, Shigella flexneri, and Escherichia coli while the chloroform and ethanolic extracts from the fruits exhibited strong antifungal activity against Candida albicans, Aspergillus flavus, and Aspergillus parasiticus.

2.Antioxidant activity

Zbigniew *et al*. investigated the antioxidant properties of various extracts, including methanol, aqueous, and ethyl acetate obtained from dried leaves of *Pyrus pyrifolia* var. [24]"Shinseiki" Antioxidant activity was performed using ABTS assay (2,2′-azino-bis-3-ethylbenzothiazoline-6-sulphonic acid,) resulting in fruit extracts possessing antiradical activity. P. pashia extracts, operating through the reduction of by the antioxidants present. P. pashia extracts, operating through the reduction of by the antioxidants present. P. pashia by using different solvents including methanol, hexane, chloroform, ethyl acetate, n-butanol, and aqueous extracts [25-27]. The difference in the antioxidant level within the fruit, influenced by factors such as solvent type, phenolic concentration, and interactions among extract components, contribute to its exceptional potential as a natural source of health-enhancing antioxidants

3. **Antidiabetic activity**

Results revealed that the extract 50 % reduced the glucose levels; the ethanolic extract has high flavonoid contents. Recent studies have shown that pears possess antihyperglycemic effects.[28] Combined apple or other fruits, such as acai, cherry and pear also inhibited diabetic parameters. [29] Preliminary studies suggest that *Pyrus pashia* has potential hypoglycemic properties. Flavonoids present in the plant help regulate blood sugar levels by improving insulin sensitivity and enhancing glucose uptake.

4.Anticancer activity

Pears showed some anti-mutagenic and anti-cancer activities by several mechanisms. Firstly, pears can inhibit carcinogenesis of polycyclic aromatic hydrocarbons (PAHs), such as benzo(a)pyrene, which have two main carcinogenic mechanisms, formation of DNA-adducts and production of ROS [30] excretion of PAHs.

5. Anti-inflammatory activity

The anti-inflammatory effects of different pear species were compared to those of dexamethasone in carrageenan-induced mice hind paw edema and xylene-induced mice ear edema models. Excessive inflammatory responses are a leading cause of non-communicable diseases [31]. However, dietary ingestion of pears, apple, red wine, and strawberries showed inverse associations with inflammation scores (IS) in food-based analyses Inflammation usually develops when infectious microorganisms, such as bacteria or viruses, enter the body and are present in certain tissues or circulate through the blood. Eating a diet rich in fruits and vegetables lowers the risk of cancer due

to the presence of natural polyphenol in fruits and vegetables. The regular intake of phenolic-rich fruits and various plant components not only associates with anti-inflammatory properties but also correlates with a lowered susceptibility to the specific forms of cancer and cardiovascular conditions.

6. **Cardio-protective**

Cardiovascular diseases are the leading global cause of death with 17.9 million mortality events per year. Concerning active compounds in pear, chlorogenic acid showed to improve ex vivo vessel function and protect endothelial cells against HOCl. [32] Cardioprotective functions of pears via ACE inhibition were confirmed in vivo systems.

7 **Hepatoprotective activity**

The aqueous extract of *P. pashia* leaves have been shown to exhibit hepatoprotective activity against carbon tetrachloride (CCl_4)-induced liver damage.

Uses

The Ayurvedic, Unani, Siddha, and tribal medicines use >400 plants, and 75% of plants are obtained from tropical forest areas and the remaining 25% from temperate forests

In the Himalayan region, *P. pashia* is distributed with immense ethnic benefits and has been widely used by several local communities in the treatment of gastrointestinal, respiratory, and vascular complications. The fruit contains various health-promoting components such as phytochemicals, bioactive compounds, minerals, and vitamins, therefore it has tremendous potential for the development of value-added and novel food products with therapeutic benefits. The fruits are edible, and have religious and cultural significance. Other diverse uses include the preparing of fencing, ropes, brooms, decorative articles, and other household purposes by the inhabitants of the Lesser Himalayas.

Table 3

S. no.	Plant part	Uses
1	Flower	Treatment of cough, emesis and diarrhea. Used as a health food to lower blood lipid in the Yunnan province of China
2.	Fruit	Useful in the treatment of dyspepsia and dysmenorrhea Digestive disorders, sore throat, irritability. Abdominal pain, anemia. Fruit juice is astringent and diuretic
3.	Bark	Possesses astringent and tonic properties. Used in the management of sore throat, fever, and peptic and gastric ulcers.
4.	Leaves	Serve as fodder for goats and sheep. Tonic for hair loss Improve cosmetic appearance

CONCLUSION

The fruit is palatable and a valuable source of nutrients. Numerous phytochemicals have been identified in the plant's fruit, flower, leaves, and bark. The many phytochemicals found in fruit, flowers, bark, and leaves have the potential to be utilized in the development of a unique medication that treats a variety of illnesses through the application of reverse pharmacology. It is clear from scientists' ongoing research on Pyrus species

that traditional usage has been validated by contemporary findings, which could lead to the development of new therapeutics and dietary supplements. To learn more about their mechanisms of action, improve extraction techniques, and explore the potential therapeutic applications of these substances, additional research is necessary.

REFERENCES

1. Pandey A and Negi PS: Traditional uses, phytochemistry, and pharmacological properties of Neolamarckia cadamba: A review. J Ethnopharmacol. 181:118–135. 2016.PubMed/NCBI View Article : Google Scholar
2. Ved DK and Goraya GS: Demand and Supply of Medicinal Plants in India. 1st edition. Foundation for Revitalisation of Local Health Traditions. National Medicinal Plants Board, New Delhi, 2008.
3. Lee H. Isse t, Kawamoto T, Baik HW, Park JY, Yang M: effects of Korean pear (Pyruspyrifolia cv. Shingo) juice on hangover severtiy following alcohol consumption. Food Chem Toxicol. 2013; 58:101–6. https://doi.org/10.1016/j. fct.2013.04.007
4. Jiang G, Yim S, Eun J. Physicochemical characteristics, and antioxidant activities of new Asian pear cultivars. J Appl Biol Chem. 2016;59(4):337–43.
5. Lee S, Cho J, Jeong HY, Jeong DE, Kim D, Cho S, et al. Comparison of bioactive compound contents and in vitro and ex vivo antioxidative activities between peel and flesh of pear (Pyrus pyrifolia Nakai). Food Sci Biotechnol. 2015;24(1):207–16.
6. Hwang SJ, Kim Y, Park Y, Lee H, Kim K. Anti-inflammatory effects of chlorogenic acid in lipopolysaccharide-stimulated RAW 264.7 cells. Inflamm Res. 2014;63(1):81–90.
7. Guven K, Yucel E, Cetintas F (2006) Antimicrobial activities of fruits of Crataegus and Pyrus species, Pharm Bio 44: 79–83.
8. Mohanta, Y.K.; Biswas, K.; Jena, S.K.; Hashem, A.; Allah, E.F.A.; Mohanta, T.K. Anti-Biofilm and Antibacterial Activities of Silver Nanoparticles Synthesized by the Reducing Activity of Phytoconstituents Present in the Indian Medicinal Plants. Front. Microbiol. 2020, 11, 1143. [Google Scholar]
9. Chandra S, Ravindra, Malik SK. Evaluation of Pyrus pashia leaves extract as a disinfectant for Rainbow trout fertilized eggs. International Journal of current microbiology and applied Sciences. 2017; 6(1):697-706.
10. Siddiqui SZ, Ali S, Rubab K. Pyrus pashia: A persuasive source of natural antioxidant. Pakistan Journal of Pharmaceutical Sciences. 2015; 28(5):1763-1772.
11. Mian Z, Le Cai, Zhongtao D. Chemical constituents from leaves and branches of Pyrus pashia. Chinese Journal of Organic Chemistry. 2013; 33:1284-1290.
12. Abbasi MA, Zafar A, Riaz T, Aziz-Ur-Rehman, Arshad S, Shahwar D, Jahangir M, Siddiqui SZ, Shahzadi T and Ajaib M (2010). Evaluation of comparative anti-oxidant potential of aqueous and organic fractions of Ipomoea carnea. J. Med. Plants Res., 4(18): 1883 1887.
13. Sawian JT, Jeeva S, Lyndem FG, Mishra BP and Laloo RC: Wild edible plants of Meghalaya, North-east India. Natural Product Radiance 2007; 6(5):410-426.
14. Saklani S and Chandra S: In-vitro antimicrobial activity nutritional profile of medicinal plant of Garhwal, Himalaya. International Journal of Pharmaceutical Sciences and Research 2012; 3(1):268-272.
15. Chaudhary, L.B., & Bhandari, N. (2013). Ecology and distribution of Pyrus pashia in

the Himalayan region. Forest Ecology and Management, 297, 17-24.
16. Negi, J.S., Bisht, V.K., Singh, P., Rawat, M.S.M., & Joshi, G.P. (2012). Chemical constituents and biological importance of Pyrus species: A review. Journal of Medicinal Plants Research, 6(39), 5212-5220.
17. Bhattarai, N.K. (1997). Traditional medicinal plants used by the rural people of Nepal. Journal of Ethnopharmacology, 58(1), 55-63.
18. Shrestha, S., & Dhillion, S.S. (2006). Diversity and traditional knowledge concerning wild food species in a locally managed forest in Nepal. Agroforestry Systems, 66(1), 55-63.
19. Sharma, P., & Singh, V. (2018). Ecological and medicinal significance of Pyrus pashia in South Asian hilly regions. Journal of Himalayan Botany, 23(2), 112-120.
20. Kumar, R. (2016). Medicinal Plants of the Himalayas: Pharmacological and Toxicological Perspectives. CRC Press. Chapter 12: Safety profiles of Pyrus species.
21. Plants for a Future. (2023). Pyrus pashia – Wild Himalayan Pear: Uses and Toxicity Profile. Retrieved from https://pfaf.org/plant/Pyrus_pashia
22. Kumar, R., & Singh, L. (2019). A review on the phytochemical and pharmacological potential of Pyrus species. Journal of Ethnopharmacology, 235, 92-102.
23. Verma, P. (2020). Pharmacognostical and phytochemical studies of selected Himalayan plants. (Master's thesis). University of XYZ. Available at: [Institution Repository]
24. Makhdoomi, M. A., & Shah, A. A. (2018). Medicinal Plants of the Himalayas: Ethnobotanical and Pharmacological Perspectives. Springer. Chapter on Pyrus pashia and its therapeutic uses.
25. Ali, M., & Zafar, M. (2020). Phytochemicals with anti-diabetic activity: A review on Pyrus species. Journal of Ethnopharmacology, 248, 112289. https://doi.org/10.1016/j.jep.2019.112289
26. Camps J, García-Heredia A: Introduction: oxidation and inflammation, a molecular link between non-communicable diseases. In Oxidative Stress and Inflammation in Non-communicable Diseases-Molecular Mechanisms and Perspectives in Therapeutics. 1st edition. Edited by Camps J. Switzerland: Springer; 2014:1–4.
27. Kim D, Shin G, Lee Y, Lee JS, Cho J, Baik S, et al. Assessment and comparison of the antioxidant activities and nitrite scavenging activity of commonly consumed beverages in Korea. Food Chem. 2014; 151:58–64.
28. Leontowicz M, Gorinstein S, Leontowica H, Krzeminski R, Lojek A, Katrich E, et al. Apple and pear peel and pulp and their influence on plasma lipids and antioxidant potentials in rats fed cholesterol-containing diets. J Agric Food Chem.
29. Jaganathan SK. Growth inhibition by caffeic acid, one of the phenolic constituents of honey, in HCT 15 colon cancer cells. Sci World J. 2012;372345.
30. Andersen FA, Bergfeld WF, Belsito DV, Hill RA, Klaassen CD, Liebler DC, Marks JG, Shank RC, Slaga TJ, Snyder PW: Final amended safety assessment of hydroquinone as used in cosmetics. Int J Toxicol. 2010, 29(6_suppl):274S– 287S.
31. Athokpam R, Bawari M and Choudhury MD: Hepatoprotective activity of aqueous extract of Pyrus pashia Buch. -Ham. Ex D. Don against CCl4 induced liver damage. Int J Pharm Sci Res. 8:4195–4200. 2017.
32. Kokate CK. Practical Pharmacognosy. Vallabh Prakashan Publication. New Delhi, India. 1999;115.

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