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A MAGICAL MEDICINAL FRUIT OF *PIPER NIGRUM*

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ABSTRACT

The Black pepper is the fruit of the plant *Piper nigrum (P.nigrum)* from the *Pipperceae family*. Black pepper is found largely and is cultivated in Western Ghats of Kerala (Southern India) and Sarawak state in Malaysia. Dried fruit of *P. nigrum* is known as "The King of the Species" as it gives delicious flavor to dish along with their medicinal properties to cure numerous diseases as well. Herb is commonly used to treat gastrointestinal disorders, malaria, respiratory diseases, cold and cough, skin cancer, scabies, nerve pain and other diseases. It can be used as Anti-apoptotic, Anti-microbial, Anti-pyretic, Anti-analgesics, Anti-tumor, Anti-depressant, Anti-inflammatory, Anti-arthritic, Anti-thyroid, Anti-platelet, Anti-fungal, Anti-diarrheal, Immunomodulatory, Larvicidal activity. This review paper mainly focused on recent advancement in variety of Pepper, biological value and medicinal uses of *piper nigrum* for future aspects.

KEYWORDS: *Piper nigrum*, Black pepper, King of the species, Peppercorn, Piperine, Biological activity.

INTRODUCTION

P. nigrum L. (black pepper), famous as the king of spices, is a flavoring vine of the family *"Piperaceae"* that is cultivated for its fruit[1], which is usually dried and used as spice and seasoning. In dried form the fruit is referred to as peppercorn. It is native to India, and is mostly cultivated in tropical and subtropical regions.[2] *P. nigrum* is commonly known as Kali Mirch in Urdu and Hindi, Pippali in Sanskrit, Milagu in Tamil and Peppercorn, White pepper, Green pepper, Black pepper, Madagascar pepper in English. Hot and pungent peppercorns are obtained from Black pepper which is the most famous and one of the commonly used spices throughout the world. Black pepper is used as medicinal agent, a preservative, and in perfumery. Whole Peppercorn of *Piper nigrum* or its active components are being used in

different types of foods and as medicine. It contains major pungent alkaloid Piperine (1-peperoyl piperidine) which is known to possess many interesting pharmacological actions. It is widely used in different traditional systems of medicine like Ayurvedic and Unani System of medicines,[3,4]

Piperine exhibits diverse pharmacological activities like antihypertensive and antiplatelets[5], antioxidant, antitumor[6], anti-asthmatics[7], antipyretic, analgesic, anti-inflammatory, anti-diarrheal, antispasmodic, anxiolytic, antidepressants[8], hepato-protective[9], immuno-modulatory, antibacterial, antifungal, anti-thyroids, antiapoptotic, anti-metastatic, antimutagenic, anti-spermatogenic, anti- Colon toxin, insecticidal and larvicidal activities etc. Piperine has been found to enhance the therapeutic efficacy of many drugs, vaccines and nutrients by increasing oral bioavailability by inhibiting various metabolizing enzymes. It is also known to enhance cognitive action and Fertility.[10]

Fig.1 *P.Nigrum* plant showing immature peppercorns.

Fig.2 Mature dried corns of *P.Nigrum (long pepper).*

Black pepper is the dried unripe berries and it gives peppercorn. Peppercorn is dried fruit which has not reached full ripening stage and it is main part which is communicated and used as spice and seasoning. In common language peppercorn is referred to black pepper and it is

the most consumable part of pepper plant. A fully matured black pepper fruits is approximately five millimeter in diameter but it turns into four millimeter in diameter after drying. It is almost spherical in shape. Each drupe grows into a single fruit. Black pepper is cultivated mainly in tropical parts of the world. India is known as "The Home of the Black Pepper". Historically black pepper was termed as "The Black Gold" because of its commercial, economical and trade value.[11]

Varieties of *P.Nigrum*[12,13]

There are over 600 varieties of pepper (genus Piper), but few are used as spice, often distinguished only by the degree of maturation and the type of processing. Common pepper on the market is the fruit of *P. nigrum*, consisting of small spherical green berries that reach a bright red when fully ripe. Depending on the period of collection and / or processing undergone, we can distinguish the following types of pepper.

1. **Black pepper:** This pepper is produced from the seed of the pepper is still not too old then dried, so he changed the color to black and wrinkled. Marketing can be shaped grains, can also in fine form. This pepper is also used as a spice in cooking, such as soups, beef steak, and stir-stir.
2. **White pepper:** White pepper is produced from the seeds of the pepper that is old then peeled, resulting in a white color. There pepper types used in rough shape, those that are sold in powder form. In the use of typically mixed in the seasoning. It has a distinctive flavor and aroma.
3. **Green pepper:** Green pepper is a pepper that are picked and harvested when it was not too old and still green, so the sales Looks like he still had fresh. To maintain freshness he mixed with seasoning solution. Delicious for chicken dishes and seafood.
4. **Red pepper:** No red pigment in the skin is then peppercorns make this kind of pepper called red pepper. The taste of red pepper pepper is different from the others. It is no less spicy and sweeter taste in this type of pepper. This pepper is suitable to be used as a spice in seafood processing. Marketing is in the form of fresh and dried.

Fig.3 Varieties of P. Nigrum [13]

BIOLOGICAL VALUE OF *P.NIGRUM*

Most of the plant species including piper produced secondary metabolites which help in body metabolism and also used as defense system against various agents such as insect feeding plants and animals.[15] The active compounds having insecticidal activity are the Piper amides extracted from different species of Piper including *P.nigrum.*[16] Piperien is a pungent alkaloid of black pepper. Two important sesquiterpens, β-Caryophyllene and Nerolidol, the first having anaesthetic activity[17] and second used as a flavoring agent. It is also reported that the piperine enhances the trans-dermal delivery of active drugs through skin membrane. Natural compound islolated from piper species known as Nerolidal having pesiticidal activity against various mites (scabies).[18] Peppercorns extract contain such an active spasmolytic compounds which blocks Ca^{+2} influx & explain its traditional medicinal use in curing various digestive disorders.[19,20] Piperine derivatives from *P.nigrum* and *P.longum* having Anti-metastatic activity [21],Anti-thyroid activity[22], Hepatoprotective[23] and Immunostimulating Activity.[24,25] It is Anti-oxidant and its Anti-apoptotic potential has also been reported.[26]The pungent compound of *P.nigrum* especially piperine increases the production of saliva and gastric secretions.[27] Furthermore, the ingestion of the peppercorn increases the production of and activation of salivary amylase. The digestive enzymes produce by the ingestion of *P.nigrum* probably stimulates the liverto secrete bile which further digest food substance.[28]

USES OF *P.NIGRUM*[29]

1. **Nutritional source:** Black pepper is a rich source of minerals like manganese, copper, calcium, phosphorus, iron, potassium source, and vitamins like riboflavin, vitamin C, K,

and B6. Black pepper has a high content of dietary fiber and has a moderate amount of protein and carbohydrates too.

2. **Health benefits:** Black pepper aids in weight loss, and treats sinus, asthma, and nasal congestion. It also reduces the risk of cancer, and heart and liver ailments.
3. **Improves digestion:** Consumption of pepper increases the hydrochloric acid secretion in the stomach, thereby facilitating digestion. Proper digestion is essential to avoid diarrhea, constipation, and colic. Pepper also helps prevent the formation of intestinal gas, and when added to a person's diet, it can promote sweating and urination. Sweating removes toxins and cleans out the pores of the foreign bodies that may have lodged there and it can also remove excess water. In terms of urination, you can remove uric acid, urea, excess water, and fat, since 4% of urine is fat. A good digestion helps in weight loss, makes your overall body function better, and prevents severe gastrointestinal conditions. As black pepper is carminative in nature, it easily expels the gas out of the body in a healthy downward motion, as upward moving gas can be dangerous because it can strain the upper chest cavity and other vital organs.
4. **Weight loss:** The outer layer of peppercorn assists in the breakdown of fat cells. Therefore, peppery foods are a good way to help you shed weight naturally. When fat cells are broken down into their component parts, they are easily processed by the body and applied to other processes and enzymatic reactions, rather than settling in your body and making you overweight.
5. **Skin care:** Pepper helps to cure vitiligo, which is a skin disease that causes some areas of skin to lose its normal pigmentation and turn white. According to researchers in London, the piperine content of pepper can stimulate the skin to produce melanocytes pigment. Topical treatment of piperine combined with ultraviolet light therapy is much better than other harsher, more chemical-based treatments for vitiligo. It also reduces the chances of skin cancer due to excessive ultraviolet radiation.
6. **Respiratory relief:** In Ayurvedic practices, pepper is added to tonics for treating cold and cough. Pepper also provides relief from sinusitis and nasal congestion. It has an expectorant property that helps break up the mucus and phlegm depositions in the respiratory tract. Its natural irritant quality helps you expel these loosened materials through the act of sneezing or coughing, which eliminates the material from the body and helps you recover from infection or illness that caused the deposition in the first place.
7. **Antibacterial activity:** The antibacterial property of black pepper helps fight against infections and insect bites. Pepper added to the diet helps keep your arteries clean

by acting in a similar way to fiber and scraping excess cholesterol from the walls, thereby helping reduce atherosclerosis, the condition highly responsible for heart attack and stroke.

8. **Antioxidant property**: Antioxidants in pepper can prevent or repair the damage caused by the free radicals and thus help prevent cancer, cardiovascular diseases, and liver problems. Free radicals are the by-products of cellular metabolism that attack healthy cells and cause their DNA to mutate into cancerous cells. Antioxidants neutralize these harmful compounds and protect your system from many conditions and even symptoms of premature aging like wrinkles, age spots, macular degeneration, and memory loss.
9. **Enhances Bioavailbility:** Black pepper helps in transporting the benefits of other herbs to different parts of the body, thus maximizing the efficiency of the other foods we consume. That is why adding it to food not only makes it delicious but also helps to make the nutrients more available and accessible to our system.
10. **Improves cognitive functions:** Piperine, one of the key components of black pepper, has been shown in numerous studies to reduce memory impairment and cognitive malfunction. The chemical pathways in the brain appear to be stimulated by this organic compound, so early research demonstrates the possibility of pepper to benefit Alzheimer's patients and those suffering from dementia and other age-related or free radical-related malfunctions in cognition**.**
11. **Peptic ulcers**: A number of studies have shown that black pepper may have beneficial effects on gastric mucosal damage and peptic ulcers, due to its antioxidant and anti-inflammatory properties.
12. **Asthma treatment**: Pepper is a good treatment for respiratory conditions due to its properties as an expectorant, as well as its strong anti-inflammatory properties.

CONCLUSION

P.nigrum, like cinnamon and cloves is one of the oldest known spices with their excellent medicinal property as we discussed above and it was being used in India over 4,000 years ago. This reviews aims was to collect and study the variety of pepper, biological value and medicinal uses till date of *P.nigrum* plant in order to provide sufficient information for future research.

REFERENCES

1. Abbasi, B. H., Khan, N. A., Mahmood, T., Ahmad, M., Chaudhary, M. F., & Khan, M. A. Plant Cell, Tissue and Organ Culture, 2010; 101: 371–376.
2. Ahmad, N., Fazal, H., Abbasi, B. H., Rashid, M., Mahmood, T., & Fatima, N. Plant Cell, Tissue and Organ Culture, 2010; 102: 129–134.
3. Ahmad N, Fazal H, Abbasi BH, Farooq S, Ali M, et al. Biological role of Piper nigrum L. (Black pepper): A review. Asian Pacific J Trop Biomed, 2012; S1945-S1953.
4. Acharya SG, Momin AH and Gajjar AV. Review of Piperine as A Bio- Enhancer. A J Pharm Tech Res, 2012; 2: 32-44.
5. Taqvi SI, Shah AJ, Gilani AH. Blood pressure lowering and vasomodulator effects of piperine. See comment in PubMed Commons below J Cardiovasc Pharmacol, 2008; 52: 452-458.
6. Manoharan S, Balakrishnan S, Menon V, Alias L, Reena A. Chemopreventive efficacy of curcumin and piperine during 7,12-dimethylbenz[a] anthracene-induced hamster buccal pouch carcinogenesis. Singapore Med., 2009; J50: 139-46.
7. Parganiha R, Verma S, Chandrakar S, Pal S, Sawarkar HA, Kashyap P. *In vitro* anti-asthmatic activity of fruit extract of Piper nigrum (Piperaceae). Inter J Herbal Drug Res., 2011; 1: 15-18.
8. Li S, Wang C, Wang M, Li W, Matsumoto K, *et al*. Antidepressant like effects of piperine in chronic mild stress treated mice and its possible mechanisms. See comment in PubMed Commons below Life Sci., 2007; 80: 1373-1381.
9. Matsuda H, Ninomiya K, Morikawa T, Yasuda D, Yamaguchi I, *et al*. Protective effects of amide constituents from the fruit of Piper chaba on D-galactosamine/TNF-alpha-induced cell death in mouse hepatocytes. See comment in PubMed Commons below Bioorg Med Chem Lett., 2008; 18: 2038-2042.
10. Johnson JJ, Nihal M, Siddiqui IA, Scarlett CO, Bailey HH, *et al*. Enhancing the bioavailability of resveratrol by combining it with piperine. See comment in PubMed Commons below MolNutr Food Res., 2011; 55: 1169-1176.
11. Murlidhar Meghwal and Goswami TK. Agricultural & Food Engineering Department, IIT, Kharagpur, India. Open Access Scientific, 2012; 1.
12. Varieties of Pepper. Webb James safe ingredients since 1973. http://www.webbjames.com/list-of-spices/varieties-of-peppers/varieties-of-pepper/
13. Efficacy or type and Pepper (Pipper nigrum). http://sehatcure.blogspot.in/2013/09/lada-atau-merica-piper-nigrum.html
14. Black Pepper. https://en.wikipedia.org/wiki/Black_pepper

15. Ahmad N, Fazal H, Ayaz M, Mohammad I, Fazal L. Dengue fever treatment with Carica papaya leaves extracts. *Asian Pacific Journal of Tropical Biomedicine, 2011; 330-333.*
16. Scott IM, Jensen HR, Philogene BJR., Arnason JT. A review of Piper spp. (Piperaceae). Phytochemistry, insecticidal activity and mode of action. Phytochem. Rev., 2008; 7: 65-75.
17. Santra M, Santra DK, Rao VS, Taware SP, Tamhankar SA. Inheritance of β-carotene concentration in durum wheat (Triticum turgidum L.ssp.durum). Eucalypta, 2005; 144: 215-221.
18. Jayalekshmy A, Menon AN, Padmakumari KP. Essential oil composition of four major cultivars of black pepper (Piper nigrum L.). J. Essential Oil Res., 2003; 15: 155-157.
19. Balkrishna A. Ayurved Jadi Buti Rahasya. 5th ed. Divya Prakashan Patanjali Yogpeeth, Maharishi Dayanand Gram, Haridwar, India; April, 2008; 362-4.
20. Chaudhry NMA, Tariq P. Bactericidal activity of black pepper, bay leaf, aniseed and coriander against oral isolates. Pak. J. Pharm. Sci., 2003; 19: 214-218.
21. Appiah I, Milovanovic S, Radojicic A, Nikolic-Kokic A, Orescanin-Dusic Z, Slavic M, Trbojevic S, Skrbic R, Spasic MB, Blagojevic D. Hydrogen peroxide affects contractile activity and anti-oxidant enzymes in rat uterus. Br. J. Pharmacol, 2009; 158: 1932-1941.
22. Ibrahim M, Nane KM, Anjum A. Hepatoprotective activity of Sapindus mukorossi and rheum emodi extracts: *In vitro* and *In vivo* studies. World J. Gastroenterology, 2008; 16: 2566-2571
23. Sunila ES, Kuttan G. Immunomodulatory and Antitumor activity of Piper longum Linn. and Piperine. J. Ethnopharmacol, 2004; 90: 339-346.
24. Pathak N, Khandlewal S. Cytoprotective and immunomodulating properties of Piperine on murine splinocytes: an in vitro study. Eur. J. Pharmacol, 2006; 576: 160.
25. Pathak N, Khandlewal S. Role of oxidative stress and apoptosis in cadmium induced thymic atropy and splenomegaly in mice. Toxicol. Lett., 2007; 169: 95.
26. Teuscher E. Pepper. Medicinal Spices; GmbH Scientific Publishers; Stuttgart, Germany, 2006: 290-302.
27. Lim CM, Ee GCL, Rahmani M, Bong CFJ. Alkaloids from Piper nigrum and Piper betle. Pertanika. J. Sci. Technol, 2009; 17: 149-154.
28. Hussain A, Naz S, Nazir H, Shinwari ZK. Tissue culture of Black pepper (Piper nigrum L.) in Pakistan. Pak. J. Bot., 2011; 43: 1069-1078.
29. Amazing benefits of Black Pepper. https://www.organicfacts.net/health-benefits/herbs-and-spices/health-benefits-of-black-pepper.html