PIPER NIGRUM L. (BLACK PEPPER) “INCREDIBLE SOURCE OF REMEDIES”

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Abstract: Black pepper is a very rich source of a wide variety of chemical elements, the majority of which are biologically active. Pepper has been used as a spice since ancient times, and it has also been utilized in numerous traditional medical remedies. The plant Piper nigrum longum has several pharmacologically and medicinally relevant components that are used in Ayurvedic medicine. This plant has significant economic and commercial value. The globe uses the black pepper fruits (Piper nigrum L.), which are considered the king of spices. This spice has been used traditionally to cure a variety of illnesses and has various health advantages. Black pepper's chemically include vitamins, minerals, carotenoids, and flavonoids, as well as a variety of biological, pharmacological, and therapeutic properties. Additionally, piperine has a wide range of therapeutic applications, including the improvement of memory, lung disease, hepatic joint discomfort, and digestion.

Keywords: Piper nigrum, Carminative, Immunomodulatory, Anti-mutagenic, Anti-cancer, Piperamide

INTRODUCTION

Piper nigrum is an unique medicinal plant, is a member of the Piperaceae Among all the species, it is one it is one of the most widely used and regarded as the king of spices. Many tropical countries, including Brazil, Indonesia, Malaysia, Thailand, Madagascar, West Africa and India grow black pepper [1]. Common names for Piper nigrum include Milagu in Tamil, Pippali in Sanskrit, Kali mirch in Urdu and Hindi and peppercorn, white, green and black pepper, Madagascar pepper in English. This seems to be most widely recognized and most commonly used spice globally. Black pepper has applications as fragrance, as a preservative and as a medicinal ingredient. Whole Piper nigrum peppercorns or their active ingredients are utilized in a variety of dishes and medications [2]. The tropical vine referred to as black pepper can attain heights of 4 to 9 meters but only with the help of surroundings trees. The leaves are thick, roughly leathery, glabrous, simple, whole, oval in shape and measure 10-15cm in length and 5-9cm in width [3]. Numerous pharmacological activities are associated with Piper nigrum including antihypertensive and anti-platelet properties, antioxidant, anti-tumor, anti-asthmatic, and antipyretic, analgesic, anti-inflammatory, anti-diarrheal, anti-spasmodic, anxiolytic, hepatoprotective, immunomodulatory, antibacterial, antifungal, anti-thyroid, anti-mutagenic, antispermatic, insecticidal and larvicidal properties [4-6].

CHEMICAL COMPOSITION

The first pharmacologically active substance to be identified from various Piperaceae family members was Piper, Numerous researchers separated a wide range of chemicals including lignans, neolignans, terpenes, chalcones, phenolics, flavonoids, alkaloids, amides and steroids [7]. Minerals, vitamins and bioactive metabolites in close proximity. Black pepper is high in nutrients, vitamins, and minerals. Brachyamide B, Dihydro-pipericidc, N-trans-Feruloyltryamine, (2E,4E)-N-Eicosadienoylpereridine, N-Formylpiperidine, Guineensine, and pentadienoyl as piperidine are a few of the chemicals. (2E, 4E)The following: isobutyl-decadienamide, isobutyl-eicosadienamide, piperamide, piperamine, piperetidine, piperidine, piperine, pipеролеин B, sarmente, sarmentosine, and retrofractamide [8]. These minerals are necessary components for human daily activities. Moreover, there is a notable concentration of vitamins in black pepper. These phytochemicals' presence was linked to a variety of reported pharmacological actions. Four isomers of piperine have been identified: isopiperine, iso-chavicine, chavicine, and piperine. Out of all the chemicals that have been identified from Piper nigrum. Different pharmacological actions were reported for piperine, pipene, piperamide, and piperamine [9].

TAXONOMICAL CLASSIFICATION AND NUTRITIONAL COMPOSITION OF PIPER NIGRUM L.[10-14]

<table>
<thead>
<tr>
<th>NUTRITION</th>
<th>COMPOSITION</th>
</tr>
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<tbody>
<tr>
<td>Carbohydrate</td>
<td>31(g)</td>
</tr>
<tr>
<td>Fat</td>
<td>4.3(g)</td>
</tr>
<tr>
<td>Nutrient</td>
<td>Amount</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Sodium</td>
<td>61.6(mg)</td>
</tr>
<tr>
<td>Protein</td>
<td>9.3(mg)</td>
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<tr>
<td>Calcium</td>
<td>117.5(mg)</td>
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<tr>
<td>Magnesium</td>
<td>196.8(mg)</td>
</tr>
<tr>
<td>Potassium</td>
<td>111.6(mg)</td>
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<tr>
<td>Phosphorous</td>
<td>1.6(mg)</td>
</tr>
<tr>
<td>Iron</td>
<td>8.5(mg)</td>
</tr>
<tr>
<td>Zinc</td>
<td>1.4(mg)</td>
</tr>
<tr>
<td>Vitamin C</td>
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</tr>
<tr>
<td>Vitamin B1</td>
<td>0.74-0.91(mg)</td>
</tr>
<tr>
<td>Vitamin B2</td>
<td>0.48-0.61(mg)</td>
</tr>
<tr>
<td>Vitamin B3</td>
<td>0.63-0.78(mg)</td>
</tr>
<tr>
<td>Tannin</td>
<td>2.11-2.80(mg)</td>
</tr>
<tr>
<td>Flavonoids Catechin</td>
<td>410.0(µg)</td>
</tr>
<tr>
<td>Myricetin</td>
<td>56.0(µg)</td>
</tr>
<tr>
<td>Quercetin</td>
<td>13.0(µg)</td>
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<tr>
<td>Carotenoids Lutein</td>
<td>260.0(µg)</td>
</tr>
<tr>
<td>Beta-Carotene</td>
<td>150.0(µg)</td>
</tr>
</tbody>
</table>

**Kingdom : Plantae**  
**Class : Equisetopsida**  
**Sub Class: Magnoliidae**  
**Super Order : Magnolianae**  
**Order : Piperales**  
**Family : Piperaceae**  
**Genus : Piper**  
**Species : piper nigrum**

**PHARMACOLOGICAL ACTIVITIES OF PIPER NIGRUM**

**Antimicrobial Activity of Black Pepper**

An antimicrobial is a substance that either destroys or stops the growth of microorganisms. Based on their primary function these substances can be categorized into various groups, including pesticides, anti-bacterial, anti-fungal, antiviral and parasitic etc. [15]. In a new study, the antibacterial activity of Piper nigrum produced silver nanoparticles against agricultural plant disease was assessed after the extracts from the leaves and stem were used to make the nanoparticles. When it came to plant disease, these silver nanoparticles had outstanding antibacterial action [16].

**Carminative Activity**

Pepper contains a high level of stimulating and carminative qualities that result in reflex salivation, increased gastric juice output, and increased hunger. Increased gastrointestinal motility leads to gas eructation and alleviation of colic. When peppers are consumed in large enough quantities, they expand the skin's superficial vessels, producing a warm sensation that is followed by diaphoresis and a little drop in body temperature [17]. These qualities make them quite popular as condiments, particularly in warm climates. The medical ailment that causes these excruciating lumps is known as piles, and the treatment for hemorrhoids involves the usage of black pepper. By extracting the pepper with acetone and separating it from piperine an oleoresin is created [18].

**Cholesterol Lowering and Immune Enhancer Activity**

Piperine and black pepper both increase the translocation of cholesterol transporter proteins and decrease the absorption of cholesterol [19]. It helps break down larger fat molecules into simpler, more easily digested ones more quickly, improving the digestive process and preventing the body from storing fat. The human body responds immunomodulatory to black pepper [20]. In addition to drastically lowering body weight, total cholesterol, triglycerides, LDL, VLDL, and fat mass, piper nigrum supplementation with a high-fat diet (40 mg/kg) also boosted HDL levels without changing anything else. Black pepper and piperine have hypolipidemic and antiatherogenic properties that lower the incidence of artherosclerosis when consumed dietary [21].
Anti-mutagenic, Anti-Tumor and Anti-cancer Activity

The prevalence of cancer is rising worldwide in today’s healthcare system. Even with the tremendous efforts that are being made, there is still not enough new technology, medication, study, or surgery being discovered. Therefore, we must look for such systems that have few side effects and excellent treatment results. Effective immunomodulatory and anticancer activity was demonstrated by (Piper Nigrum L). Angiogenesis is essential to the development of cancer and tumors. Research reveals that piperine prevents human umbilical vein endothelial cells from proliferating and from going through the G1/S transition [22].

Anti-oxidant Activity

One significant natural antioxidant source is found in black pepper. Antioxidants’ primary function is to shield cells from free radicals, which have been linked to cancer, heart disease, and other illnesses. The chemicals known as free radicals are created when food is broken down by your body, when you are exposed to radiation or tobacco smoke, or both [23]. The significance of antioxidants in preserving the liver, kidney, and digestive system's physiological processes as well as preventing cancer and cardiovascular disorders. They have a positive impact on the effectiveness of lipid metabolism as an anti-diabetic [24].

Digestive Activity of Black Pepper

Dietary piper nigrum speeds up the gastrointestinal tract's meal transit time and improves digestion by stimulating pancreatic enzymes. To boost the production of saliva and gastric secretions, as well as the activation of salivary amylase [25]. Oral consumption of piperine, also known as Piper nigrum, stimulates the liver's production of bile acids, which are essential for the absorption and digestion of lipids [26].

Antipyretic Activity

In India, pepper and concoctions containing pepper were employed in Ayurvedic, Yunani, Siddha, and traditional treatments to cure intermittent fever. Colds, sore throats, neuritis, and other ailments are treated in Pepper is said to have analgesic and antipyretic qualities since it is also utilized as an anti-periodic in malarial fever [27]. Research on the analgesic and antipyretic properties of piperine has revealed a potent antipyretic effect [28].

Antidiarrheal Effect

In addition to the antimicrobial properties already mentioned, black pepper also has antibacterial properties against certain bacteria that cause diarrhea. Additional research demonstrates its remarkable effectiveness in managing diarrhea [29]. As is well known diarrhea is a major global source of illness and mortality, particularly for young people in impoverished nations. Black pepper aqueous extract exhibits strong dose-dependent anti-motility, anti-secretary, and antidiarrheal actions at 75, 150, and 300 mg/kg. Because black pepper contains alkaloids, it has this effect. It is well known that diarrhea is a major source of illness and death worldwide, particularly for children living in developing nations. Significant dose-dependent anti-motility, anti-secretary, and antidiarrheal actions are produced by an aqueous extract of black pepper at 75, 150, and 300 mg/kg. Black pepper contains alkaloids, which are responsible for this impact [30].

Immunomodulatory Activity of Black Pepper

The anticancer and immunomodulatory properties of Piper nigrum were assessed. Due to their immunomodulatory and anticancer properties, cardamom and black pepper are examples of natural substances that can support the upkeep of a robust immune system. Utilizing immunomodulation of piperine to produce cytokines, activate macrophages, and promote lymphocyte proliferation [31-32].

Other Pharmacological Activity

Many other pharmacological activities are exhibited by Piper nigrum (black pepper), or the pure compound "Piperine,” which includes antihypertensive, antiplatelet, antipyreic, antispasmodic, antifungal, anti-apoptotic, anti-mutagenic, antispermatogenic, anti-Colon toxin, anti-asthmatic, anti-anxiety, anti-thyroid, antifungal, insecticidal, and larvicidal properties [33-35].
REFERENCE


24. Meghwal, M., & Goswami, T. K. (2012). Chemical Composition, Nutritional, Medicinal And Functional Properties of Black Pepper: A Review. 1: 172. doi: 10.4172/scientificreports. 172 Page 2 of 5 Volume 1• Issue 2• 2012 for any spice and they are combinations of many compounds; in particular for black pepper major compounds responsible for the color, odor and aroma are shown in the (Table 3) which are found out from GCMS analysis [2]. It contains lignans, alkaloids, flavonoids, aromatic compounds and amides [3]. It also contains essential oil up to, 3.


