



A PHYTO PHARMACOLOGICAL REVIEW OF RASAYAN DRAVYA PIPPALI

Vishnu Vasant Medkar *, Dr. Sanjivani S. Shekokar**

Post Graduate Student, Department of Dravyuguna, Government Ayurved College, Nanded

Professor and Head of Department, Department of Dravyaguna,

Government Ayurved College, Nanded.

Abstract: Pippali (*Piper longum* Linn.), a revered medicinal herb in Ayurveda, has been widely utilized for its therapeutic properties, particularly in the treatment of respiratory and digestive disorders. This review explores the historical significance, chemical composition, and pharmacological actions of Pippali. Its potent bioactive compounds, notably piperine, enhance drug bioavailability, making Pippali a critical component in both traditional Ayurvedic formulations and modern medicine. The herb's anti-inflammatory, antimicrobial, and antioxidant properties are extensively documented, supporting its efficacy in managing chronic diseases such as asthma, bronchitis, and digestive ailments. Moreover, Pippali's role as a Rasayana herb highlights its rejuvenative and longevity-promoting effects. The review also discusses the potential for integrating Pippali into contemporary therapeutic practices, emphasizing its holistic benefits in maintaining health and vitality.

Keywords:

Pippali, *Piper longum*, Ayurveda, Rasayana, Piperine, Bioavailability enhancer, Respiratory health, Digestive disorders, Anti-inflammatory, Antimicrobial, Antioxidant, Traditional medicine, Herbal pharmacology.

Introduction

Ayurveda, the traditional system of medicine originating from India, is based on natural remedies, including herbs, minerals, and animal products. It emphasizes the balance of the body, mind, and spirit, using plant-based medicines to treat a variety of conditions. Among these plants, **Pippali (*Piper longum* Linn.)**, commonly known as long pepper, holds a special place. Used for centuries, Pippali is recognized for its potent medicinal properties, especially in treating respiratory and digestive ailments. Its inclusion in Ayurvedic texts, such as the **Charaka Samhita**¹ and **Sushruta Samhita**², highlights its significance in ancient healthcare. This review aims to explore the multifaceted properties of Pippali, examining its historical context in Ayurveda and its relevance in modern pharmacology. Through the synthesis of Ayurvedic texts and recent scientific research,

this review will delve into Pippali's chemical composition, pharmacological actions, and therapeutic applications, particularly in respiratory and digestive health. Furthermore, the review will address its role as a **bioenhancer** in drug absorption and its classification as a **Rasayana** (rejuvenative herb), exploring its holistic benefits in maintaining health and longevity. Lastly, the review will discuss the potential for integrating Pippali into modern therapeutic practices.

2. Historical Significance of Pippali in Ayurveda

In Ayurvedic medicine, Pippali is revered for its unique properties and its ability to balance **Kapha** and **Vata** doshas³. Classified as a **Rasayana**⁴, Pippali is used not only to treat diseases but also to promote longevity and vitality. The term "Rasayana"⁵ in Ayurveda refers to substances that rejuvenate the body, enhance immunity, and slow the aging process. Pippali's Rasayana properties are well-documented in Ayurvedic texts, and it is often recommended for its ability to strengthen the body's resistance to diseases.

Traditionally, Pippali is used in several classic Ayurvedic formulations. One of the most famous is **Trikatu**⁶, a blend of Pippali, black pepper (*Piper nigrum*), and ginger (*Zingiber officinale*). Trikatu is known for its digestive and carminative properties, stimulating **Agni**⁷ (digestive fire) and promoting the absorption of nutrients. Another well-known formulation is **Chyawanprash**, an herbal jam that contains Pippali as a key ingredient. Chyawanprash is used as a general tonic to enhance immunity and promote overall health.

Pippali's classification in Ayurvedic texts includes its **Rasa** (taste), **Guna** (quality), **Virya** (potency), **Vipaka** (post-digestive effect), and **Prabhava** (specific action). Pippali is described as having a **Madhura** (sweet) Vipaka and a **Ushna** (hot) Virya, making it particularly useful in treating disorders related to **Kapha** and **Vata** doshas⁸, such as colds, asthma, and digestive problems. Its **Yogavahi**⁹ property, or the ability to enhance the absorption of other substances, is one of the key reasons for its widespread use in Ayurvedic medicine.

3. Chemical Composition and Phytochemistry:

The bioactive components of Pippali are largely responsible for its wide range of therapeutic effects. **Piperine**¹⁰, the principal alkaloid in Pippali, is the most studied compound, known for its role in enhancing drug bioavailability. Piperine enhances the absorption of various drugs by inhibiting drug-metabolizing enzymes and enhancing gastrointestinal absorption¹¹. This property has led to its inclusion in various pharmaceutical formulations to improve the efficacy of other compounds.

In addition to piperine, Pippali contains several other bioactive compounds, including **sesamin**, **piperlonguminine**, **lignans**, and **terpenoids**¹². These compounds contribute to Pippali's anti-inflammatory, antimicrobial, and antioxidant effects. The essential oils in Pippali, which include **myristicin**, **safrole**, and **lignans**¹³, also contribute to its medicinal properties, particularly its ability to stimulate digestion and clear respiratory congestion.

Phytochemical studies have shown that Pippali is rich in **flavonoids** and **polyphenols**¹⁴, which are known for their antioxidant activity. These compounds help in neutralizing free radicals and reducing oxidative stress in the body, which is a key factor in preventing chronic diseases such as cardiovascular disease and cancer. Moreover,

piperlongumine¹⁵, another compound found in Pippali, has shown potential in inducing apoptosis in cancer cells, making it a subject of interest in cancer research.

4. Pharmacological Actions of Pippali: -

Pippali exhibits a wide range of pharmacological actions that make it a versatile medicinal herb. **Anti-inflammatory**¹⁶ and **antioxidant**¹⁷ properties are among the most significant, as they provide protection against chronic inflammation and oxidative stress, both of which are linked to various diseases, including arthritis, cardiovascular disorders, and neurodegenerative diseases.

- **Anti-inflammatory Action**¹⁸:

Studies have demonstrated that Pippali has potent anti-inflammatory effects, making it useful in treating inflammatory conditions such as arthritis. Piperine, the active compound in Pippali, has been shown to inhibit pro-inflammatory cytokines, thus reducing inflammation in the body. This action has made Pippali a popular remedy for joint pain and other inflammatory conditions in Ayurveda.

- **Antimicrobial and Antiviral Properties**¹⁹:

Pippali has demonstrated significant antimicrobial and antiviral activities, which can be attributed to its bioactive compounds. In traditional medicine, it is often used to treat infections of the respiratory and gastrointestinal tracts. Recent studies have validated these uses, showing that Pippali extracts can inhibit the growth of bacteria such as **Staphylococcus aureus** and **Escherichia coli**. Its antiviral activity has also been noted, particularly in treating common respiratory infections.

- **Digestive Stimulant and Carminative Effects:**

Pippali is widely recognized in Ayurveda for its ability to stimulate digestion. It acts as a carminative, reducing gas formation in the intestines and relieving bloating. Pippali's ability to stimulate the secretion of digestive enzymes and bile helps in improving digestion and nutrient absorption. Its role in treating indigestion, flatulence, and other gastrointestinal disorders is well-established both in Ayurvedic practice and modern research ²⁰.

- **Immunomodulatory Action**²¹:

Pippali's **immunomodulatory** effects make it an important herb in Ayurvedic formulations aimed at boosting the immune system. Studies have shown that Pippali can enhance the activity of immune cells, including **macrophages** and **natural killer cells**, which play a crucial role in defending the body against infections .

5. Therapeutic Uses of Pippali in Respiratory Disorders

One of the most notable applications of **Pippali** in Ayurvedic medicine is its role in treating respiratory disorders.

Ayurvedic Perspective on Respiratory Disorders

In Ayurveda, diseases of the respiratory system are primarily associated with imbalances in the **Kapha** and **Vata** doshas. Pippali, being **Ushna (hot)** in nature and possessing **Kaphahara** (Kapha-reducing) properties, is frequently employed to treat conditions such as asthma, chronic bronchitis, and the common cold. Its use is especially prominent in disorders of the **Pranavaha Srotas** (respiratory channels), where congestion, mucus accumulation, and breathlessness are primary symptoms²².

Pippali is a key ingredient in several well-known Ayurvedic formulations for respiratory disorders, including:

- **Sitopaladi Churna**: A powder formulation used for coughs and colds.
- **Talisadi Churna**: Another Ayurvedic preparation that is particularly effective for coughs and chronic bronchitis.
- **Chyawanprash**: A popular Ayurvedic tonic known for enhancing immunity and respiratory health.

Scientific Studies on Pippali's Efficacy in Respiratory Health

Modern pharmacological research has provided evidence supporting the traditional use of Pippali in treating respiratory diseases. Clinical studies have demonstrated Pippali's effectiveness in conditions such as asthma, chronic obstructive pulmonary disease (COPD), and bronchitis.

1. Anti-asthmatic Effects²³:

In a study conducted on patients with asthma, Pippali was found to significantly reduce the frequency and severity of asthma attacks. The active ingredient, **piperine**, was shown to relax the bronchial muscles, thus helping in the management of asthma symptoms. This aligns with its traditional use in Ayurveda for treating **Tamaka Shwasa** (bronchial asthma).

2. Expectorant and Mucolytic Properties²⁴:

Pippali has a mild **expectorant** effect, aiding in the expulsion of phlegm from the lungs. This is particularly beneficial in cases of chronic bronchitis, where mucus buildup is a major issue. Pippali's mucolytic properties help in breaking down the mucus, making it easier to expel, thus alleviating the symptoms of congestion and breathlessness.

3. Effect on Chronic Cough:

Pippali has been used for centuries in Ayurveda to treat chronic coughs. Clinical trials have shown that

Pippali's anti-inflammatory and mucolytic effects help reduce irritation in the respiratory tract, leading to relief from chronic coughs, including those associated with tuberculosis²⁵. This makes it a versatile treatment option for both acute and chronic respiratory conditions.

Formulations and Clinical Applications

In Ayurvedic practice, Pippali is often used in combination with other herbs to enhance its efficacy. As part of **Sitopaladi Churna**, Pippali works synergistically with ingredients such as **Vamsa Lochana** (bamboo silica) and **Ela** (cardamom) to treat both dry and productive coughs. In **Talisadi Churna**, Pippali is combined with **Talisapatra** (*Abies webbiana*) to treat respiratory infections. The combination of Pippali with other herbs not only enhances its respiratory benefits but also helps to balance its hot nature, making it more suitable for long-term use.

Recent clinical trials on **Chyawanprash**, which contains Pippali as a key ingredient, have further validated its role in boosting immunity and respiratory function, especially in children and the elderly²⁶(16). Chyawanprash is widely used to prevent respiratory infections, improve lung function, and enhance general immunity.

Summary of Respiratory Benefits

Pippali's wide-ranging effects on the respiratory system—anti-asthmatic, mucolytic, expectorant, and anti-inflammatory—have been validated through both traditional use and modern research. Its incorporation into numerous Ayurvedic formulations for respiratory health demonstrates its versatility and effectiveness. Future research on its role in treating modern respiratory conditions, such as COPD and allergic rhinitis, may further expand its therapeutic potential.

6. Pippali as a Bioavailability Enhancer

One of the most remarkable aspects of Pippali is its ability to enhance the bioavailability of other drugs. This property, termed **Yogavahi** in Ayurveda, is attributed to **piperine**, the primary alkaloid found in Pippali. Piperine enhances the absorption and efficacy of various therapeutic compounds, making Pippali a key component in formulations that require enhanced absorption for maximum therapeutic effect.

Mechanism of Bioenhancement

Piperine has been extensively studied for its ability to improve the bioavailability of both herbal and pharmaceutical compounds. It achieves this through several mechanisms:

- **Inhibition of Drug Metabolizing Enzymes:** Piperine inhibits **cytochrome P450** enzymes, which are responsible for the metabolism of many drugs in the liver. By slowing down the metabolism of these drugs, piperine increases their bioavailability and prolongs their activity in the body²⁷.
- **Enhanced Gastrointestinal Absorption:** Piperine stimulates the production of digestive enzymes and enhances the permeability of the intestinal wall, allowing for greater absorption of nutrients and therapeutic compounds. This makes Pippali an excellent adjunct in formulations that require optimal absorption, such as those used for treating malabsorption syndromes²⁸.

- **Inhibition of Multidrug Resistance Proteins:** Piperine has been shown to inhibit certain drug transport proteins, such as **P-glycoprotein**, which pump drugs out of cells. By inhibiting these proteins, piperine increases the concentration of drugs within cells, enhancing their efficacy ²⁹.

Research Supporting Piperine's Bioenhancing Properties

Several studies have demonstrated the bioenhancing effects of piperine. For example, research has shown that piperine significantly increases the absorption of **curcumin**, the active compound in turmeric (*Curcuma longa*). Curcumin has poor bioavailability on its own, but when combined with piperine, its absorption increases by 2000%, making the combination highly effective in anti-inflammatory and antioxidant therapies ³⁰.

Another notable example is piperine's effect on the bioavailability of **resveratrol**, a polyphenolic compound found in grapes. Resveratrol has numerous health benefits, including anti-aging and cardiovascular protective effects, but its poor bioavailability limits its therapeutic use. Studies have shown that piperine enhances the bioavailability of resveratrol, making it more effective in clinical applications ³¹.

Applications in Modern Drug Formulations

Pippali's bioenhancing properties have led to its inclusion in both traditional and modern medicinal formulations. In Ayurvedic medicine, Pippali is frequently used in combination with other herbs to improve their absorption and efficacy. This is particularly important in Rasayana formulations, where enhanced absorption is critical for achieving the desired rejuvenative effects.

In modern medicine, piperine is increasingly being incorporated into drug formulations to improve the pharmacokinetics of poorly absorbed drugs. For example, pharmaceutical companies are exploring the use of piperine as an adjuvant in cancer therapies, where it can enhance the absorption and efficacy of chemotherapeutic agents ³².

The potential for piperine to enhance the bioavailability of various therapeutic compounds presents an exciting avenue for future research, particularly in the development of more effective drug delivery systems.

7. Pippali as a Rasayana (Rejuvenative Herb)

In Ayurveda, **Rasayana** therapy is considered one of the most important treatments for promoting longevity, vitality, and overall well-being. Rasayana herbs are believed to rejuvenate the body, enhance immunity, and slow down the aging process. Pippali is classified as a **Rasayana** herb due to its ability to promote health, increase vitality, and enhance the body's resistance to diseases.

Ayurvedic Concepts:**Table 1: Name of the *samhitha Gana/varga* ^{33,34,35,36}**

Sl no	Samhita	Gana/varga
1	Charaka Samhita	Shirovirechan, Vamana, Dipaniya, Kanthya, Truptighna, Asthapanopaga, Shirovirechanopag, Hikkanigrahana, Kasahara, Shoolaprashamana
2	Sushutra Samhita	PippalyadiGana, Trikatu, Urdhwabhagahara, Shirovirechana.Amalakyadi varga
3	Astang Sangraha	Shirovirechan, Vamana, Dipaniya, Kanthya, Truptighna, Asthapanopaga, Shirovirechanopaga, Hikkanigrahana, Kasahara, Shoolaprashmana, Sheetashamana, Pippalyadi Gana.
4	Astang Hridaya	Vamanopayogi Dravya, Vatsakadi Gana

Table 2: Name of *Nighantu and Varga* :³⁷⁻⁴¹

1	Dhanvatari Nighantu	Shatapushpadi varga
2	Shodhala Nighantu	Shatapushpadi Varga
3	Hridaya Dipaka Nighantu	Catuspada Varga
4	Madanapala Nighantu	Shunthyadi Varga
5	Raja Nighantu	Pippalyadi Varga
6	Bhavaprakasha Nighantu	Haritakyadi Varga
7	Saraswati Nighantu	Chandanadi Varga
8	Nighantu Adarsha	Pippalyadi Varga
9	Shaligrama Nighantu	Haritakyadi Varga
10	Priya Nighantu	Pippalyadi Varga
11	Guna Ratnamala	Haritakyadi Varga
12	Yadavji Trikamaji Acharya	Pippalyadi Varga

Table no 3: Vernacular names⁴²⁻⁴³

Sl.no	Language	Vernacular names
1	Sanskrit	Pippali, Magadhi, Kana, Usana, etc.
2	English	Indian long pepper, Long pepper
3	Hindi	Pipal, Pipli,

4	Gujarati	Lindipipal, Pipli
5	Marathi	Pimpli
6	Bengali	Pipul, Pipli
7	Sindhi	Tippali
8	Malyalam	Pimpli, Tippali, Magadhi, Lada, Mulagu,
9	Punjabi	Maghs pipal, Pipal, Filfildaras, Drafilfil.
10	Telagu	Pippallu, pipili, Pippali katte.
11	Tamil	Pippili, Tippili, Kundan, tippili, Sirumulam, Pippallu.
12	Kannada	Tipili, Hipli, yippali
13	Arabian	Drafilfil.
14	Oriya	Baihehi, Krykola, Mogodha, Pippoli.
15	Persi	Filfilidray, Pipal, Filfilidaras.
16	Santhal	Ralli
17	Urdu	Pipul

Table 4: showing pharmacological properties of *ardhra pippali* ⁴⁴⁻⁵³

	<i>Ardhra Pippali</i>	CS	SS	AS	AH	DN	RN	BPN	MP N	KN
<i>Rasa</i>	<i>Madhura</i>	+	+	+	+			+		+
<i>Guna</i>	<i>Guru</i>	+	+		+			+		+
	<i>Snigdha</i>	+			+			+		+
<i>Veerya</i>	<i>sheeta</i>		+		+			+		+

Table no 5: showing pharmacological properties of *shuska pippali*

	<i>Shuska pippali</i>	CS	SS	AS	A H	DN	RN	BP N	MP N	K N
<i>Rasa</i>	<i>Katu</i>	+	+	+		+	+	+	+	+
	<i>Tikta</i>						+			
<i>Guna</i>	<i>Snigdha</i>						+	+	+	+
	<i>Nati snigdha</i>	+								
	<i>Laghu</i>								+	+
<i>Veerya</i>	<i>Ushna</i>					+				
	<i>Sheeta</i>					+				
	<i>Anushna</i>							+		
	<i>Nati snigdha</i>	+								
<i>Vipaka</i>	<i>Madhura</i>	+		+	+			+	+	+

<i>Doshagnata</i>	<i>Vata</i>					+	+	+		+
	<i>Pitta</i>					+			+	
	<i>kapha</i>	+		+	+	+	+	+	+	+

Table 6: showing different *rogagnatha* and *karma* mentionedin different ayurvedic texts ⁴⁴⁻⁵³

<i>ROGAS</i>	C	S	A	AH	DN	RN	BP	MP	KN
	S	S	S				N	N	
<i>Agnimandhya</i>	+		+	+			+		+
<i>Apasmara</i>	+								
<i>Arshas</i>	+	+	+	+			+	+	+
<i>Aruchi</i>	+	+	+	+					+
<i>Atisara</i>	+		+	+				+	
<i>Chardi</i>	+								
<i>Galaamaya</i>	+	+	+	+					
<i>Granthi</i>		+							
<i>Grahani</i>	+		+	+					
<i>Gulma</i>	+		+	+			+	+	+
<i>Hikka</i>	+	+	+	+					
<i>Hrudroga</i>	+	+	+						+
<i>Jwara</i>	+	+	+	+	+	+	+	+	+
<i>Kamala</i>	+	+	+	+					
<i>Kapha vridhhi</i>	+	+	+	+	+	+	+	+	+
<i>Kasa</i>	+	+	+	+		+	+	+	+
<i>Krimi</i>	+	+	+	+	+		+		
<i>Kshataksheena</i>	+	+	+	+	+				
<i>Kushta</i>	+	+	+	+		+	+	+	
<i>Pandu</i>	+	+	+	+					+
<i>Parshvashoola</i>	+	+	+	+					
<i>Peenasa</i>	+	+	+	+					
<i>Pleeha</i>	+	+	+	+			+		+
<i>Prameha</i>	+	+	+	+			+	+	+
<i>Rajyakshma</i>	+	+	+	+					
<i>Shopha</i>	+	+							
<i>Stanya</i>							+		
<i>Shosha</i>	+	+	+	+					
<i>Shirashula</i>	+	+	+	+					

<i>Shwitram</i>					+				
<i>Udara</i>	+	+	+	+			+		+
<i>Udavarta</i>	+	+	+	+					
<i>Vibandha</i>			+	+			+		
<i>Vatavyadhi</i>	+	+	+	+		+			
<i>Visarpa</i>	+		+	+					
<i>Vishamajwara</i>	+	+	+						
<i>Vatarakta</i>	+	+							
<i>Yonishula</i>	+	+							
<i>Yonivyapath</i>	+								
<i>Rasayana</i>	+	+	+	+	+		+	+	
<i>Krimi</i>	+	+	+	+	+		+		
<i>Trishna</i>					+				
<i>Rechana</i>			+	+			+		
<i>Shwasa</i>	+		+	+		+		+	+
<i>Raktapitta</i>			+	+					
<i>Shoola</i>	+		+	+			+	+	
<i>Medoroga</i>	+	+	+	+					

Table 7: showing *ekamoolika prayoga* ^{44,47,49,54}

<u><i>Bhesaja swarupa</i></u>	<u><i>Anupana</i></u>	<u><i>Indication</i></u>	<u><i>Reference</i></u>
<u><i>Pippali churna</i></u>	<u><i>Guda</i></u>	<i>Pandu krimi roga ajeerna aruchi</i>	<i>B.P.N haritakyadi varga 5558</i>
<u><i>Pippali churna</i></u>	<u><i>Ksheera</i></u>	<i>Pandu</i>	<i>Su utt 44/22</i>
<u><i>Pippali churna</i></u>	<u><i>Nagakesar, yasti,guda,ghrutha</i></u>	<i>Pandu</i>	<i>A .Hr.ci 16/38</i>
<u><i>Pippali churna</i></u>	<u><i>Guda, ksheera</i></u>	<i>Kasa</i>	<i>A .Hr.ci 3/166</i>
<u><i>Pippali churna</i></u>	<u><i>Madhu</i></u>	<i>Kasa jwara pleeha roga</i>	<i>Sh.sam madhyama khanda 6/8</i>
<u><i>Pippali churna</i></u>	<u><i>guda</i></u>	<i>Ajeerna</i>	<i>Sh.sam madhyama khanda7/24</i>

YOGAS^{44,45,46,47,48,49,54,55,56,57,58}

Table 8: Showing Important yogas of Pippali

Sl no	Name of the Yoga	Indication	Reference
1	Amalaka Rasayana	Rasayana	C.Chi.1.2/7
2	Brumhani Gutika	Vrishya, Bruhmana	C.Chi.2.1/27
3	Pippalyadi Ghrita	Jeernajwara, Kshaya, Kasa, Parshwa shoola	C.Chi.3/219
4	Sitopaladi Choorna	Kasa, Shwasa	C.Chi.8/103
5	Panchakola Ghrita	Udara, Gulma, Arsha	C.Chi.13/112
6	Phalarishta	Gulma, Kasa, Vibandha	C.Chi.14/155
7	Pippalyadi Yavagu	Yoni, shoola, Hrudroga	C.Chi.30/54
8	Kalyanakara lavana	Vataroga, Gulma, Ajeerna, Kasa	S.Chi.4/32
9	Tiktaka ghrita	Kushta, Vishama jwara, Arsha	S.Chi.6/12
10	Tilwaka ghrita	Udara, Gulma, Vidradhi, Unmada	S.Chi.14/7
11	Mustakadi kavala	Shirovirechana	S.Ka.17/27
12	Gutikanjana	Abhishyandha	S.Chi.14/14
13	Gomootra rasakriya	Netra roga	S.Ka.17/17
14	Mustadi yoga	Amatisara	S.Ka.40/49
15	Amruta prasha ghrita	Trishna	A.H.Chi.3/80
16	Jeevantyadi choorna	Kasa, Hikka, Jwara	A.H.Chi.3/160
17	Soorana gutika	Arsha	A.H.Chi.5/33
18	Dhanwantari ghrita	Prameha, Shwasa, Pandu	A.H.Chi.8/157
19	Dadimadhya ghrita	Hrudhya, Pandu, Gulma	A.H.Chi.15/40
20	Pippali rasayana	Shwasa, kasa	A.H.U.39/96
21	Chaturbhadrika avaleha	Kasa, shwasa	B.P.S.1/378
22	Jathiphaladi choorna	Grahani	B.P.S.4/4851
23	Samasharkara choorna	Arsha	B.P.S.5/63
24	Ashtakatvara taila	Urusthamba	B.P.S.25/3637
25	Abhayadi kwatha	Shotha	C.D.39/6
26	Ksharadi gutika	Shotha	C.D.39/2630
27	Krishnadya modaka	Shleepada	C.D.42/23
28	Nidigdikadi kwatha	Jeerna jwara	C.D.1/205
29	Chukkamtippalyadi kashaya	Phiranga	S.Y.Ka.pra./12
30	Snuhi Pippali choorna	Udara roga	S.Y.Chu.pra/58
31	Pippalyasava	Kshaya, Gulma, Udara	S.Y.aa.pra/1
32	Pulim kulambu	All 8 types of Gulma	S.Y.Le.pra/13
33	Brungalarkadi taila	Kasa, Shwasa	S.Y.Tai.pra/23
34	Pippalyaadi kwatha	Udavarta	B.R
35	Vachaadi kwatha	Gulma roga	B.R
36	Pashaanabedadi kwata	Mutrakricchra	B.R
37	Pippali khanda	Amlapitta	B.R.53/121125
38	Pippalyadyalouha	Hikka, Svasa	B.R.16/4243
39	Pippalyadi varti	Yoniroga	B.R.64/180

40	<i>Alambooshadi choorna</i>	<i>Amavata</i>	<i>B.R.29/3941</i>
41	<i>Katutrikadi kwatha</i>	<i>Kaphajvara</i>	<i>B.R.5/136</i>
42	<i>Vidangadi louha</i>	<i>Pandu</i>	<i>B.R.12/3233</i>
43	<i>Sagudakanabhaya prayoga</i>	<i>Arsha</i>	<i>B.R.9/2425</i>
44	<i>Bhunimbadi khwata</i>	<i>Kaphajwara</i>	<i>Sha.M.K.2/1819</i>
45	<i>Dashamoola khwata</i>	<i>Vatashleshma jwara</i>	<i>Sha.M.K.2/2831</i>
46	<i>Renukadi khwata</i>	<i>Hikka</i>	<i>Sha.M.K.2/8283</i>
47	<i>Shrungi choorna</i>	<i>Kasa,Jwara,Chardi</i>	<i>Sha.M.K.6/43</i>
48	<i>Kapittashtaka choorna</i>	<i>Grahani</i>	<i>Sha.M.K.6/5457</i>
49	<i>Triphala guggulu</i>	<i>Bhagandara,Gulma</i>	<i>Sha.M.K.7/8283</i>
51	<i>Changeri ghruta</i>	<i>Atisara,Grahani</i>	<i>Sha.M.K.9/2124</i>

The concept of Rasayana is deeply rooted in Ayurvedic philosophy, where it is believed that certain herbs and therapies can enhance **Ojas**, the vital essence responsible for health, immunity, and longevity. Rasayana therapy is not just about curing diseases but about preventing them and promoting overall wellness. Herbs like Pippali are considered Rasayanas because they help in maintaining the balance of the doshas and improving the function of the **Dhatus** (tissues) ⁵⁹.

Pippali's rejuvenative properties are attributed to its ability to enhance digestion and metabolism, which in turn improves the nourishment of tissues and promotes vitality. It is particularly effective in rejuvenating the respiratory and digestive systems, which are key to maintaining overall health and longevity⁶⁰.

Discussion:

Pippali's role as a bioavailability enhancer is one of its most valuable properties, making it an indispensable part of both traditional Ayurvedic formulations and modern therapeutic regimens. By enhancing the absorption and efficacy of other drugs, Pippali not only improves therapeutic outcomes but also reduces the required dosage of drugs, potentially minimizing side effects. Future research into the application of piperine in pharmaceutical formulations may lead to new treatments for conditions where drug bioavailability is a limiting factor.

Conclusion:

Pippali is unique rasayan drug used for improving the respiratory functions, bioenhancement, bioavailability enhancer, rejuvenator, mucolyte, anti-asthmatic, deepen,Rochana Dravya & is used as adya chikitsa in various disorders.

Ref:

1. Acharya Vidyadhar Shukla and Dr Ravidutta Tripathi, CharakSamhita of Agnivesa, Chaukhambha Sanskrit Pratishthan, Delhi, Reprint edition 2017, Part I, page no. 96.
2. Kaviraj Ambikadutta Shastri, SushrutSamhita of Maharshi Sushruta, Chaukhambha Sanskrit Sansthan, Varanasi, part I, Sutrasthana, Reprint edition 2022, page no. 205.
3. Lad V. Textbook of Ayurveda: Fundamental Principles. 1st ed. Albuquerque: The Ayurvedic Press; 2002.
4. Sharma A, Singh P. Pippali (Piper longum) as a Rasayana: Its therapeutic applications and potential benefits for longevity and vitality. *J Ayurveda Integr Med.* 2019;10(3):214-220.
5. Sharma A, Singh P. Pippali (Piper longum) as a Rasayana: Its therapeutic applications and potential benefits for longevity and vitality. *J Ayurveda Integr Med.* 2019;10(3):219
6. Kumar A, Sharma R. Trikatu: A traditional herbal formulation of Pippali, black pepper, and ginger with potential health benefits. *Ayurvedic Herb J.* 2021;15(2):101-110.
7. Kumar A, Sharma R. Trikatu: A traditional herbal formulation of Pippali, black pepper, and ginger with potential health benefits. *Ayurvedic Herb J.* 2021;15(2):105.
8. Singh S, Priyadarshi A, Singh B, Sharma P. Pharmacognostical and phytochemical analysis of Pippali (Piper longum Linn.). *The Pharma Innovation Journal*, 2018; 7(6): 286-9.
9. Patel M, Joshi S. The Yogavahi property of Ayurvedic herbs: Enhancing absorption and efficacy in herbal medicine. *Indian J Tradit Knowl.* 2020;19(1):55-62.
10. Sharma V, Gupta S. Piperine: A review on its pharmacological properties and its role in enhancing drug bioavailability. *Phytomedicine.* 2019;15(6):225-230.
11. Sharma P, Gupta M. Role of piperine in improving bioavailability and efficacy of drugs: A review. *World J Pharm Sci.* 2019;7(6):67-76
12. Jain S, Verma S. Therapeutic potential of bioactive constituents from Piper longum Linn. *Nat Prod Res.* 2022;36(12):1825-1835.
13. Kapoor M, Singh B. The bioactive potential of essential oils from Piper longum: Myristicin, safrole, and their therapeutic applications. *Pharmacognosy Rev.* 2021;15(30):88-95.
14. Sharma R, Kumar A. Phytochemical analysis of Piper longum: Richness in flavonoids and polyphenols. *Asian Pac J Trop Biomed.* 2021;11(5):231-239.
15. Das S, Ghosh S. Piperlongumine: A promising compound for cancer therapy through induction of apoptosis. *Cancer Lett.* 2022;522:123-132.
16. Kumar S, Verma R. Pharmacological actions of Piper longum: A comprehensive review on its anti-inflammatory effects. *J Ethnopharmacol.* 2021;267:113611.
17. Singh P, Sharma V. The antioxidant potential of medicinal herbs: Implications for health and chronic disease prevention. *Free Radic Res.* 2020;54(10):805-819.
18. Sharma A, Patel S. Anti-inflammatory properties of Piper longum: Mechanisms and therapeutic applications. *J Ayurvedic Herb Med.* 2021;10(3):115-120.
19. Kumar A, Singh R. Antimicrobial activity of Piper longum extracts against common bacterial pathogens. *Indian J Pharm Sci.* 2021;83(4):663-670.
20. Yadav R, Kumar S. Impact of Piper longum on digestive enzyme secretion and nutrient absorption: Evidence from clinical studies. *Indian J Gastroenterol.* 2020;39(6):631-638.
21. Kumar R, Singh A. Immunomodulatory properties of Piper longum: A review of its therapeutic potential in enhancing immune responses. *Phytomedicine.* 2021;80:153388.

22. Sharma N, Gupta R. Ayurvedic perspective on respiratory disorders: The role of dosha imbalances in disease pathology. *J Ayurvedic Integr Med.* 2021;12(4):405-410.
23. Singh J, Yadav A. Ayurvedic management of Tamaka Shwasa (bronchial asthma) with Piper longum: A review. *Ayurvedic Med J.* 2020;13(2):200-207.
24. Verma S, Gupta A. Expectorant and mucolytic effects of Piper longum in respiratory disorders: A clinical study. *J Ethnopharmacol.* 2021;269:113665.
25. Yadav R, Patel M. Mucolytic activity of Piper longum in chronic cough and tuberculosis: A review of clinical findings. *Indian J Chest Dis Allied Sci.* 2020;62(1):45-51.
26. Singh P, Kumar S. Efficacy of Chyawanprash in improving health outcomes in vulnerable populations: A systematic review. *Curr Nutr Food Sci.* 2020;16(4):411-418.
27. Kumar R, Singh S. Enhancing drug bioavailability with piperine: A review of pharmacokinetic implications. *Pharmacol Res.* 2022;176:105907.
28. Kumar A, Sharma R. Role of piperine in enhancing digestive enzyme production and gastrointestinal absorption. *J Nutr Biochem.* 2021;89:108547.
29. Yadav R, Patel M. The pharmacological significance of piperine in overcoming drug resistance: Implications for cancer therapy. *Evid Based Complement Alternat Med.* 2020;2020:9183471
30. Gupta S, Verma P. Effects of piperine on multidrug resistance: Enhanced intracellular drug concentration and therapeutic efficacy. *J Drug Target.* 2022;30(8):843-851.
31. Singh P, Patel M. The synergistic effects of curcumin and piperine in reducing inflammation and oxidative stress: A systematic review. *Evid Based Complement Alternat Med.* 2020;2020:4389154.
32. Nath R, et al. Piperlongumine and its anticancer potential: A review of the evidence. *Cancer Res J.* 2019.
33. Agnivesa, Charaka Samhita (revised by Charaka and Dridhabala) with commentary of Chakrapanidatta, Edited by Vaidya Acharya Yadavaji Trikamji, 5th ed, Varanasi: Chaukambha Sanskrit Sansthan 2001, Tpg: 738.
34. Susruta, Susruta Samhita, Vol I (Edited with Ayurveda Tattva Sandipika) by Shastri Kaviraja Ambikadutta, 12th ed. Varanasi: Chaukhamba Sanskrit Sansthan 2001, Tpg:879.
35. Vagbhatacharya, Ashtanga Hridayam with Sarvangasundhara of Arunadutta and Ayurved Rasayana of Hemadri, collated by Dr. Anna Moreshwar Kunte and 28. Krishna Ramachandra Shastri Navre, Reprint, New Delhi, Rashtriya Sanskrit Sansthan, 2002 Tpg:956.
36. Vagbhatacharya, Ashtanga Samgraha, Translated by Prof.K.R.Shrikanta Murthy, Vol I 2nd Edition, Varanasi, Chaukhamba Orientalia, 1998, Tpg:631.
37. Ojo Jharkande, Umaphathi, Dhanwantari Nighantu, Reprint, Varanasi, Chaukhamba Surabharathi Prakashan, 2004, Tpg:393.
38. Narahari Pandit, Raja Nighantu, edited with Dravyaguna prakashika by Dr. Indradio Tripathi, Introduction by Acharya Vishwanath Dwivedhi, 2nd edition Varanasi, Krishnadas Academy, Oriental Publishers and Distribution. 1998 Tpg:703.
39. Sharma.P.V, Guru Prasad Sharma, Kaiyadeva Nighantu (Pathya apathya vibhodhakar) 1st Edition, Varanasi, Chaukhamba Orientalia, and 1979 Tpg: 696.
40. Vaidya G Bapalal, Nighantu Adarsha, 3rd Edition, Varanasi, Chaukhamba Bharathi Academy, 2002 Tpg:919.
41. Vaidya Prasad Ram Gangavishnu Shrikrishnadas, Madanapala Nighantu, Mumbai, Lakshmi Venkateshwara Steam Press Kalyana Publications, 1954, Tpg:135.

42. Ayurvedic Pharmacopoeia of India, Vol-IV, Ministry of Health and Family Welfare, SGovt of India, 1st Edition, Dept of Indian Science of Medicine and Homeopathy, New Delhi, Controller of Publication Civil Lines, Reprint 2001, Tpg:397.
43. Sharma.P.V., Nama Rupa Vijnanam, 1st Edition, Varanasi, Sathya Priya Prakashan 2000 Tpg:213
44. Bhavamishra, Bhavaprakasa Nighantu, commentary and edited by Dr. Chunekar K.C, Dr.Pandey G.S, and Varanasi: Chaukambha Sanskrit Sansthan Reprint 2004, T pg: 984,pg- 15.
45. Agnivesa, Charaka Samhita (revised by Charaka and Dridhabala) with commentary of Chakrapanidatta, Edited by Vaidya Acharya Yadavaji Trikamji, 5th ed, Varanasi: Chaukambha Sanskrit Sansthan 2001, Tpg: 738.
46. Susruta, Susruta Samhita, Vol I (Edited with Ayurveda Tattva Sandipika) by Shastri Kaviraja Ambikadutta, 12th ed. Varanasi: Chaukhamba Sanskrit Sansthan 2001, Tpg:879.
47. Vagbhatacharya, Ashtanga Hridayam with Sarvangasundhara of Arunadutta and Ayurved Rasayana of Hemadri, collated by Dr. Anna Moreshwar Kunte and 28. Krishna Ramachandra Shastri Navre, Reprint, New Delhi, Rashtriya Sanskrit Sansthan, 2002 Tpg:956.
48. Vagbhatacharya, Ashtanga Samgraha, Translated by Prof.K.R.Shrikanta Murthy, Vol I 2nd Edition, Varanasi, Chaukhamba Orientalia, 1998, Tpg:631.
49. Ojo Jharkande, Umapathi, Dhanwantari Nighantu, Reprint, Varanasi, Chaukhamba Surabharathi Prakashan, 2004, Tpg:393.
50. Narahari Pandit, Raja Nighantu, edited with Dravyaguna prakashika by Dr. Indradio Tripathi, Introduction by Acharya Vishwanath Dwivedhi, 2nd edition Varanasi, Krishnadas Academy, Oriental Publishers and Distribution. 1998 Tpg:703.
51. Sharma.P.V, Guru Prasad Sharma, Kaiyadeva Nighantu (Pathya apathya vibhodhakar) 1st Edition, Varanasi, Chaukhamba Orientalia, and 1979 Tpg: 696.
52. Vaidya G Bapalal, Nighantu Adarsha, 3rd Edition, Varanasi, Chaukhamba Bharathi Academy, 2002 Tpg:919.
53. Vaidya Prasad Ram Gangavishnu Shrikrishnadas, Madanapala Nighantu, Mumbai, Lakshmi Venkateshwara Steam Press Kalyana Publications, 1954, Tpg:135.
54. Pandit Sharangadharacharya Sharangadhara Samhita-With the commentary Adhamalla's Dipika and Kasirama's Gudhartha Dipika Vyakyakara- Dr. Bramhananda Tripathi Varanasi, Chaukhamba Orientalia, edition-2006 TPg- 398
55. Chakrapanidatta, Chakradutta with Bhavartha Sandeepini Hindi commentary 5th edition, Choukamba Sanskrit series office, Varanasi. 1983.
56. Sen Govindaraj Kaviraj, Bhaishajya Ratnavali, Edited by Siddhiprada Hindi Commentary by Prof Siddhinandan Mishra 1st Edition, Varanasi, Chaukhamba Surabharathi Prakashan, 2005, Tpg:1196
57. Vaidya Shri Lakshmi pathi Shastri Yogaratnakara, Vidyotini Hindi Tika, 2nd edition Varanasi, Chaukhamba Samskrita Sirija 1973, Tpg:503.
58. Pandey Dr Vivekanand, mishra, Sahasrayoga. Kendriya Ayurveda evam Siddha anusandhana paddati, 1990, New Delhi.

59. Mehta SK, et al. Immunomodulatory effects of Pippali: Enhancing immune system function. J Ayurveda Res. 2017.
60. 1. Gandhi A, Ajay A, Hegde PL. Pippali Vardhamana - A comprehensive review [Internet]. Unique Journal of Ayurvedic and Herbal Medicines. Available from: https://www.researchgate.net/publication/363348522_PIPPALI_VARDHAMANA_-_A_COMPREHENSIVE_REVIEW

